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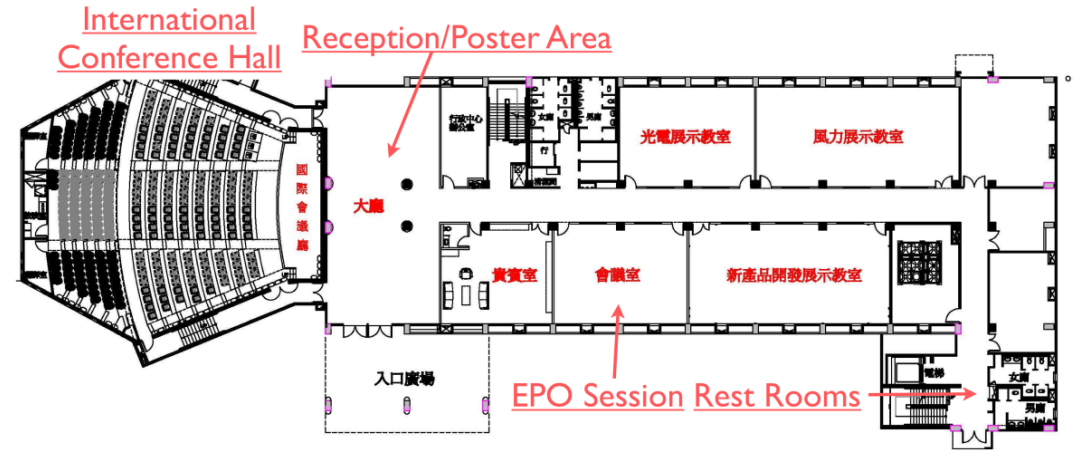
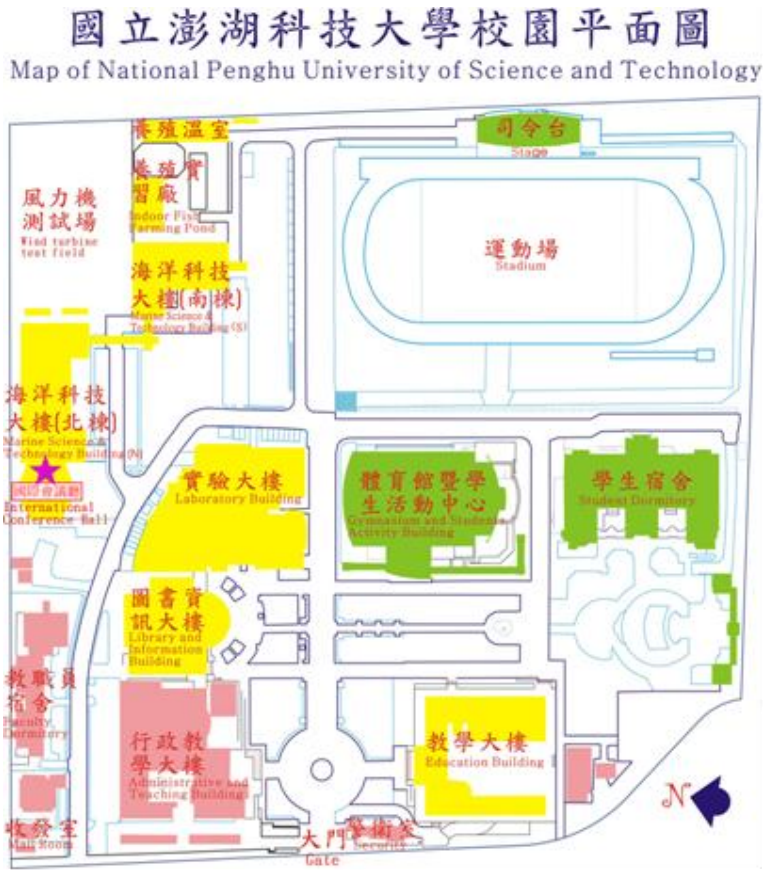
General Information
會議資訊

1. 年會會場 / Meeting Venue

A. 國立澎湖科技大學 海洋科技大樓北棟一樓 國際會議廳
International Conference Hall, 1F Marine Science and Technology Building (N), National Penghu University of Science and Technology (NPUST)



B. 國立澎湖科技大學 校園平面圖
NPUST Campus Map



C. 國立澎湖科技大學位置
Location of the NPUST

3. 會員大會 / General Assembly

A) 理事長會務報告 (Business Report)
B) 年會最佳壁報論文獎頒獎 (Best Poster Awards)
C) 最佳壁報論文獎獲獎人三分鐘報告 (3-minute presentation from each awardee)

4. 會場無線網路 / On-Site Wireless Internet Access

請洽會場工作人員/Please contact the LOC on-site.

5. 會議相關活動 / Off-Site Events

A) 團體參訪 Local Tour (May 25th, Saturday 13:30-19:00)
行程 A -- 環島知性之旅; Excursion A -- travel around the Penghu island
行程 B -- 海洋牧場; Excursion B -- Offshore rangeland

B) 大會晚宴 Banquet (May 25th, Saturday 19:00-21:00)
阿東餐廳 (A-Dong Restaurant): 澎湖縣馬公市新店路6巷6號 (電話: 06-9260203)

C) 其他澎湖相關旅遊訊息

花火節預定於4月18日至6月24日每週一及週四晚間盛大登場，開幕表演活動於晚間7時30分展開，其餘場次於晚間8時開始，煙火則於9時至9時15分施放（開幕煙火自9時至9時20分

澎湖逍遙遊: http://tour.penghu.gov.tw/
澎湖國家風景區: http://www.penghu-nsa.gov.tw/

6. 廠商展示 / Vendors

A) 桂林圖書股份有限公司 / Kweilin Books
台北市重慶南路一段61號7樓716室 電話: (02) 2311-6451

Program
會議議程

Day 1 (May 24, Friday)			第一天（5月24日, 星期五） **Venue /地點：NPU/國立澎湖科技大學**
12:30 – 14:30	**Registration 註冊報到**		
14:30 – 14:50	**Opening remarks 大會開幕致詞** **Chair: Yi-Jehng Kuan** Welcome remark by President C. Y. Shiau (NPU) 來賓致詞：蕭泉源 校長（國立澎湖科技大學）		
14:50 – 16:30	**Scientific oral session S1 科學論文宣讀 S1** **Chair: Sebastien Foucaud** **Star Formation and Solar System**		
S1.1 (20 min) **14:50 – 15:10**	ALMA Cycle 0 Results of the Protostellar Jet HH 212	Chin-Fei Lee	ASIAA
S1.2 (15 min) **15:10 – 15:25**	Quadrupolar Outflow from the Class 0 Protostar NGC 1333 IRAS 2A	Cheng-Hung Tsai	NTHU
S1.3 (15 min) **15:25 – 15:40**	Are ”Low Luminosity Objects” Young Protostars?	Tien-Hao Hsieh	NTHU
S1.4 (20 min) **15:40 – 16:00**	Magnetic Field Structure in Turbulent Star-Forming Clouds Inferred by Near Infrared and Optical Polarization	W. P. Chen	NCU
S1.5 (15 min) **16:00 – 16:15**	The Next Generation Virgo Cluster Survey V: Discovery of a New Member of the Inner Oort Cloud	Ying-Tung Chen	NCU
S1.6 (15 min) **16:15 – 16:30**	A Systematical Method to Search for the Active Solar System Objects from the Pan-STARRs Pstamp Images	Y. C. Cheng	NCU
16:30 – 17:00	**Coffee break and poster installation 茶敘及壁報張貼**		
17:00 – 18:30	**Scientific oral session S2 科學論文宣讀 S2** **Chair: Chin-Fei Lee** **Project Reports and Stars**		
S2.1 (20 min) **17:00 – 17:20**	The Taiwan Extragalactic Astronomical Data Center	Sebastien Foucaud	NTNU
S2.2 (20 min) **17:20 – 17:40**	Current and Future Instrumentation at the Canada-France-Hawaii Telescope	Daniel Devost	CFHT
S2.3 (20 min) **17:40 – 18:00**	Status Report of the UFFO-Pathfinder	M.A. Huang	NUU
S2.4 (18 min) **18:00 – 18:18**	A Remarkable Spiral as the Swan Song of a Dying Star with a Companion	Hyosun Kim	ASIAA
S2.5 (12 min) **18:18 – 18:30**	A Photometric, Polarimetric and Spectroscopic Campaign on the Be Stars, HD 45677 and CD-49 3441, with Large Near-Infrared Excess and Peculiar Variations	Chien-De Lee	NCU
18:30 – 21:00	**Welcome reception and poster session P1 歡迎茶會及壁報欣賞 P1**		

Day 2 (May 25, Saturday)			第二天（5月25日, 星期六） **Venue /地點：NPU/國立澎湖科技大學**
09:00 – 10:00	**Plenary talk (I)　大會講演（I）（科研類）　Chair: Yi-Jehng Kuan** "Probing Strong Gravity with Accreting Black Holes" Prof. Andy Fabian (University of Cambridge)		
10:00 – 10:45	**Scientific oral session S3　科學論文宣讀 S3　Chair: Yi Chou** **Black Holes and AGNs**		
S3.1 (18 min) **10:00 – 10:18**	Investigating the Event Horizon of Supermassive Black Hole with the Greenland Telescope	Cheng-Yu Kuo	ASIAA
S3.2 (12 min) **10:18 – 10:30**	Binary Period of the Supermassive Black Holes in 3C 75	Hung-Shuo Chen	ASIAA
S3.3 (15 min) **10:30 – 10:45**	Optical Variability of type 2 AGNs Monitored with Pan-STARRS MD Survey	I-Chenn Chen	NCU
10:45 – 11:30	**Coffee break, group photo and poster session P2** **茶敘、與會來賓團體照及壁報欣賞 P2**		
11: 30 – 12:30	**Scientific oral session S4　科學論文宣讀 S4　Chair: Sheng-Yuan Liu** **Extragalactic (I)**		
S4.1 (18 min) **11:30 – 11:48**	The Most Massive Galaxies in X-ray Associated and Non-associated Groups	Chin-Wei Chen	ASIAA
S4.2 (12 min) **11:48 – 12:00**	The Physical Properties of X-ray Detected 70 μm Galaxies	Ming-Yi Lin	NTNU
S4.3 (18 min) **12:00 – 12:18**	Mid-Infrared Properties of Optically Selected Red QSOs	Anli Tsai	NCU
S4.4 (12 min) **12:18 – 12:30**	UKIDSS-UDS: UV-Luminosity Density at 1 < z < 3	Ching-Min Lo	NTNU
12:30 – 13:30	**Lunch break and poster session P3　午餐及壁報欣賞 P3**		
13:30 – 19:00	Group discussions　**分組討論/自由參訪**		
19:00 – 21:00	**Banquet　大會晚宴**		

Day 3 (May 26, Sunday)	**第三天（5月26日, 星期日）**		
	Venue /地點：NPU/國立澎湖科技大學		
09:00 – 10:00	**Plenary talk (II)　大會講演 (II) (科普類)　Chair: Wen-Ping Chen** "The Past, Present, and Future of Searching for Extraterrestrial Life" Dr. Donald Goldsmith (Interstellar Media)		
10:00 – 10:45	General Assembly, best poster awards & presentations **會員大會、頒發最佳壁報論文獎及得獎論文口頭報告** **Chairs: Yi-Jehng Kuan**		
10:45 – 11:30	**Coffee break and poster session P4　茶敘及壁報欣賞 P4**		
11:30 – 12:30	**Scientific oral session S5** **科學論文宣讀 S5**	**Education & Public Outreach session E1** **天文教育及業餘天文活動報告 E1**	
Scientific oral session S5　科學論文宣讀 S5　Chair: Yi-Nan Chin **Extragalactic (II)**			
S5.1 (18 min) **11:30 – 11:48**	PAH Formation History in Galaxies	Ji Yeon Seok	ASIAA
S5.2 (12 min) **11:48 – 12:00**	The Contribution from Circumstellar Dust to the Integrated Spectral Energy Distribution of the Large Magellanic Cloud	Mei-Chun Lin	ASIAA
S5.3 (18 min) **12:00 – 12:18**	The Evolved-Star Dust Budget in Nearby Galaxies	Sundar Srinivasan	ASIAA
S5.4 (12 min) **12:18 – 12:30**	Properties of Galaxies in Groups up to z=2 from the UKIDSS Ultra-Deep Survey	Ho Hsiao	NTNU
Education & Public Outreach session E1　天文教育及業餘天文活動報告 E1 **Chair: Hsin-Chang Chi**			
E1.1 (45 min) **11:30 – 12:15**	天地玄黃宇宙洪荒 — 談天體碰撞與人類歷史	Wen-Ping Chen	NCU
E1.2 (15 min) **12:15 – 12:30**	High Schools in Taiwan Joining the International Arena to Find Asteroids Using Pan-STARRS Data	Shih-Chao Lin	國立大里高中
12:30 – 14:00	**Lunch break and poster session P5　午餐及壁報欣賞 P5**		
14:00 – 15:30	**Scientific oral session S6** **科學論文宣讀 S6**	**Education & Public Outreach session E2** **天文教育及業餘天文活動報告 E2**	
Scientific oral session S6　科學論文宣讀 S6　Chair: Linwen Chen **Extragalactic (III) & Pulsar**			
S6.1 (18 min) **14:00 – 14:18**	Radio Galaxies: Their Dynamics and Episodic Jet Activities	Chiranjib Konar	ASIAA
S6.2 (12 min) **14:18 – 14:30**	Measuring Galaxy Environment with Spectroscopic and Photometric Redshifts	Chuan-Chin Lai	NTU
S6.3 (18 min) **14:30 – 14:48**	Evidence for a ~300 Mpc Scale Local Under-density in the Galaxy Distribution	Ryan Keenan	ASIAA

S6.4 (12 min) **14:48 – 15:00**	The Analysis of Parameter Constraints on Reionization Process	Fang-Chun Liu	ASIAA
S6.5 (15 min) **15:00 – 15:15**	Constraining the Mass-richness Relation of Galaxy Clusters Using Large Scale Clustering	Yun-Hsin Huang	NTU
S6.6 (15 min) **15:15 – 15:30**	The Study of Gamma-ray MSPs in Globular Cluster	J. H. K. Wu	NTHU

Education & Public Outreach session E2　天文教育及業餘天文活動報告 E2 **Chair: Chien-Lun Hung**			
E2.1 (15 min) **14:00 – 14:15**	天文教育與特殊教育的邂逅— 以「可觸摸式立體星座盤」進行視障學生天文教學	Kai-Hsiang Chang	私立崇光女中
E2.2 (15 min) **14:15 – 14:30**	發展非制式場域之天文科學學習模式-以「月相變化」主題導覽以為例	Chi-Feng Lin	TAM
E2.3 (15 min) **14:30 – 14:45**	How to Implement Astronomy Education: a Case Study in Taipei Elementary School	Lih-Lin Leou	北市金華國小
E2.4 (15 min) **14:45 – 15:00**	打造星光小學，點亮星希望！	Chia-Ling Hu	TAM
E2.5 (15 min) **15:00 – 15:15**	第 24 太陽週期極大值之科普教學 — 以臺北天文館自製「太陽與太空天氣」數位星象節目為例	Jim Hung	TAM
E2.6 (15 min) **15:15 – 15:30**	Taiwan Astronomy Educational Cloud Computing Organization	Yih-Cherng Yen	永光儀器

15:30 –	**Departure　賦歸**

Poster Presentation
壁報論文目錄

A. Solar System and Exoplanets

PS1	**The early results of PS1 TNO discoveries/recoveries** Hsing-Wen (Edward) Lin (National Central University), Ying-Tung Chen (National Central University), Wing-Huen Ip (National Central University), Wen Ping Chen (National Central University)
PS2	**A Comparison of the Occurrence rates of the Solar Flares with Stellar Flares from Solar-type Stars** Chi-Ju Wu (Institute of Space Science, National Central University), Wing-Huen Ip (Institute of Space Science, National Central University), Li-Ching Huang (Institute of Space Science, National Central University)
PS3	**The tails of comet C/2011 L4 PanSTARRS** Zhong-Yi Lin (Institute of Astronomy, National Central University), Wing-Huen Ip (Institute of Astronomy, National Central University)
PS4	**Polarimetric Observations on the Hot Jupiter WASP-12b** Hu, Juei-Hwa (Institute of Astronomy, National Central University), Chiang, Po-Shih (Institute of Astronomy, National Central University), Lin, Zhong-Yi (Institute of Astronomy, National Central University), Lin, H.-W. (Institute of Astronomy, National Central University), Chen, W.-P. (Institute of Astronomy, National Central University), Ip, W.-H. (Institute of Astronomy, National Central University)
PS5	**Searching a stellar flare during the transit of the exoplanets** Zhong-Yi Lin (Institute of Astronomy, National Central University), Po-Shih Chiang (Institute of Astronomy, National Central University), Juei-Hwa Hu (Institute of Astronomy, National Central University), Wing-Huen Ip (Institute of Astronomy, National Central University), Wen-Ping Chen (Institute of Astronomy, National Central University)
PS6	**Taiwan Meteor Network System at NDHU Node** LYU, MING-SYUAN (National Dong Hwa University), LYU, MING-SYUAN (National Dong Hwa University)
PS7	**Introduction to MIOSOTYS: a multiple-object, high-speed photometer for probing the trans-Neptunian population with stellar occultations** Chih-Yuan LIU (NTHUPHYS/NTHUIOA/ObsPM/LESIA), Yi-Shan WU (NTHUIOA), Hsiang-Kuang CHANG (NTHUPHYS/NTHUIOA), Alain DORESSOUNDIRAM (ObsPM/LESIA), Francoise ROQUES (ObsPM/ LESIA), I-Chun SHIH (ObsPM/GEPI), Andree FERNANDAZ (ObsPM/LESIA), Frederic DAUNY (ObsPM/ LESIA), BernardCHRISTOPHE (ObsPM/LESIA), Lucie MARQUET (ObsPM/LESIA)

B. Star Formation and Star-Forming Regions

PS8	**Gas motions around the protostar NGC 1333 IRAS 4A2** Hung-Jin Huang (ASIAA), Chin-Fei Lee (ASIAA)
PS9	**Estimating IRDC temperature with ammonia emission** Vlas Sokolov (Institute of Astronomy, National Tsing Hua University), Vivien Chen (Institute of Astronomy, National Tsing Hua University), Sheng-Yuan Liu (Institute of Astronomy & Astrophysics, Academia Sinica), Yu-Nung Su (Institute of Astronomy & Astrophysics, Academia Sinica)
PS10	**Submillimeter Molecular-Line Observations of a Prototypical Protostellar Binary IRAS 16293-2422** Yen-Chi Chen (ASIAA), Shigehisa Takakuwa (ASIAA)

PS11	**Substellar objects in the Rho Ophiuchi star-formimg region** Poshih Chiang (NCUIA), Wen-Ping Chen (NCUIA)
PS12	**Time Variability of Emission Lines for Four Active T Tauri Stars** Mei-Yin Chou (ASIAA), Michihiro Takami (ASIAA), Nadine Manset (CFHT), Tracy Beck (STScI), Tae-Soo Pyo (Subaru Telescope), Wen-Ping Chen (NCU), Neelam Panwar (NCU), Jennifer L. Karr (ASIAA), Hsien Shang (ASIAA), Hauyu Baobab Liu (ASIAA)
PS13	**Gas And Dust In The Protoplanetary Disk Around LKHa 330** I-Hsiu Li(ASIAA), Naomi Hirano(ASIAA)
PS14	**Probing the magnetic field structure in the filamentary cloud IC5146** Jia-Wei Wang (NTHU), Chakali Eswaraiah (ARIES, India), Shih-Ping Lai (NTHU), Wen-Ping Chen (NCU), Anil K. Pandey (ARIES, India)
PS15	**Modeling Magnetic Fields in Protostellar Cores Using Interferometric Polarization Measurements** Lai, Shih-Ping (National Tsing-Hua University)
PS16	**Torus-like and Outflow in the Proto-Planetary Nebula IRAS 17150-3224** Tzu-Ying Chen (NTNU/ASIAA), Chin-Fei Lee (ASIAA)
PS17	**The circumstellar disk of AB Aurigae: evidence for envelope accretion at late stages of star formation?** Ya-Wen Tang (ASIAA), Stephane Guilloteau (LAB/CNRS, France), Vincent Pietu (IRAM, France), Anne Dutrey (LAB/CNRS, France), Paul T. P. Ho (ASIAA; CfA, USA), Nagayoshi Ohashi (Subaru telescope)
PS18	**The Infall Motions in the W3(OH) Massive Star-Forming Region Traced by HCO^+** Wei-Ting Kuo (National Tsing Hua University), Vivien Chen (National Tsing Hua University)
PS19	**Orion KL: the Hot Molecular Core - from the Eye of ALMA** Yo-Ling, Chuang (National Taiwan Normal University), Yi-Jehng, Kuan (National Taiwan Normal University), Ronny, Zhao-Geisler (National Taiwan Normal University), Yu-Sen, Hsu (National Taiwan Normal University)
PS20	**Simulating the collapse of a molecular cloud** Sheng-Jun Lin (NTHU), Shih-Ping Lai (NTHU)

C. Stars and Star Clusters, Evolved Stars, and Compact Objects

PS21	**Measuring Rotational Speed by High-Dispersion Spectra of Classical Be Stars with Infrared Excess** Pei-Min Shen (Graduate Institute of Astronomy, National Central University, Taiwan), Wen-Ping Chen (Graduate Institute of Astronomy, National Central University, Taiwan), Chien-De Lee (Graduate Institute of Astronomy, National Central University, Taiwan)
PS22	**Identification of faint members in open cluster by Pan-STARRS and PPMXL data** Chung-Kai Huang (Institute of Astronomy, National Central University, Chung-Li, 32001, Taiwan), Chien-Cheng Lin (Institute of Astronomy, National Central University, Chung-Li, 32001, Taiwan), Wen-Ping Chen (Institute of Astronomy, National Central University, Chung-Li, 32001, Taiwan)
PS23	**Search for and Characterization of Open Clusters Toward the Galactic Anticenter with Pan-STARRS1** Chien-Cheng Lin (林建爭) (National Central University), Wen-Ping Chen (陳文屏) (National Central University)
PS24	**Multi-bands Light Curves of Classical Cepheids from Pan-STARRS1 3π data：Preliminary Results Based on Differential Photometry** I-Ling, Lin (Graduate Institute of Astronomy, National Central University, Jhongli City, 32001, Taiwan), Chow-Choong Ngeow (Graduate Institute of Astronomy, National Central University, Jhongli City, 32001,Taiwan)

PS25	**Spectro-imaging of the Mira variable W Hya with MIDI/VLTI** Ronny Zhao-Geisler (National Taiwan Normal University, Taipei, Taiwan and Institute of Astronomy and Astrophysics, Academia Sinica, Taipei, Taiwan), Rainer Kohler (Max-Planck-Institut fur Astronomy, Heidelberg, Germany), Andreas Quirrenbach (Zentrum fur Astronomie der Universitat Heidelberg, Heidelberg, Germany), Bruno Lopez (Laboratoire J.-L. Lagrange, Nice, France)
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PS27	**Periodogram Analysis and Space Motion of AZ Capricorni – A Low-Mass Member in the Beta Pictoris Moving Group** C. Y. Chen (陳長趯) (Dept. of Physics, National Central University, Taiwan), W. P. Chen (陳文屏) (Dept. of Physics, National Central University, Taiwan, Institute of Astronomy, National Central University, Taiwan)
PS28	**Swift X-ray Source Catalog** Kwan Lok (Li) (NTHU)
PS29	**Discovery of X-ray Pulsation from the Geminga-like Pulsar PSR J2021+4026** Kaiting Li (China Medical University), Chun-Yu Hsu (National Chung-Hsin University), Lupin Lin (China Medical University), Chin-Ping Hu (National Central University), Yi Chou (National Central University), Regina Huang (National Tsing-Hua University), Jason Wu (National Tsing-Hua University)
PS30	**Simulating x-ray emission from the Fermi Bubbles at the Galactic center** Chung-Ming Ko (Institute of Astronomy, Department of Physics and Center for Complex Systems, National Central University, Jhongli, Taiwan 320, R.O.C.), Chung-Ming Ko (Institute of Astronomy, Department of Physics and Center for Complex Systems, National Central University, Jhongli, Taiwan 320, R.O.C.)

D. Extragalactic

PS31	**A statistical study of ultraluminous X-ray sources and their host galaxies** Chun-Cheng Lin (National Tsing Hua University), A. K. H. Kong (National Tsing Hua University), Lin-Wen Chen (National Taiwan Normal University)
PS32	**Elliptical galaxies in different environments** Chen Jhen-Yu (陳振予) (Institude of Astronomy, National Central University), Hwang Chorng-Yuan (黃崇源) (Institude of Astronomy, National Central University)
PS33	**A young low-mass extremely star formation galaxy class at z < 2** Chen Fatt Lim (National Taiwan Normal University), Chen Fatt Lim (National Taiwan Normal University)
PS34	**Investigate the y-and images of merging galaxy systems** Lin Yi-Fan (National Central University), Hwang Chorng-Yuan (National Central University)
PS35	**Use the N-nearest Neighbours Method estimate the evolution of galaxy property and environment from z=0 2 with the data of UKIDSS-UDS** Kuan Chen (NTNU), Sebastien R.A. Foucaud (NTNU)
PS36	**The Relation between large scale structure and kinematic and photometric properties of galaxies.** Shou-Lun Cheng (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University)
PS37	**K-band selected galaxy luminosity function in cluster** Chi-Chun Lung (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University)

PS38	**Estimate Mass of Galaxy Clusters via Counting** Hao-Yuan Duan 段皓元 (ASIAA), Yen-Ting Lin 林彥廷 (ASIAA)
PS39	**Can MOND explain the velocity dispersion measurement in clusters of galaxies?** Chia-Jung Chuang (莊佳蓉) (Institute of Astronomy, National Central University, Jhongli, Taiwan 320, R.O.C.), Chung-Ming Ko (Institute of Astronomy, Department of Physics and Center for Complex Systems, National Central University, Jhongli, Taiwan 320, R.O.C.), Ting-Hung Peng (Institute of Astronomy, National Central University, Jhongli, Taiwan 320, R.O.C.)
PS40	**Environmental effects on the relations between star formation history and clustercentric distance in the Shapley Supercluster** Pei-Li Ho (NTNU/CWB), Lin-Wen Chen (NTNU)
PS41	**The Role of the Intra-group Medium on Group Galaxy Evolution** Zong-Xian Gao (高宗賢) (Department of Earth Sciences, National Taiwan Normal University), Lin-Wen Chen (陳林文) (Department of Earth Sciences, National Taiwan Normal University)
PS42	**NIR AO imaging and lens model for UM673** Ekaterina Koptelova (Physics Department, National Taiwan University), Tzihong Chiueh (Physics Department, National Taiwan University)
PS43	**Determining the dust composition of AGN from Spitzer-IRS Spectroscopy** Huan-Ting Peng (NTNU, ASIAA), F.Markwick-Kemper (ASIAA), Srinivasan, Sundar (ASIAA), Sebastien Foucaud (NTNU)
PS44	**The spatial distribution of AGNs in and outside of clusters.** Chia-Ju Hsu (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University)
PS45	**Investigation of the Relation Between Dust-to-Gas Ratio and Metallicity by Gamma Ray Burst Afterglow Extinction** 郭子銘 (Kuo, Tzu-Ming) (中央研究院天文及天文物理研究所／國立臺灣大學物理學系), 平下博之 (Hirashita, Hiroyuki) (中央研究院天文及天文物理研究所)

E. New Observing Facilities, Instrumentation and Spectroscopy

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PS47	**Angular and Polarization Correlations of Double-Excitation Resonances in Mg** Cheng-Liang Lu (盧政良) (Department of Physics, National Taiwan University, Taipei, Taiwan 106, Republic of China), Ju-Tang Hsiao (蕭儒棠) (Research Center for Testing and Assessment, National Academy for Educational Research, New Taipei City, Taiwan 237, R.O.C.), Hsin-Chang Chi (紀信昌) (Department of Physics, National Dong Hwa University, Hualien, Taiwan 974, R.O.C.), Keh-Ning Huang (黃克寧) (Institute of Atomic and Molecular Sciences, Academia Sinica, P.O. Box 23-166, Taipei, Taiwan 106, Republic of China)
PS48	**How to make an astronomical CCD imager?** Kinoshita Daisuke (Institute of Astronomy, National Central University), Chen Tse-Chuan (Institute of Astronomy, National Central University)
PS49	**The ALMA Project: Status and Science** Yu-Nung Su (ASIAA), ALMA-T ARC (ASIAA)
PS50	**Possible THz Single-Dish Science by Greenland Telescope** Hiroyuki Hirashita (ASIAA), Satoki Matsushita (ASIAA), Patrick M. Koch (ASIAA), GLT team (ASIAA)

PS51	**Status of Pan-STARRS data and servers in Taiwan** Jhen-Kuei Guo (Graduate Institute of Astronomy, National Central University), Wen-Ping Chen (Graduate Institute of Astronomy, National Central University), Yung-Hsin Chang (Graduate Institute of Astronomy, National Central University)
PS52	**Current Status of the Nuclear Compton Telescope (NCT)** Jeng-Lun Chiu (Institute of Astronomy, NTHU), Chien-Ying Yang (Institute of Astronomy, NTHU), Jie-Rou Shang (Institute of Astronomy, NTHU), Chao-Hsiung Tseng (Institute of Astronomy, NTHU), Hsiang-Kuang Chang (Department of Physics, NTHU), Steven E. Boggs (Space Sciences Laboratory, UC. Berkeley)

F. Education and Public Outreach

PE1	**Development of the Astronomy-themed Interdisciplinary Curriculum At Taipei First Girls' High School** Shan-Chien Yang (Taipei First Girls' High School), Yu-Mei Lin (Taipei First Girls' High School), Shih- Ping Lai (Department of Physics, National Tsing-Hua University), Albert Kong (Department of Physics, National Tsing-Hua University), Hsiang-Kuang Chang (Department of Physics, National Tsing-Hua University), Pin-Han Wu (Taipei First Girls' High School), Li-Fen Jan (Taipei First Girls' High School)

Invited Speakers
大會邀請演講講者

Royal Society Research Professor in Astronomy
Andrew Fabian
Institute of Astronomy, University of Cambridge, UK

Prof. Fabian is recognized for his exceptional contribution to astrophysics over more than four decades. He is best known for his work on black holes and on the gas found in the cores of clusters of galaxies, both of which are strong sources of X-rays. Beyond this, Professor Fabian has examined the origin of high-energy radiation throughout the Universe and contributed to many other areas of X-ray astronomy.

Prof. Fabian is the author of more than 891 peer reviewed papers in MNRAS, ApJ, Nature, etc. that have attracted more than 47,255 citations (ADS). Prof. Fabian's contribution to the broader astronomical community has been exemplary, from mentoring early career scientists to working as editor-in-chief for the journal Monthly Notices of the Royal Astronomical Society. From 2008 to 2010 he was President of the Royal Astronomical Society (RAS), representing UK astronomers and geophysicists, during a period of severe and growing financial pressure, with distinction and strong leadership. The recipient of numerous international awards and prizes, Prof. Fabian received the Order of the British Empire (OBE) in 2006 in recognition of his services to science.

Education:

- 1969 University of London (King's College); B.Sc. (1st Class Hon., Physics)
- 1972 University of London (University College); Ph.D.
- 1972 Carey Foster Research Prize (jointly), UCL
- 1988 University of Cambridge, MA, 1988

Posts held:

- Jan 1982 - present, Royal Society Research Professor in Astronomy, University of Cambridge;
- Dec 1997 - May 2012, Vice-Master Darwin College, Cambridge;
- Oct 1977 - Dec 1981 Radcliffe Fellow in Astronomy;
- 1975 - 1978 Non-stipendiary Research Fellow, Clare Hall, Cambridge;
- Oct 1975 - Sept 1977 Research Associate, Institute of Astronomy (IoA);
- Oct 1973 -Sept 1975 SRC Postdoctoral Research Fellow at above;
- Oct 1972 - Sept 1973 Postdoctoral Research Assistant, MSSL/UCL

Named Lectures:

- 1996 George Darwin Lecture, Royal Astronomical Society;
- 2000 Lindsey Lecture, Goddard Space Flight Center;
- 2011 Petrie Prize Lecturer, Canadian Astronomical Society

Fellowships, Awards, Honours:

1996 Fellow of the Royal Society;
1983 Fellow Darwin College, Cambridge;
2001 Rossi Prize, American Astronomical Society (jointly with Y Tanaka);
2006 Officer of the Order of the British Empire (OBE);
2008 Dannie Heineman Prize of the AAS and AIP
2008 - 2010 President of the Royal Astronomical Society;
2012 Gold Medal of the Royal Astronomical Society;
2012 Mohler Prize, University of Michigan

Dr. Donald Goldsmith
Interstellar Media

Education:

- Harvard College, Cambridge, MA, 1959-63: B.A. 1963
- University of California, Los Angeles: Graduate study in astronomy, 1963-64
- University of California, Berkeley, 1964-69: Ph.D. in astronomy, 1969
- University of California, Boalt Hall School of Law, 1980-83: J.D., 1983

Professional Memberships:

- American Astronomical Society; Chair, Council on Employment, 1972-74
- Astronomical Society of the Pacific; Board of Directors, 1977-1983
- American Association for the Advancement of Science (Fellow since 1999)
- International Astronomical Union

Honors:

- Award for best science book of the year from Amazon.com, for Origins: Fourteen Billion Years of Cosmic Evolution (co-written with Neil Tyson), 2004
- American Astronomical Society: Annenberg Award for lifetime achievement in astronomy education, 1995
- Astronomical Society of the Pacific: Dorothea Klumpke-Roberts Award for lifetime achievement in popularization of astronomy, 1990
- American Institute of Physics: Science Writing Award, 1986

Griffith Observer Essay Contest (popular astronomy essays): First Prize, 1983; Second Prize, 2012

Abstracts
論文摘要

Plenary Talk I: Probing Strong Gravity with Accreting Black Holes

Prof. Andrew Fabian (University of Cambridge)

The most persistent luminous objects in the Universe are accreting black holes. Much of the radiation originates from close to the black hole in the form of quasi-blackbody emission from an accretion disc and power-law continuum X-rays from a corona above the disc. Reflection of the power-law component from the disc produces characteristic signatures in terms of spectral shape and time delays which can be used as a probe of the strong gravity regime. Reflection spectra and reverberation delays will be discussed and illustrated with examples from nearby active galaxies and Galactic black hole binary systems.

Plenary Talk II: The Past, Present, and Future of Searching for Extraterrestrial Life

Dr. Donald Goldsmith (Interstellar Media)

Half a century ago, Frank Drake began the first radio searches for other civilizations that may exist in our Milky Way galaxy, and also created the famous "Drake Equation" to classify our knowledge and our ignorance of the parameters involved in this search. At the same time, Philip Morrison and Giuseppe Cocconi published the first modern discussion of this subject as a scientific endeavor. Since then, an array of new telescopes, as well as more advanced analyses, have broadened humanity's efforts in the Search for Extraterrestrial Intelligence (SETI). To date, however, no reliable evidence has appeared for any forms of intelligent life beyond Earth. I shall present the conclusions that can be drawn from fifty years of SETI, as well as plans and hopes for these attempts in the near and intermediate future. This will include a discussion of who may fund – and who should fund – the search for extraterrestrial intelligent beings, and a consideration of what might occur once reliable evidence appears that the search has succeeded.

S1.1: ALMA Cycle 0 results of the protostellar jet HH 212

Chin-Fei Lee (ASIAA)

I will present our ALMA cycle 0 results of the Protostellar Jet HH 212 in comparison to our SMA results a few years ago. In particular, I will show the proper motion of the jet.

S1.2: Quadrupolar Outflow from the Class 0 Protostar NGC 1333 IRAS 2A

Cheng-Hung Tsai (Department of Physics and Institute of Astronomy, National Tsing Hua University), Vivien Chen (Department of Physics and Institute of Astronomy, National Tsing Hua University), Chin-Fei Lee (Institute of Astronomy & Astrophysics, Academia Sinica), Naomi Hirano (Institute of Astronomy & Astrophysics, Academia Sinica), Hsien Shang (Institute of Astronomy & Astrophysics, Academia Sinica)

We have observed a quadrupolar outflow associated with the Class 0 protostar NGC 1333 IRAS 2A with the Submillimeter Array (SMA) and Berkeley-Illinois-Maryland Association (BIMA) Millimeter Array. The quadrupolar outflow consists a highly collimated east-west outflow and an extended north-south outflow in both CO (1 – 0) and CO (2 – 1) emissions. It has been suggested that this structure could be due to two independent bipolar outflows or the limb brightening of the cavity swept by a single precessing outflow. Our observations show the differences in the morphology and chemical compositions of the two outflows and favor the quadrupolar outflow scenario of two independent bipolar outflows. However, the central continuum emission is not resolved into two separated components with an angular resolution of 0.5" (110 AU) though it shows a clumpy structure with a separation of roughly 400 AU in the different studies. From our SMA observation, the shocked knots are better resolved in the east-west outflow in CO (2 – 1) and SiO (5 – 4) emissions and show a subtle wiggling structure suggesting an unresolved hypothesized proto-binary system. By studying the position distribution of knots in the wiggling structure, we can constrain binary parameters, such as binary separation and total mass. Examining these properties derived from a wiggling outflow sheds light on the possible configurations of the central source(s).

S1.3: Are " Low Luminosity Objects" Young Protostars?

Tien-Hao Hsieh (National Tsing Hua University), Shih-Ping Lai (National Tsing Hua University)

" Low Luminosity Objects" (LLOs) are faint embedded young stellar objects with internal luminosity $L_{int} < 0.2\ L_{\odot}$). The extremely low luminosity suggests that they could be either very young protostars, very low-mass protostars, or normal young stellar objects (YSOs) at the quiescent stage of episodic accretion process. The last possibility has been modeled successfully by Dunham et al. (2010) and Dunham & Vorobyov (2012) as the solution for famous " Luminosity Problem" . However, we are intrigued by the possibility of finding the youngest protostars in LLOs. We present two observations results to support that some of LLOs are indeed very young protostars. First, we observe N_2D^+ and N_2H^+ line ratio toward 12 LLOs with Arizona Radio Observatory (ARO), because N_2D^+ and N_2H^+ line ratio is particularly high in the cores right before and after the protostars form. Our results show that 9 out of 12 sources have the line ratio consistent with very young protostars. Second, we carry out Canada France Hawaii Telescope (CFHT) observations toward 20 LLOs at Ks band which probes the scattered light from the cavity wall carved by molecular outflows. Measuring the outflow opening angles by comparing to the radiative transfer model, we found that LLOs following the trend for YSOs that the outflow opening angles increases as the protostars evolve.

S1.4: Magnetic Field Structure in Turbulent Star-Forming Clouds inferred by Near Infrared and Optical Polarization

W. P. Chen (National Central University)

The magnetic field plays a pivotal role in star formation, from steering the contraction of molecular clouds to collimation of mass outflows from protostellar objects. Here we present near-infrared JHKs imaging polarization measurements to diagnose the magnetic field structure in two turbulent cloud complexes, the Carina Nebula (NGC 3372) and RCW 57A (NGC 3576), both among the brightest Galactic nebulae, with ongoing massive star formation. In the central part of the Carina Nebula, where Eta Carina with other luminous stars have carved a cavity, only moderate polarization is measured, mainly caused by the general Galactic magnetic field. In contrast, RCW 57A is associated with copious molecular clouds hence sufficient dichroic extinction, and the field shows an hour-glass geometry closely related to the cloud morphology — suggestive of field-dominated cloud contraction. We will also show a few cases where the magnetic structure in clouds is inferred by optical polarization observations.

S1.5: The Next Generation Virgo Cluster Survey V: Discovery of a New Member of the Inner Oort Cloud

Ying-Tung Chen (Institute of Astronomy, National Central University, Taiwan), JJ Kavelaars (Herzberg Institute of Astrophysics, National Research Council of Canada), Stephen Gwyn (Herzberg Institute of Astrophysics, National Research Council of Canada), Laura Ferrarese (Herzberg Institute of Astrophysics, National Research Council of Canada), Patrick Cote (Herzberg Institute of Astrophysics, National Research Council of Canada), Wing-Huen Ip (Institute of Astronomy, National Central University, Taiwan)

We report the discovery of 10NP2P31, one of only four known members of the Inner Oort Cloud (IOC), and the second most distant perihelion in the solar system. 10NP2P31 is one of 91 new Trans Neptunian Objects (TNOs) and Centaurs detected based on 76 deg^2 of the sky imaged as part of the Next Generation Virgo Cluster Survey (NGVS), a moderate ecliptic latitude survey reaching a mean limiting magnitude of 25.5 in g$'$, using MegaPrime/MegaCam at the Canada France Hawaii Telescope. XXXX has semi-major axis $a \simeq 358.5$ AU, peri-centre $q \sim 48.5$ AU and inclination $i \simeq 21.6°$. The IOC spans the dynamical boundary between the Kuiper belt and the Oort cloud; although its boundaries are not well defined, objects with semi-major axis larger than 250 AU and peri-centres beyond the 2:1 Neptune resonance are decoupled from the dynamics of the giant planets, and can therefore reasonably be assumed to belong to the IOC. Twenty years after the discovery of the first Kuiper belt object (1992 QB_1) and a A decade after the discovery of the first members of the IOC (2000 CR_{105} and Sedna) the size distribution remains relatively unconstrained, and the discovery can provide important information as to the properties of outer solar system. Given the a real coverage and depth of the NGVS, we estimate that the number of IOC members with sizes larger than 300 km ($H < 6.2$ mag) is $\simeq 11000$, while a comparison of the detection rate from the NGVS and QUEST (the survey from which Sedna was discovered) hints at a luminosity function for IOC objects with power-law slope $\alpha \simeq 0.7$.

S1.6: A systematical method to search for the active solar system objects from the Pan-STARRs Pstamp images

Y. C. Cheng (Institute of Astronomy, National Central University), W. H. Ip (Institute of Astronomy, National Central University), R. Jedicke (Institute for Astronomy, University of Hawaii)

We developed a numerical method to analyze the PanSTARRs Pstamp images on selected targets: about 380 asteroids in cometary orbits (ACOs) and 11 main belt comets (MBCs), to search for the possible activity or outgassing event. In our preliminary result, we had analyzed more than 20,000 Pstamp images by comparing the point separate function (PSF) of both background stars and our targets. We get a good detection for all the known active MBCs and will use this method for the future monitoring program on ACOs, Themis and Hilda asteroids.

S2.1: The Taiwan Extragalactic Astronomical Data Center

Sebastien Foucaud (NTNU), Yasuhiro Hashimoto (NTNU), Meng-Feng Tsai (NCU), Nicolas Kamennoff (ACSEL (France))

Founded in 2010, the Taiwan Extragalactic Astronomical Data Center (TWEA-DC) has for goal to propose access to large amount of data for the Taiwanese and International community, focusing its efforts on Extragalactic science. In continuation with individual efforts in Taiwan over the past few years, this is the first stepping-stone towards the building of a National Virtual Observatory. Making advantage of our own fast indexing algorithm (BLINK), based on a octahedral meshing of the sky coupled with a very fast kd-tree and a clever parallelization amongst available resources, TWEA-DC will propose from spring 2013 a service of " on-the-fly" matching facility, between on-site catalogs and user-based catalogs. We are also planning to offer access to raw and reducible data available from archives worldwide, allowing a friendly access to this goldmine of under-exploited information. Finally, we are developing our own specific on-line analysis tools, such as an automated photometric redshifts and SED fitting code, an automated groups and clusters finder, and a multiple-objects and arc finder. I am going to the latest status of the project, focusing on the services planned such as the matching tool, our automated photometric redshift algorithm (APz) and our automated groups and cluster finder (APFoF), and do a demonstration of our database and our indexation algorithm.

S2.2: Current and Future instrumentation at the Canada-France-Hawaii Telescope

Daniel Devost (CFHT)

The CFHT currently has three instruments running in QSO mode and one in Classical mode. I will touch on the capabilities of these instruments and give an update on the future instrumentation at CFHT. One new instrument, SITELLE, is scheduled to be delivered to CFHT at the end of the year. Another instrument which is a proof of concept is GRACES which should see first light during the summer. I will also give an update on the Dome Venting project and the Next generation CFHT.

S2.3: Status report of the UFFO-pathfinder

M.A. Huang (National United Universirt & LeCosPA, NTU)

Gamma-Ray Bursts (GRBs) are the most energetic explosions in the universe, their optical photon flux rise very quickly, typically within one minute, then fall off gradually. Hundreds of GRBs optical light curves have been measured since the first discovery of GRB in 1967. However, only a handful of measurements have been made within a minute after the gamma ray signal. Because of this drawback, the short-hard type GRBs and rapid-rising GRBs, which may account for 30% of all GRBs, remain practically unexplored. To reach sub-minute timescales, the Ultra-Fast Flash Observatory (UFFO) uses a rapidly moving mirror to redirect the optical beam instead of slewing the entire spacecraft. The first realization of this concept is UFFO-pathfinder, which is equipped with fast-response Slewing Mirror Telescope (SMT) and a UFFO Burst Alert and Trigger Telescope (UBAT). SMT has a slewing mirror to redirect optical photons into a telescope and then record them by an intensified CCD. UBAT uses coded mask to provide X-ray trigger from a GRB and provides the GRB location for SMT. UFFO's sub-minute measurements of the optical emission of dozens of GRBs each year will result in a more rigorous test of current internal shock models, probe the extremes of bulk Lorentz factors, provide the first early and detailed measurements of fast-rise GRB optical light curves, and help verify the prospect of GRB as a new standard candle. The UFFO-pathfinder is fully integrated with the Lomonosov satellite and is scheduled to be launched in Nov. 2013. We will present the latest progress in this conference.

S2.4: A Remarkable Spiral as the Swan Song of a Dying Star with a Companion

Hyosun Kim (ASIAA), Ronald E. Taam (ASIAA, Northwestern University), I-Ta Hsieh (ASIAA), Sheng-Yuan Liu (ASIAA)

With the advent of high-resolution high-sensitivity observations, spiral patterns have been revealed around asymptotic giant branch (AGB) stars. Such patterns provide evidence for the existence of central binary stars embedded in outflowing circumstellar envelopes. In particular, incomplete ring-like patterns observed in the past with a low-resolution and a low-sensitivity may be possibly caused by the motion of unknown binary components. We develop a new method of determining the characteristics of such binary stars from the properties of the observed circumstellar spiral and incomplete ring patterns. Molecular line kinematics furthermore provide the three-dimensional information of the circumstellar pattern. This method is easily applicable to many sources in the AGB and pre-planetary nebula phases, which are highly anticipated with the ALMA.

S2.5: A Photometric, Polarimetric and Spectroscopic Campaign on the Be stars, HD 45677 and CD-49 3441, with Large Near-Infrared Excess and Peculiar Variations.

Chien-De Lee (Graduate Institute of Astronomy, National Central University, Chung-Li 32054, Taiwan), Chakali Eswaraiah (Aryabhatta Research Institute of Observational Sciences, Manora Peak, Nainital 263129, India), Anil Pandey (Aryabhatta Research Institute of Observational Sciences, Manora Peak, Nainital 263129, India), Frederick Walter (Department of Physics and Astronomy, Stony Brook University, Stony Brook, NY 11794-3800, USA), Wen-Ping Chen (Graduate Institute of Astronomy, National Central University, Chung-Li 32054, Taiwan)

HD 45677 and CD−49 3441 are Be stars far away from any star-forming regions, so they are classical Be stars. However, both stars have many peculiarities, like extremely strong Hα flux, forbidden lines, and among the largest near-infrared excess—which must be accounted for by thermal dust emission—in all known classical Be stars. Both stars should be on the verge of turning off the main sequence, and the expanding gas cools off and condenses to form dust grains, which reprocess starlight to produce the observed excessive IR emission. We present the results of photometric, polarimetric and spectroscopic campaigns, which were carried out in 2010 - 2013 for HD 45677 and CD−49 3441. The variations of photometry, polarization and equivalent width of Hα emission were found not to be correlated, indicating that the gas activity associated with unstable stellar mass loss is not collocated spatially with the clumpy dust structure in the disk.

S3.1: Investigating the Event Horizon of Supermassive Black Hole with the Greenland Telescope

Cheng-Yu Kuo (ASIAA), Inoue Makoto (ASIAA), Keiichi Asada (ASIAA), Masanori Nakamura (ASIAA), Juan-Carlos Algaba (ASIAA), Nicolas Pradel (ASIAA), Satoki Matsushita (ASIAA), Hiroaki Nishioka (ASIAA)

Direct imaging of the shadow cast by the event horizon of supermassive black hole (SMBH) will soon become feasible with the technique of Very Long Baseline Interferometry (VLBI) at submillimeter. A successful imaging of the SMBH shadow will not only be important for a direct proof of the existence of black hole, but will also be crucial for providing an important window for testing Einstein's theory of general relativity (GR) under strong gravitational field. In addition, the high resolution image of SMBH will also be important for investigating the launching machism of the relativisitic jets from active galactic nuclei and accretion disk around supermassive black hole. In this talk, I will first briefly present the recent development of the Greenland telescope (GLT) project for direct imaging of the black hole shadow at the center of M87, and discuss the astrophysics we can study in the vicinity of the BH with the upcoming submillimeter observations with the GLT.

S3.2: Binary Period of the Supermassive Black Holes in 3C 75

Hung-Shuo Chen (ASIAA / Institute of Astrophysics, NTU), Makoto Inoue (ASIAA)

Binary black hole is expected to be formed during some stage of galaxy merging process. The binary black hole is also thought to relate in the evolution of supermassive black holes (SMBHs). We are thus studying the period of a possible SMBH binary, 3C 75, by the spectral age of its jets. The spectral age of jet is estimated by the break-frequency (ν_b) of synchrotron loss (Nagai et al., 2006). Since the orbit period was suggested by the jet trajectory of 3C 75 to be $\sim 10^8$ years (Yokosawa and Inoue, 1985), we can confirm it by ν_b. We are trying to derive ν_b by the images made from the VLA archive data 3C 75, at 10, 5, 1.4 GHz. Our rough estimation of ν_b is lower than 1.1 GHz. If this is the case, we will make more observations at lower frequencies to derive ν_b.

S3.3: Optical Variability of type 2 AGNs Monitored with Pan-STARRS MD Survey

I-Chenn Chen (National Central University), Chorng-Yuan Hwang (National Central University)

According to the widely accepted Unified Model of AGN, the so called type 2 AGN is thought to be obscured with the optically-thick material along the line of sight, and hence optical variability is hard to be observed since most of the photons are absorbed by the surrounding material so called torus. To systematically trace the variability of AGNs, A long-term, but short-time-separation is needed. Here we present our preliminary results of monitoring the variability of 61 Seyfert 2 AGNs using Pan-STARRS Medium Deep (MD) Survey.

S4.1: The Most Massive Galaxies in X-ray Associated and Non-associated Groups

Chin-Wei Chen (ASIAA), Lihwai Lin (ASIAA), Hung-Yu Jian (NTU), Sebastien Foucaud (NTNU)

We study the color and structure properties of the most massive galaxies in optical selected groups out to z = 0.8 with different X-ray properties, i.e. groups associated and non-associated with diffuse X-ray emissions. The optical samples were selected from zCOSMOS 20k group catalog (spectroscopic survey of 50% averaged sampling rate) with at least 5 Spec-z members. By cross-matching the samples with X-ray selected groups in coincident spatial field, we found 47 X-ray non-associated groups and 32 groups which were X-ray associated with the most massive galaxies close to the X-ray center. At all redshifts, the majority of the most massive galaxies in X-ray non-associated groups dominate the low-mass end with the fraction of NUV-r blue and averaged color similar to their X-ray associated counterparts. In addition, the most massive galaxies in both environments show similar Sersic index ~ 5, suggesting a spheroidal-like structure. The low-z X-ray non-associated samples are smaller in size and seem to exhibit smaller mass-size relation. Although the statistics is marginal, our results seem to favor the scenario that the X-ray non-associated (underluminous) groups are still forming and not yet virialized.

S4.2: The physical properties of X-ray detected $70\mu m$ galaxies

Lin, Ming-Yi (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University), Sebastien Foucaud (National Taiwan Normal University)

The mutual influence between active galactic nuclei (AGN) and host galaxy is a crucial issue in galaxy evolution, both the secular scenario and the merger scheme, indicate the material in circumnuclear region accretes into central black hole, then the luminous AGN phase will be awakened. We investigated 142 galaxies detected in X-ray and $70\mu m$ observations in Cosmic Evolution Survey (COSMOS) field. Although the IRAC colors of our samples indicate the existence of star formation, the ratio of rest frame 2-10 keV luminosity to total infrared luminosity (8-1000 μm) shows that AGN predominates the spectral energy distribution (SED). Comparing to pure X-ray samples, the AGNs with $70\mu m$ detection have a higher obscuration fraction indicates an extra contribution from the star formation in the host galaxy in addition to the usual AGN dusty torus. Temperature fitting result shows there is no significant dust temperature enhancement in far-infrared wavelength, suggesting in far-infrared portion, the physical mechanism drives the AGN hosted galaxies is similar to those star forming galaxies.

S4.3: Mid-Infrared Properties of Optically Selected Red QSOs

Tsai, An-Li (NCU), Hwang, Chorng-Yuan (NCU)

We investigate the Mid-Infrared (MIR) properties of a sample of red QSOs using the data from the Wide-Field Infrared Survey Explorer (WISE) all-sky source catalog. These QSOs are selected from the Sloan Digital Sky Survey Data Release 7 quasar catalog which overlaps the radio observations of the Very Large Array Faint Images of the Radio Sky at Twenty-Centimeters (VLA FIRST) with redshifts between 0.6 and 2.0. We define red QSOs and normal QSOs based on QSO differential color $\Delta(g-i)$, and define radio-loud QSOs (RLQs) and radio-quiet QSOs (RQQs) based on radio-to-optical ratio. The results from the WISE data shows that the red WISE QSOs have significantly brighter MIR emission than the normal ones have, no matter whether they are RLQs or RQQs. On the other hand, we find that the red WISE QSOs have a higher probability to be RLQs than the normal QSOs have, and the RLQs have more red QSOs than the RQQs have. We conclude that red color is not caused by the obscuration from the surrounding dusty torus of a normal QSO but is caused by excess warm dust.

S4.4: UKIDSS-UDS: UV-Luminosity density at $1 < z < 3$

Ching-Min Lo (National Taiwan Normal University)

The star formation history is a key-element to understand galaxy evolution and formation. Recent studies have shown that the star-formation rate peaks at redshift z=1-3 and then decline to its local value. The physical processes responsible for the sudden quenching of star-formation are still unknown. In order to better understand the origin of these effects, we propose in this study to use the UV-luminosity as an indicator of the Star-formation rate. We take advantage of our deep NIR/optical data from the UKIDSS-UDS/SXDS survey and our very deep CFHT U-band data to compute the luminosity function of galaxies at z=1-3. We demonstrate that our UV Luminosity Function agrees well with studies from the literature, showing evidences of migration of the domination of the UV-LF from bright systems at high redshifts to faint systems at low redshift. We derived then the UV Luminosity Density, a good indicator of Star-Formation Rate, in the redshift range $\sim$1.

S5.1: PAH formation history in galaxies

Ji Yeon Seok (ASIAA), Hiroyuki Hirashita (ASIAA)

Polycyclic aromatic hydrocarbon (PAH) is one of the major dust components in the interstellar medium (ISM). We present our evolution models for the abundance of PAH in the ISM on a galaxy-evolution timescale. We consider shattering of carbonaceous dust grains as the formation mechanism of PAHs while PAHs can be reduced by coagulation onto dust grains, destruction by supernova shocks, and injection into star formation. Based on theoretical models developed by our previous work, a timescale of shattering and coagulation is calculated for various ISM phases. Large shattering effects are seen in warm ionized medium whereas coagulation occurs most efficiently in dense clouds. We adopt dust formation history by Asano et al. 2013 and calculate the coevolution of PAHs with carbonaceous dust based on the formation and destruction timescales of PAHs estimated above. While the destruction by supernova shocks is the primary destruction mechanism in the metal-poor environment, the coagulation governs the destruction of PAHs in the metal-rich environment. We compare the calculated PAH abundances with the observed abundances in galaxies of various types. We discuss the physical properties that play a key role in the evolution of PAH abundance.

S5.2: The Contribution from Circumstellar Dust to the Integrated Spectral Energy Distribution of the Large Magellanic Cloud

Mei-Chun Lin (ASIAA/NTU), Ciska Kemper (ASIAA)

The spectral energy distribution (SED) of galaxies consists of contributions due to starlight (in the UV/optical and near-infrared) and thermal emission of interstellar dust (in the far-infrared). The excess flux in the near- and mid-infrared is usually explained as emission from interstellar polycyclic aromatic hydrocarbons (PAHs). Most popular SED models nowadays use stellar population synthesis models combined with stellar spectral libraries without dusty envelopes. This might be acceptable for starburst galaxies with a relatively large population of young stars, it might not accurately represent galaxies with a significant population of dusty Asymptotic Giant Branch (AGB) stars. When inspecting the Spitzer IRAC images of the Large Magellanic Cloud (LMC), a nearby dwarf galaxy, it becomes clear that AGB stars are important contributors to the overall flux of the LMC at 3.6, 4.5 and 5.8 μm, in addition to PAHs at 8.0 μm (Melbourne & Boyer, 2013). In order to estimate the contribution from circumstellar dust, we use MCPS (Magellanic Cloud Photometric Survey, int the bands of U, B, V, I), 2MASS (in the bands of J, H, Ks), SAGE (Surveying the Agents of Galaxy Evolution, 3.6, 4.5, 5.8, 8.0, 24, 70, 160 μm), and HERITAGE (HERschel Inventory of The Agents of Galaxy Evolution, 100, 160, 250, 350, 500 μm) to construct a complete SED of the LMC. We plan to compare our observed SED to a population-synthesis-based modeled SED, which are fitted to the UV and optical fluxes and uses stellar spectral libraries without dusty envelopes. The near-infrared difference between the observed SED and the modeled starlight contribution represents the contribution from circumstellar dust around evolved stars. We will also separate evolved stars into many sub-categories (i.e. O-rich AGB, C-rich AGB, Red Super Giant) by means of color-magnitude classification, in order to investigate the contribution from circumstellar dust of each category to the integrated SED of the LMC.

S5.3: The Evolved-Star Dust Budget in Nearby Galaxies

Sundar Srinivasan (Academia Sinica Institute of Astronomy & Astrophysics (ASIAA)), Martha L. Boyer (NASA Goddard Space Flight Center (GSFC), Oak Ridge Associated Universities (ORAU)), David Riebel (United States Naval Academy (USNA)), Benjamin A. Sargent (Rochester Institute of Technology), Margaret Meixner (Space Telescope Science Institute)

Evolved objects such as red supergiants (RSGs) and asymptotic giant branch (AGB) stars inject metal-rich material in the form of gas molecules and solid dust particles into the interstellar medium (ISM) of their host galaxies, where they may seed and be incorporated into the next generation of stars. This mass loss from AGB and RSG stars thus drives galactic chemical evolution, and the total dust production rate from these stars is an important parameter that can be used to constrain evolutionary models. In order to quickly compute the total dust budget for large photometric datasets, we have constructed a Grid of RSG and AGB ModelS (GRAMS, Sargent et al. 2011, Srinivasan et al. 2011) for the dusty shells around these stars. The models, when fit to the observed data, provide reliable estimates of the luminosities and dust production rates (DPRs). We have already used our models to study the AGB/RSG population in the Magellanic Clouds, for which we had photometry and spectra as part of the SAGE (Surveying the Agents of Galaxy Evolution, Meixner et al. 2016), SAGE-SMC (Gordon et al. 2011) and SAGE-Spec (Kemper et al. 2010) programs, and we are now extending our work to other galaxies in our neighbourhood. In this talk, I will describe our model grid and present our results for the Magellanic Clouds as well as for the galaxy M33. Our method provides a quick way of estimating the dust budget for entire galaxies, which will allow us to probe the dependence of this mass loss on properties of the host galaxies.

S5.4: Properties of galaxies in groups up to z=2 from the UKIDSS Ultra-Deep Survey

Hsiao, Ho (NTNU), Sébastien Foucaud (NTNU), Hung-Yu Jian (NTU), Lihwai Lin (ASIAA), Ching-Min Lo (NTNU), Wei-Hao Wang (ASIAA)

Galaxies live preferentially in groups environment, therefore groups play a very important role in galaxy evolution. Merging activity is fostered in groups and some environmental processes could eventually take place in groups and have an impact on galaxy evolution. In general, several methods are available to identify overdensities (cluster/group) and their members, each with its own strengths and weaknesses: ICM (Intracluster medium) detection in X-ray, red sequence in optical or IR, Friends-of-Friends algorithm, VDM (Voronoi – Delaunay method), etc. However when only a limited access to spectroscopic redshifts is available, and the finder algorithm has to rely heavily on photometric redshifts, a probabilistic Friend-of-Friend approach is the most efficient. Observing and detecting groups at high redshift is extremely challenging, especially for the redder systems, involving passive galaxies. The current generation of optically-selected surveys are biased against the passive population in pairs and groups, leading to an underestimation of their role in the galaxy evolution. Making the best use of the worldwide release of the near-infrared data UKIDSS-UDS DR8, combined with Subaru and CFHT data in the optical waveband, and Spitzer-IRAC mid-infrared data, we coupled photometric redshift with a probabilistic Friends-of-Friends algorithm by deep X-ray information and Millennium simulation data to train the parameter and build a groups catalog up to redshift z=2. Here we will discuss this method, focusing on its strong dependency on training sample, and present some preliminary results on our selection of groups up to z=2, in particular on the evolution of the red fraction.

S6.1: RADIO GALAXIES: THEIR DYNAMICS AND EPISODIC JET ACTIVITY

Chiranjib Konar (ASIAA, Taipei, Taiwan)

Radio galaxies are spectacular AGN phenomena. The properties of jets in episodic FRII radio galaxies (mostly double-double radio galaxies) have been studied. Our study says that (i) the duty cycle of episodic FRII radio galaxies ranges from $10^7 - 10^8$ yr, (ii) the duration of quiescent phase of episodic jet activity ranges from $10^5 - 10^8$ yr, (iii) many of them (if not all) launch jets with similar power in each episode, and (iv) Observations of radio lobes are consistent with the model of particle acceleration at relativistic MHD shock.

S6.2: Measuring galaxy environment with spectroscopic and photometric redshifts

Chuan-Chin Lai (Graduate Institute of Astrophysics, National Taiwan University), Lihwai Lin (Institute of Astronomy & Astrophysics, Academia Sinica), Hung-Yu Jian (Graduate Institute of Astrophysics, National Taiwan University), Tzi-Hung Chiueh (Graduate Institute of Astrophysics, National Taiwan University)

It's well known that galaxy properties, for example, galaxy color, luminosity and star formation rate, strongly depend on their environments. Many estimators have been proposed and tested to successfully quantify the environmental effect. While those environmental estimators in general work well with spectroscopic redshift samples, their applications to photometric redshift (photo-z hereafter) surveys is uncertain. In this work, we study how the projected galaxy local densities are correlated with real-space local densities measured as a function of photometric redshift uncertainties by using the Durham mock catalog built on Millennium Simulation. And we discuss its application to the Pan-STARRS Medium Deep survey, one of the largest on-going deep imaging surveys.

S6.3: Evidence for a 300 Mpc scale local under-density in the galaxy distribution

Ryan C. Keenan (Academia Sinica Institute for Astronomy and Astrophysics, Taiwan), Amy J. Barger (University of Wisconsin, Madison), Lennox L. Cowie (Institute for Astronomy, Hawaii), Isak G. B. Wold (University of Wisconsin, Madison)

Galaxy counts and recent measurements of the luminosity density in the near-infrared (NIR) have indicated the possibility that the local universe may be under-dense on scales of several hundred megaparsecs. The presence of a large-scale under-density in the local universe could introduce significant biases into the interpretation of cosmological observables, and, in particular, into the inferred effects of dark energy on the expansion rate. Here we measure the $K-$band luminosity density as a function of redshift to test for such a local under-density. Our sample is comprised of galaxies selected in the $K-$band from the UKIRT Infrared Deep Sky Large Area Survey (UKIDSS-LAS). We restrict this study to an area of ~ 500 deg^2 on the sky where spectroscopy from the Sloan Digital Sky Survey (SDSS) and other redshift surveys provides a $K-$selected catalog of $\sim 35,000$ galaxies that is $> 90\%$ spectroscopically complete to $K_{\rm AB} = 16.3$. The relative depth and wide area of our sample allow for a detailed measurement of the $K-$band luminosity density as a function of redshift in the range $0.005 < z < 0.2$. We find that the overall shape of the $z = 0$ rest-frame $K-$band LF ($M^* = -21.6 \pm 0.04$ and $\alpha = -0.99 \pm 0.03$) appears to be relatively constant as a function of environment and redshift out to $z \sim 0.2$. We find a local ($z < 0.07$) luminosity density that is in good agreement with previous studies. At $z > 0.07$ we detect a rising luminosity density, and at $z > 0.1$, the integrated rest-frame $K-$band light from galaxies is roughly ~ 1.5 times higher than that measured locally. This suggests that the stellar mass density as a function of redshift follows a similar trend. Assuming that luminous matter traces the underlying dark matter distribution, this implies that the local mass density of the universe may be lower than the global value on a scale and amplitude sufficient to introduce significant biases into the determination of basic cosmological observables, such as the expansion rate. An under-density on this scale and amplitude, for example, would be more than sufficient to resolve the apparent tension between direct measurements of the Hubble constant and those inferred by Planck.

S6.4: The Analysis of Parameter Constraints on Reionization Process

Fang-Chun Liu (ASIAA/NTU), Tzu-Ching Chang (Institute of Astronomy and Astrophysics, Academia Sinica)

Reionization is a complex process that includes many uncertainty of physical effects. The 21cm brightness temperature of neutral hydrogen has the potential to probe the epoch of reionization. We use the semi-numerical modeling tool, 21cmFAST, designed for simulating the 21cm power spectrum. We examine the sensitive parameters which effect the inhomogeneous heating of first source and 21cm spin temperature at redshift $5 < z < 40$. Using the Fisher Matrix analysis extract the parameters from 21cm power spectrum, and these physical parameters are the main effects during the reionization. We combine the CMB optical depth measurement that gives the informations about the evolution of ionizing fraction, and derive the more strong constraint on parameters of reionization process.

S6.5: Constraining the mass-richness relation of galaxy clusters using large scale clustering

Yun-Hsin Huang (National Taiwan University (NTU), Academia Sinica Institute of Astronomy & Astrophysics (ASIAA)), Yen-Ting Lin (Academia Sinica Institute of Astronomy & Astrophysics (ASIAA)), Keiichi Umetsu (Academia Sinica Institute of Astronomy & Astrophysics (ASIAA)), Jean Coupon (Academia Sinica Institute of Astronomy & Astrophysics (ASIAA))

We investigate the large-scale clustering of galaxy clusters using the maxBCG cluster sample from the Sloan Digital Sky Survey, at redshifts between 0.1 and 0.3. We employ two methods, the bias-based method and the grid-based method, to characterize the mass-richness relation of the clusters. First, we measure the auto-correlation function of the subsamples in different richness bins, obtaining the linear bias of the clusters, and convert it into mass using the bias-mass relation. The estimated bias of the clusters increases monotonically with the richness. The inferred masses of the clusters are in reasonable agreement with the results from the weak gravitational lensing measurement by Reyes et al. (2008). Second, we populate a large N-body simulation with different prescriptions of the mass-richness relation to generate a suite of mock catalogs. The best mass-richness relation is obtained when the correlation function and the richness function of real clusters are successfully reproduced. Our tests on mock catalogs show that this method is a promising way to constrain the scatter of the mass-richness relation. Our results imply the potential to use the large-scale clustering as an independent tool, in addition to the gravitational lensing, in measuring masses and constrain the mass-richness relation of galaxy clusters for the upcoming surveys such as Hyper Suprime-Cam and Dark Energy Survey.

S6.6: The study of gamma-ray MSPs in Globular Cluster

J. H. K. Wu (NTHU), A. K. H. Kong (NTHU)

Millisecond pulsars (MSPs) are fast spinning neutron stars with spin periods of a few milliseconds, that have been confirmed by the Fermi-LAT as a class of gamma-ray emitters. During over four years of operation, Fermi-LAT has detected over 30 MSPs, these gamma-ray emitting MSPs can be found in various environments (e.g., globular cluster, galactic field). By studying the gamma-ray properties of MSPs in different environment, in particular - Globular Cluster, we can improve out understanding on the recycling process of MSPs formation as well as the emission mechanisms. We present our latest findings on gamma-ray emitting MSPs in Globular Cluster using Fermi-LAT data.

E1.1: 天地玄黃宇宙洪荒 — 談天體碰撞與人類歷史

Wen-Ping Chen (NCU)

E1.2: High Schools in Taiwan Joining the International Arena to Find Asteroids Using Pan-STARRS Data

Shih-Chao Lin (國立大里高中), *Yu-Mei Lin* (北一女中), *Dah-Lih You* (彰化高中), *Bing-Xun Wu* (惠文高中), *Janni Su* (羅東高中), *Hsin-Pei Lee* (明道高中)

High school students and teachers in Taiwan (北一女、彰化、國大里、惠文、羅東及明道高中) have participated in the IASC (International Astronomical Search Collaboration) since 2011. About 2 campaigns are held each year, organized by Hardin-Simmons University (Abilene, Texas, USA), in which high-quality images taken by Pan-STARRS (Panoramic Survey Telescope And Rapid Response System) are made available for analysis. In the current campaign in March, 2013, for example, there are a total of 747 preliminary discoveries in first two weeks, for which more than 80 were contributed by students from Taiwan. The discovery process goes from Preliminary to Provisional to Numbered. A discovery becomes numbered after 3-6 years when it has been observed a sufficient number of times to fully determine its orbit. Once it is numbered then the student discoverers can propose an official name to the International Astronomical Union. In 2011 and 2012, of the 186 main-belt asteroids and one NEO asteroid confirmed, we made 39 provisional discoveries, among the most successful high schools or junior colleges in the campaigns.

E2.1: 天文教育與特殊教育的邂逅——以「可觸摸式立體星座盤」進行視障學生天文教學

張凱翔 (天主教崇光學校財團法人新北市崇光女子高級中學、新北市立江翠國民中學)

天體運行之間的空間關係在現行國、高中天文課程佔了相當大的比重，但視障學生因為視力的限制空間推理能力較弱，也無法以視覺觀察方式透過星座盤模擬天體運行的規律。本教具將一般的星座盤表面進行特殊處理，讓視障學生以「觸摸」取代「肉眼觀察」的方式理解天體運動的規律。「可觸摸式立體星座盤」為1個放大約1.5倍的星座盤，於星座盤內盤之星座連線上黏貼立體凸出物，使視障學生能夠以觸摸的方式辨識星體位置及星座外觀。為避免星座盤上呈現之資訊過於雜亂，可依教學需求僅對部份星座進行處理即可。由於視障學生中全盲生之學習以觸覺為主，弱視學生之學習以色彩對比為主；製作「可觸摸式立體星座盤」時，建議可選擇色彩對比及觸感差異較大的材料做為立體凸出物，即可同時供全盲及弱視學生使用。 受限於點字大小之限制（點字太小無法辨識，若在星座盤上增加點字則星座盤長度需增加至1公尺以上，攜帶或操作都相當不便），使用此教具對視障學生進行天文教學時，必需由指導教師協助操作並搭配口述說明。使用此教具進行教學時，必需依照學生個別差異（全盲或弱視、先天視障及後天視障），對教科書中的操作程序進行彈性調整，部份與視障學生生活經驗不符的操作程序亦可省略或刪除。

E2.2: 發展非制式場域之天文科學學習模式-以「月相變化」主題導覽以為例

林琦峰 (臺北市立天文科學教育館), 張文華 (國立臺灣師範大學), 張俊彥 (國立臺灣師範大學), 謝智坤 (國立臺灣師範大學), 曹蕙文 (國立臺灣師範大學), 楊雅婷 (國立臺灣師範大學)

本研究以「重理解的課程設計」（Understanding by Design, UbD，賴麗珍譯，2005）為模式，期望為臺北市立天文科學教育館（以下稱天文館）展示場導覽解說，發展一套有關「月相變化」主題的導覽活動，能有效協助參觀民眾與校外教學學生，建立正確月相變化概念。更希望可以發展出「重理解的主題導覽」模式，應用於非制式場域的學習中，讓學習有更多元的選項。

E2.3: How to Implement Astronomy Education: A Case Study in Taipei Elementary School

Lih Lin Leou (Taipei Jinhua Elementary School), Ruei Guo Liang (Taipei Jinhua Elementary School)

Practical astronomy classes, taught frequently, are an important foundation for developing astronomy in the future. At Taipei elementary schools there are 87,242 students learning the basic concepts of astronomy. The subjects include Moon, Sun, Constellations, Oceanography and Meteorology that have been taught at the K3- K6 (8-12 years old levels). To explore the implementation of astronomy education and the effective instruction, this study uses quality research (case study), including interviews with those teachers who have over 10 years science teaching experience. We had five themes: a) the strategies of teaching methods, b) the use of materials, c) the evaluations, d) class observation, and e) students feedback. During data analysis, we assessed the performance of students, photos for teaching and diagrams, films, daily notes and interview content for triangulations. This research found that, the primary school science teacher' s profession is not relative to their backgrounds in astronomy. They need a large number of external resources. It is difficult to teach constellations due to the poor conditions for observation in urban areas. The passive learning attitudes of the students were related to the lack of opportunities for astronomical exploration. The teaching methods best for implementation involved a attracting the students' interest in learning. This included the use of 3D technology and attractive materials to enhance the students' learning achievement. The teachers have to spend a lot of time in preparatory work in order to positively affect the multiple assessments. The most important conclusion was that attention to the teaching atmosphere and its situational design can improve student achievement.

Key words: astronomy education, moon, sun, constellations

E2.4: 打造星光小學，點亮星希望！

Chi-Feng Lin (林琦峰) *(National Taiwan Normal University; Taipei Astronomical Museum), Chia-Ling Hu* (胡佳伶) *(Taipei Astronomical Museum)*

臺北市立天文科學教育館結合社會資源，積極參與偏遠地區天文科學教育之推廣，自97年開始推動「打造星光小學，點亮星希望」計畫，目前共有七所偏遠小學參加本計畫，本計畫分為兩階段，第一階段為兩天一夜天文體驗營，如此讓中南部、花東及山區的學童，可以前來臺北參加天文館舉辦的營隊，豐富學童多元的學習經驗，引發學童學習天文科學的興趣。第二階段由天文館工作團隊，深入偏遠地區學校，追蹤及培育該校天文種子教師與學童，整合當地天然優厚觀星環境，將天文科學教育深耕地方，打造成一所獨具特色的星光小學。成為當地天文教育推廣的基地，透過教育資源的交流，增加偏遠地區小學的教育價值，延伸其教育生命。本系列活動的宗旨，在縮小天文科學教育的城鄉差距，並協助臺灣各偏遠地區的迷你小學，整合當地人員、文化及天然環境，培養學童成為星空領航的天文尖兵，發展天文科學教育特色，成為星光小學。

E2.5: 第24太陽週期極大值之科普教學—以臺北天文館自製「太陽與太空天氣」數位星象節目為例

洪景川 *Jim Hung* (臺北市立天文科學教育館 *Taipei Astronomical Museum)*

第24太陽週期是從1755年開始紀錄太陽黑子活動以來的第24個太陽週期，是目前正在進行的週期，開始於2008年1月8日，預測將於2013年5月達到極大值，其黑子數值是90，是自第16太陽週期以來最低的一次。 為了使全臺各地中、小學生及到訪一般大眾認識太陽活動與太空氣候現象，進而體認日地關係對地球生物與人類生活的影響，臺北市立天文科學教育館特別於今年元旦製作並推出自製數位星象節目「太陽與太空天氣」於該館宇宙劇場上映。「太陽與太空天氣」節目提供了炫目耀眼的視覺效果來呈現太陽的各種活躍變化與太空天氣現象，並介紹人類對太陽和黑子的觀測史。 節目中也忠實呈現了國內天文同好遠征阿拉斯加所拍攝的珍貴全天域極光縮時影片，讓學習者恍如置身於冰天雪地欣賞絢麗的天文奇景；再加上NASA和ESA清晰驚人的太陽探測任務詳實影像記錄，使學習者彷彿乘著太陽風，親眼目睹威力十足的爆發現象—太陽閃焰及日冕物質噴發，進而體認主宰地球生命的太陽威力，期能使學習者於觀賞節目後，清楚瞭解為何科學家要嚴密監測掌控和預測太空天氣，以及時時作好準備並適確應對，避免造成生活上的不便或設備上的損失。

The 24th solar cycle 24 solar cycle record of sunspot activity since 1755, is an ongoing cycle began on January 8, 2008, the forecast for May 2013 will reach a maximum value, its sunspots value is 90, the lowest since the solar cycle 16. Solar Cycle 24 is the 24th solar cycle since 1755, when recording of solar sunspot activity began. It is the current solar cycle, and began on 8 January 2008, but there was minimal activity through early 2009. NASA predicts that solar cycle 24 will peak in mid 2013 with about 59 sunspots. This would make it the least active cycle in the past one hundred years. The International Space Environment Service predicts the cycle to peak at 90 sunspots in August 2013. In order to make students and general public visitors more understand of solar activity and space weather phenomena, and thus realize the Sun-Earth relationship, Taipei Astronomical Museum produced digital planetarium show ”The sun and space weather” this year, and launch shows at the museum’s IMAX DOME Theater— the museum’s planetarium. ”The sun and space weather” program provides a dazzling visual effects rendering the various active change of the sun and space weather phenomena, and describes the history of human observation of the sun and sunspots. In the program, the producer faithful renders the time-lapse video of Aurora Borealis taken by domestic amateur to Alaska, so that the audiences can feel like as being in the ice and snow lands enjoying the magnificent astronomical wonders; coupled with NASA and ESA detailed clear images of the amazing sun exploration mission, makes learners feel as though they were riding on the solar wind, witnessed the outbreak of powerful solar flares and coronal mass ejection; so as to recognize the power of the sun and its influence on the life on Earth. Hopefully, it might enable learners who watch this programs, come out of the museum with a clear understanding of why scientists should intensely monitor and predict the space weather, and always be ready to take appropriate respond, to avoid loss of life and inconvenience caused.

E2.6: Taiwan Astronomy Educational Cloud Computing Organization

Yih-Cherng Yen (Nick Enterprise)

We collaborate with Central Weather Bureau and proposed an astronomy image broadcasting system project in 2012. The system provides high resolution image but upload images with mobile network efficient bandwidth algorithm. This project allows school/private observatories and portable observers broadcast their realtime astronomy event image on the project website in Central Weather Bureau. A backup website can be link via the web link: http://www.nick.com.tw/broadcast 4 observations were hold in year 2012. (20120521 Annual Eclipse,20120604 Partial Lunar Eclipse, 20120606 Venus Transit, and 20121128 Penumbral Lunar Eclipse) The most 16 stations were joined and more than 50000 individual connections visit the project website in a single event ”20120606 Venus Transit”. The manager/owner of each stations are organized together, create a Facebook group and hold panel meeting twice at Central Weather Bureau and Taichung municipal Hui-Wen senior high school. An expanding project of cloud computing system serving astronomy education purpose is planing. The next panel meeting will be hold at National Hsin-Feng senior high school in Tainan City.

PS01: The early results of PS1 TNO discoveries/recoveries

Hsing-Wen (Edward) Lin (National Central University), Ying-Tung Chen (National Central University), Wing-Huen Ip (National Central University), Wen Ping Chen (National Central University)

Since PS1 survey started from May 2010, we collected more than 2.5 years survey data and are able to search for TNO with very accurate orbital solution. As a compromise with NEO search project, detecting outer solar system object in PS1 survey has to face the huge number of false positives. To conquer the difficulties, we have to build a special processing pipeline to focus on detecting slow moving objects in large amount of data. In this work, we introduce the concept of PS1 outer solar system pipeline, including the method of searching slow moving objects, the way to reduce false positives, known object matching and object classification. Finally we report the early discoveries and recoveries of dozens of TNOs and their preliminary classification.

PS02: A Comparison of the Occurrence rates of the Solar Flares with Stellar Flares from Solar-type Stars

Chi-Ju Wu (Institute of Space Science,National Central University), Wing-Huen Ip (Institute of Space Science,National Central University), Li-Ching Huang (Institute of Space Science,National Central University)

The space weather effect caused by solar storms might reach the peak of the solar cycle in 2013. How about similar processes in other stellar objects? The Kepler mission of an Earth-orbiting space astronomical telescope for the search of habitable exoplanets provides a wealth of observational data concerning the time variability of stars in the Cygnus-Lyra region above the galactic plane. Some of the solar-type stars were found to exhibit large energy-release events with power as much as a million times of the large solar flares. An interesting question is whether they have the same flaring mechanism just like the case of the solar flares. In this work, we report our study of the occurrence frequency distributions of the stellar flares of a number of selected solar-type stars and compare them to that of our Sun. We will discuss the similarities and dissimilarities of the frequency distributions and their implications on the generation mechanism.

PS03: The tails of comet C/2011 L4 PanSTARRS

Zhong-Yi Lin (Institute of Astronomy, National Central University), Wing-Huen Ip (Institute of Astronomy, National Central University)

Three tails found in comets are ion tail, dust tail and sodium tail. The ion and dust tails are well-known but the sodium tail is rare because the abundance is relatively lower than other observable elements and molecules. However, sodium emission has been previously observed in both long-period and dynamically new comets. In this work, we will present preliminary results on tails analysis of comet C/2011 L4 PanSTARRS.

PS04: Polarimetric Observations on the Hot Jupiter WASP-12b

Hu, Juei-Hwa (Institute of Astronomy, National Central University), Chiang, Po-Shih (Institute of Astronomy, National Central University), Lin, Zhong-Yi (Institute of Astronomy, National Central University), Lin, H.-W. (Institute of Astronomy, National Central University), Chen, W.-P. (Institute of Astronomy, National Central University), Ip, W.-H. (Institute of Astronomy, National Central University)

We present the primarily results on the polarimetric observations of a exoplanet system WASP-12. WASP-12b is a known hot Jupiter and has evaporating atmospheres heated by its host star. Particles escaping from planets will scatter starlights leading to observable linear polarization. Evaporating atmospheres of exoplanets are laboratories to directly study planetary atmospheres, such as the compositions and the structures of planetary atmosphere, and the interactions between host stars and planets. The observations is taken by the simultaneous tri-color polarimeter, TRIPOL2, set on the Lulin one meter telescope at Lulin Observatory. The simultaneously tricolor and high-cadence observations would provide unique data for variation study of transits.

PS05: Searching a stellar flare during the transit of the exoplanets

Zhong-Yi Lin (Institute of Astronomy, National Central University), Po-Shih Chiang (Institute of Astronomy, National Central University), Juei-Hwa Hu (Institute of Astronomy, National Central University), Wing-Huen Ip (Institute of Astronomy, National Central University), Wen-Ping Chen (Institute of Astronomy, National Central University)

The physical properties of transiting extrasolar planes can be measured from the transit light curve. For instance, the radii of exoplanet can be determined from the transit depth. However, the transit light curve would be affected by star spots or by intrinsic stellar variability. Here, we report our monitoring results that could lead to incorrect planetary parameters of the exoplanets particularly in WASP 3b, WASP 12b and WASP 14b.

PS06: Taiwan Meteor Network System at NDHU Node

LYU, MING-SYUAN (National Dong Hwa University)

Taiwan Meteor Network System at NDHU Node Ming-Syuan Lyu , Cheng-Yan Chen , Yen-Chen Chen , Yu-Luen Hu , Yu-Chieh Huang, Yin-Fang Wang and Hsin-Chang Chi Department of Physics,National Dong Hwa University,1, Sec 2, Da-Hsueh Rd., Shou-Feng,Hualien, Taiwan 974, R. O. C. Abstract DongHwa Meteor System is a node of Taiwan Meteor Network. We intend to observe the meteor events in the east and southeast directions , and analyze the detected data consequently. We plan to develop data base from observations at the present NDHU node. The observed data are cross referenced and cross checked with the other Taiwan Network observation nodes. We will apply triangulation observation method to analyze the velocity, direction and the final illumination. The present observation system can also be used to observe TLEs(Transient Luminous Events).

PS07: Introduction to MIOSOTYS: a multiple-object, high-speed photometer for probing the trans-Neptunian population with stellar occultations.

Chih-Yuan LIU (NTHUPHYS/NTHUIOA/ObsPM/LESIA), Yi-Shan WU (NTHUIOA), Hsiang-Kuang CHANG (NTHUPHYS/NTHUIOA), Alain DORESSOUNDIRAM (ObsPM/LESIA), Francoise ROQUES (ObsPM/LESIA), I-Chun SHIH (ObsPM/GEPI), Andree FERNANDAZ (ObsPM/LESIA), Frederic DAUNY (ObsPM/LESIA), BernardCHRISTOPHE (ObsPM/LESIA), Lucie MARQUET (ObsPM/LESIA)

MIOSOTYS is a multiple-object, high-speed photometer. It is mainly operating on the 1.93m telescope at Observatoire de Haute-Provence (OHP), France. The instrument consists of a multi-fibre positioner which can access maximum 29 targets simultaneously, and an EMCCD camera which is capable of recording low-level light at high frame rate. MIOSOTYS will provide the observational abilities for various astronomical researches, such as surveying the small objects in Kuiper Belt, p-mode oscillation of pulsating white dwarfs, fast variability in compact binaries, young stellar objects in star formation region, etc.

PS08: Gas motions around the protostar NGC 1333 IRAS 4A2

Hung-Jin Huang (ASIAA), Chin-Fei Lee (ASIAA)

IRAS 4A is a nearby, well-studied Class 0 low-mass protostellar system resides in the NGC 1333 molecular cloud in Perseus cluster. It is one of the best candidates for studying infall motion in star formation. The detection of inverse P-Cygni profiles from previous studies suggest strong evidences for inward gas motions in this region. However, confirming the infall motion towards a protostar can be quite a challenge because similar line profiles can also be produced due to the combination of different types of motions projected along the line of sight. By combining Compact-North, Extended and Very Extended configuration data in the 1.33mm continuum and the 13CO 2-1 line from SMA observation in the IRAS 4A region, we resolved it into two sources, 4A1 and 4A2, with a separation of about 1.6 arcsec. An inverse P-Cygni line profile is seen at 4A2 but with a very wide and strong absorption in 13CO. After modeling our data using the radiative transfer code, we suggest that the observed line profile at 4A2 may comes from the combination of a disk and an infalling envelope surrounding outside.

PS09: Estimating IRDC temperature with ammonia emission

Vlas Sokolov (Institute of Astronomy, National Tsing Hua University), Vivien Chen (Institute of Astronomy, National Tsing Hua University), Sheng-Yuan Liu (Institute of Astronomy & Astrophysics, Academia Sinica), Yu-Nung Su (Institute of Astronomy & Astrophysics, Academia Sinica)

Infrared dark clouds (IRDCs) are cold, dense extinction feature found against the diffuse Galactic infrared emission. They often harbor dense cores in different evolutionary stages that may be differentiated by various evolutionary tracers such as line width, gas temperature, mass distribution, etc. In particular, gas temperature is a critical parameter to convert the observed line brightness to the corresponding column density. In this study, we derive gas temperature of 14 IRDC cores to complete the last portion of a large deuterium fractionation survey of 47 IRDC cores. The ammonia (1,1) and (2,2) spectra were observed with the Nobeyama 45m Telescope. Hyperfine structures of the (1,1) line were

resolved, allowing us to constrain the column density reliably. We derive the gas temperature using the population ratio of the two inversion energy levels.

PS10: Submillimeter Molecular-Line Observations of a Prototypical Protostellar Binary IRAS 16293-2422

Yen-Chi Chen (ASIAA), Shigehisa Takakuwa (ASIAA)

We present SMA results of a prototypical binary protosttellar system IRAS 16293-2422 in the CS (7-6), CO (6-5), and the 690 GHz submillimeter dust continuum emission. The CS (7-6) line emission was also observed using the JCMT to supply missing short-spacing information. The 690 GHz dust continuum emission is detected from the individual binary components of Source A in the southeast and Source B in the northwest, with a separation of $\sim$ 5". The CO (6-5) emission shows an east-west elongated feature originated from Source A, presumably tracing the molecular outflow driven from Source A. The combined SMA+JCMT CS (7-6) emission shows a signature of a differential rotation between Source A and B, as well as an infalling motion toward Source A. We will discuss these results in the context of formation mechanism of widely-separated binaries.

PS11: Substellar objects in the Rho Ophiuchi star-formimg region

Poshih Chiang (NCUIA), Wen-Ping Chen (NCUIA)

The formation process and the mass function of lowest mass objects are still unclear. A sample of young brown dwarfs offer the opportunity to address both these two questions. However, except two controversial T dwarf candidates in star-forming regions, the majority of T dwarfs found so far are in the field. We present 29 T-dwarf candidates in the Rho Ophiuchi star-forming region, as a result of a deep (21.5 AB mag) methane imaging survey with CFHT/WIRCAM using the CH4ON filter at 1.7 micron. Combining with archival CFHT/WIRCAM JHK and Spitzer/IRAC 3 to 8 micron data, we use K-[4.5] and H-[4.5] as temperatural indicators, and H-CH4ON and [3.6]-[4.5] as indicators of methane absorptions. Objects showing possible methane absorptions and cool temperatures are identified as T-dwarf candidates. We show how our selection is more secure than using colors alone to identify T dwarfs, and how contamination by AGNs and stellar variability is quantified. We also identified 129 very low mass objects with the temperature indicators and their proper motions.

PS12: Time Variability of Emission Lines for Four Active T Tauri Stars

Mei-Yin Chou (ASIAA), Michihiro Takami (ASIAA), Nadine Manset (CFHT), Tracy Beck (STScI), Tae-Soo Pyo (Subaru Telescope), Wen-Ping Chen (NCU), Neelam Panwar (NCU), Jennifer L. Karr (ASIAA), Hsien Shang (ASIAA), Hauyu Baobab Liu (ASIAA)

We present optical spectrophotometric monitoring of four active T Tauri stars (DG Tau, RY Tau, XZ Tau, RW Aur A) at high spectral resolution ($R >= 1 \times 10^4$), to investigate the correlation between time variable mass ejection seen in the jet/wind structure of the driving source and time variable mass accretion probed by optical emission lines. This may allow us to constrain the understanding of the jet/wind launching mechanism, the location of the launching region, and the physical link with magnetospheric mass accretion. In 2010, observations were made at six different epochs to investigate

how daily and monthly variability might affect such a study. We perform comparisons between the line profiles we observed and those in the literature over a period of decades and confirm the presence of time variability separate from the daily and monthly variability during our observations. This is so far consistent with the idea that these line profiles have a long term variability (3-20 years) related to episodic mass ejection suggested by the structures in the extended flow components. We also investigate the correlations between equivalent widths and between luminosities for different lines. We find that these correlations are consistent with the present paradigm of steady magnetospheric mass accretion and emission line regions that are close to the star.

PS13: Gas And Dust In The Protoplanetary Disk Around LKHa 330

I-Hsiu Li (ASIAA), Naomi Hirano (ASIAA)

Protoplanetary disks are mainly gaseous at the beginning. As they evolve, they dissipate gas and become disks composed nearly only of dust. It is important to understand how and when the disks dissipate gas, because the gas dissipation process is closely related to the formation of gaseous giant planet. A young star LkHα 330 is associated with a so-called "transition disk", which is considered to be in the gas dissipation phase. Using the Submillimeter Array (SMA), we have observed the disk of LKHα 330 in dust continuum emission at 230 GHz, 12CO (J=1-0) and 13CO (J=1-0) emission lines. The gas mass derived from molecular lines is 2.25 x 10-3 $M_{\odot}$, while the dust mass derived from continuum emission is 2.67 x 10-4 $M_{\odot}$. The gas to dust ratio is derived to be 8.4, which is much lower than in normal interstellar medium (ISM), gas/dust=100. This suggests that a large portion of gas has already dissipated in the disk of LkHα 330, and that this disk is a rather evolved protoplanetary disk.

PS14: Probing the magnetic field structure in the filamentary cloud IC5146

Jia-Wei Wang (NTHU), Chakali Eswaraiah (ARIES, India), Shih-Ping Lai (NTHU), Wen-Ping Chen (NCU), Anil K. Pandey (ARIES, India)

Recent Herschel and Spitzer survey found a lot of filamentary clouds in the star-forming regions, which are one of the potential birth sites for massive star or cluster formation. However, how filamentary clouds form is still on debate. The filamentary clouds may form from compression of large scale convergent flows (Mac Low & Klessen 2004), while other theoretical works suggest filamentary clouds may result from the gas collapsing along the field line of a strong magnetic field (Ostriker et al. 2001). To evaluate the relative importance of these two mechanisms on filament formation, the magnetic field measurement would provide crucial information. Here we present our optical polarization observations toward IC5146 taken with AIMPOL in ARIES, India and TRIPOL in Lulin. IC5146 is one of the filamentary clouds observed in Herschel Gould Belt Survey, and the complex network of filaments discovered within the cloud favors the scenario that the filaments network are generated by large scale MHD turbulence and fragment into prestellar cores by gravitational instability (Arzoumanian et al. 2011). Our results reveal that the large scale structure of magnetic field is well perpendicular to the main filament, but is likely parallel to the sub-filaments, which are structure extended out from the main filaments. In addition, our CO observations show that the material in the sub-filament is flowing to the main-filament along the magnetic field. Those results suggest that the sub-filaments may be the cloud which is not gravitationally bounded and can flow into the main-filament along the magnetic field.

On the other hand, the main-filament is possibility the filament bounded gravitationally. Our results demonstrate how a magnetized filament evolves from gravitationally unbounded to bounded.

PS15: Modeling Magnetic Fields in Protostellar Cores Using Interferometric Polarization Measurements

Lai, Shih-Ping (National Tsing-Hua University)

Whether magnetic fields play a crucial role in star formation is one of the most debated topics in astronomy studies. Detecting linearly polarized thermal dust emission is the most commonly used method for measuring the magnetic fields in protostellar cores; however, because the observed dust polarization emission is an integrated quantity, it is difficult to compare the observations with the theoretical models. Here we attempt to take the advantage of the property of the interferometric observations, which are natural spatial filters that give us the power of the structure within a range of lengths scales. We first construct simple empirical models for density and magnetic fields. With the assumption of constant dust opacity and small dust alignment efficiency, we compute the Stokes I, Q, and U maps of the empirical models and convolve them with interferometer responses to generate polarization maps. A set of field geometries including poloidal and toroidal components has been modeled for a range of viewing angels with respect to the line of sight. The polarization maps of the sample fields are presented along with their features discussed. With the comparison between the best-fit models and the observations of NGC1333 IRAS 4A, DR 21(OH) and L1157, we determine whether simple geometries, such as hourglass and twisted magnetic tubes, can be used to describe the magnetic field structure at various length scales.

PS16: Torus-like and Outflow in the Proto-Planetary Nebula IRAS 17150-3224

Tzu-Ying Chen (NTNU/ASIAA), Chin-Fei Lee (ASIAA)

IRAS 17150-3224 is a bipolar proto-planetary nebula (PPN) with a series of dust shells in the optical image (Kwok et al, 1998). It is one of the best candidates for studying this short-lived episode between the asymptotic giant branch star phase and the planetary nebula during the intermediate mass star evolution. We have mapped it in CO J = 2-1 with the Submillimeter Array (SMA) at about 1 arcsec resolution. A dusty torus is seen cut low velocity perpendicular to the outflow axis. From the Position-Velocity diagram (PV diagram), the torus is expanding at $\sim$10 kms^{-1} away from the central star. In order to obtain more precise physical properties (density, temperature and velocity distribution of the torus, and the mass-loss rate), we use a radiative transfer model to model the torus. In our model, we also include a warm blackbody radiation at the center of the torus to produce the compact emission at the center. From the image and the speed of outflow, it shows the last $\sim$ 1000 yr history of mass ejection from the central star.Llater the star is surrounded by a dense torus, and results in the bipolar outflow.

PS17: The circumstellar disk of AB Aurigae: evidence for envelope accretion at late stages of star formation?

Ya-Wen Tang (ASIAA), Stephane Guilloteau (LAB/CNRS, France), Vincent Pietu (IRAM, France), Anne Dutrey (LAB/CNRS, France), Paul T. P. Ho (ASIAA; CfA, USA), Nagayoshi Ohashi (Subaru telescope)

More and more circumstellar discs around pre-main-sequence stars are found to have complex structures, such as great cavities seen in thermal dust emission and spiral-like features seen in the optical near-infrared images. Among them, AB Aurigae exhibits a spectacular spiral pattern. One popular formation mechanism often invoked for these two structures is the gravitational perturbation created by embedded companion/brown dwarf in the disks. However, the explanations of the spiral formations are purely based on the morphologies due to the lack of the kinematic information. We have observed the AB Aurigae system with high sensitivity and high angular resolution to trace the kinematics of the spirals using CO lines with the Submillimeter Array, the Plateau de Bure Inteferometer and the 30-m. Using the ^{12}CO 2-1 images with 0.5" resolution of AB Aurigae, we found the " spiral" like features appear counter-rotating with respect to the circumstellar disc. Late accretion from the envelope above and below the disc plane is the simplest mechanism to form these molecular spirals. Beside the spirals, the dense disk of AB Aurigae is resolved into an inner disk, an outer ring and a dust gap with a width of 50 AU using the 1.3 mm continuum (dust) emission. This suggests that there is an undetected companion with a mass of 0.03 M_{sun} at a radius of 45 AU.

PS18: The Infall Motions in the W3(OH) Massive Star-Forming Region Traced by HCO^+

Wei-Ting Kuo (National Tsing Hua University), Vivien Chen (National Tsing Hua University)

The W3(OH) massive star-forming region is in the course of developing a small OB stellar group, including a hot core, W3(H2O), an ultra-compact HII region,W3(OH), and at least seven HII regions. Using the Arizona Radio Observatory (ARO) 12m Telescope and the C and D configurations of the Berkeley-Illinois-Maryland Association Millimeter Array, we have imaged the HCO+(1-0) emission to study the infall motions in W3(OH) region at an angular resolution of 6.3". Our results show the blue-skewed infall asymmetry spectra in the circumcluster envelope, suggesting a large-scale ongoing collapse over 100". As a first step to describe the infall motions, we use RATRAN (Hogerheijde & van der Tak 2000) and analytical infall model (De Vries & Myers 2005) to analyze our data cube. We will discuss the results of our analysis and the implications to the formation of this OB group.

PS19: Orion KL: the Hot Molecular Core - from the Eye of ALMA

Yo-Ling, Chuang (National Taiwan Normal University), Yi-Jehng, Kuan (National Taiwan Normal University), Ronny, Zhao-Geisler (National Taiwan Normal University), Yu-Sen, Hsu (National Taiwan Normal University)

Known to be the nearest massive star-forming region from the Sun, Orion KL has been widely studied over past decades. A large variety of organic molecular species including simple and complex molecules, like H_2CO, C_2H_5CN, have been found in this hot molecular core. To explain the chemical diversity observed in Orion KL, many chemical models have been proposed but remain unsatisfactory.

One of the key questions in astrobiology to be answered is whether the rich chemistry found in the Orion KL hot molecular core could have led to the development of prebiotically important complex organic molecules or not in interstellar space. Therefore, high sensitivity and precise measurements of the physical temperatures and hence temperature gradient within the Orion giant molecular cloud, as well as the spatial distributions of various organic species, are essential to understand both the physical and chemical environments of this hot molecular core. Being the most powerful observing facilities in existence on Earth, during its Commissioning and Science Verification phase, the Atacama Large Millimeter/submillimeter Array (ALMA) observed a number of targets of scientific significance at arcsecond and subarcsecond resolution in millimeter and submillimeter wavebands, respectively. Due to its uniqueness in chemical richness, Orion KL was surely chosen by the ALMA as one of its main SV targets. With sixteen 12-m antennas in operation hence 120 baselines, Orion KL was observed at a resolution of about $1.4'' \times 0.8''$ in band-scan mode between 215 to 245 GHz at 1.3 mm and reached an amazing sensitivity of about 15 mJy/beam. In preparation for our actual 9.5-hour Cycle 0 data soon to be delivered, as an exercise to accustom ourselves to ALMA data format and the CASA data-analysis software, we have thus used ALMA SV data to study some important organic molecular species in Orion KL. In this meeting, based on the Orin KL SV data, we will present our preliminary analysis and interesting findings of some important organic molecules – from a brand-new perspective through the eye of ALMA.

PS20: Simulating the collapse of a molecular cloud

Sheng-Jun Lin (NTHU), Shih-Ping Lai (NTHU)

Star formation is a complex problem involving not only the gravitational force, but also the diffusion of angular momentum and magnetic fields as well as the radiation feedback. Analytical solutions for star formation have only be obtained for the simplest case, i.e., the inside-out collapse model that considers only gravity for the formation of a single star. Therefore, numerical simulation has been widely used to study the star formation problem. Here we aim to understand the fragmentation of molecular cores and the formation of binary, since most of the stars are in binary/multiple system. As a start, we use Athena code to simulate the single star formation and compare the results to the inside-out collapse model. We choose to use Athena code developed by the Princeton group, because it is a grid-based non-ideal magnetohydrodynamics code that can deal with ambipolar diffusion and self-gravity which can affect the dynamics of the clouds substantially. We will present our simulation results for the cases of single star formation with and without ambipolar diffusion.

PS21: Measuring Rotational Speed by High-Dispersion Spectra of Classical Be Stars with Infrared Excess

Pei-Min Shen (Graduate Institute of Astronomy,National Central University,Taiwan), Wen-Ping Chen (Graduate Institute of Astronomy,National Central University,Taiwan), Chien-De Lee (Graduate Institute of Astronomy,National Central University,Taiwan)

Classical Be stars are fast-rotating, B-type stars with emission lines in their spectral. Using the echelle spectrograph mounted on the 2.4 m telescope of the National Astronomical Research Institute of Thailand (NARIT), we have acquired high-dispersion spectra (R 10000) of three classical Be stars, R CMa, BD 56573 and HD 50138, with the goal to measure their rotational velocities. These target stars

were selected for their excessive near-infrared radiation arising from dust thermal emission. We present the hypothesis of infrared excess in relation to stellar fast rotation and dust formation.

PS22: Identification of faint members in open cluster by Pan-STARRS and PPMXL data

Chung-Kai Huang (Institute of Astronomy, National Central University, Chung-Li, 32001, Taiwan), Chien-Cheng Lin (Institute of Astronomy, National Central University, Chung-Li, 32001, Taiwan), Wen-Ping Chen (Institute of Astronomy, National Central University, Chung-Li, 32001, Taiwan)

Open Clusters play an important role in studying stellar evolution, as well as the formation and evolution of the Galactic disk. Identification of member stars in a star cluster is the first step to derive the fundamental physical parameters of the cluster, such as the distance, age, size, spatial distribution, reddening, and metallicity. In particular, possible tidal structure related to the internal dynamical evolution and external influence by the Galactic environments can be inferred. As a pilot program to identify and study the low-mass members in open clusters, or substellar objects for nearby clusters, we present here analysis of NGC 752 and NGC 5822 by using the PPMXL proper motion data and deep Pan-STARRS photometry to characterize (e.g., binarity and mass segregation) the low-mass members in these clusters.

PS23: Search for and Characterization of Open Clusters Toward the Galactic Anticenter with Pan-STARRS1

Chien-Cheng Lin (林建爭) (National Central University), Wen-Ping Chen (陳文屏) (National Central University)

We have used a star-count algorithm based on the 3-pi sky survey data taken by the Panoramic Survey Telescope And Rapid Response System to identify and characterize uncharted open clusters (OCs). With limiting magnitudes of about 22 mag in g_{p1}, r_{p1}, i_{p1} bands and about 20 mag in z_{p1} and y_{p1} bands, our data are 100 times more sensitive than currently available surveys. We have analyzed a field of 20 deg times 20 deg toward the Galactic anticenter and found 1660 density enhancement regions of which 79 (out of 129) are known OCs, and 949 are OC candidates. We will present several cases for which previously unknown OCs are characterized by our study.

PS24: Multi-bands Light Curves of Classical Cepheids from Pan-STARRS1 3π data：Preliminary Results Based on Differential Photometry

I-Ling, Lin (Graduate Institute of Astronomy, National Central University, Jhongli City, 32001, Taiwan)

PS1 (Pan-STARRS1，the Panoramic Survey Telescope and Rapid Response System) is a multi-bands and multi-epoch survey project, by using a 1.8 meter wide field telescope (located at Mount Haleakela, Mauna Kea, Hawaii). PS1 telescope is equipped with a CCD camera that has 1.4 billion pixels, composed with 60 Orthogonal Transfer Arrays (OTAs), to form a field of view of 7 degree square. The camera includes a set of 5 filters: g, r, i, z, and y. Cepheids are useful standard candles that can be used to determine the distances to nearby galaxies. Properties of Cepheids are well investigated in BVI filters; however they are not well studied in grizy filters. Therefore the goal of our project is to characterize

the known Cepheids from PS1 3π data, and deriving accurate mean magnitudes for these Cepheids in PS1 photometry system. This will allow us to calibrate the Cepheids' period-luminosity relations in PS1 system. Since there are only few data points available in each band for a given Cepheid from PS1 3π survey, we will stack the light curves to generate template light curves. The template light curves can then be used to obtain accurate mean magnitudes for all Cepheids. We adapted the differential photometry method in our analysis to deal with possible calibration issue in PS1 3π data. Using the method, we can obtain relative light curves of Cepheids by removing systematic effects. In this work we present preliminary light curves for several Cepheids based on the differential photometry method.

PS25: Spectro-imaging of the Mira variable W Hya with MIDI/VLTI

Ronny Zhao-Geisler (National Taiwan Normal University, Taipei, Taiwan and Institute of Astronomy and Astrophysics, Academia Sinica, Taipei, Taiwan), Rainer Köhler (Max-Planck-Institut für Astronomy, Heidelberg, Germany), Andreas Quirrenbach (Zentrum für Astronomie der Universität Heidelberg, Heidelberg, Germany), Bruno Lopez (Laboratoire J.-L. Lagrange, Nice, France)

Asymptotic giant branch stars are among the most important distributors of dust into the interstellar medium. However, the dust formation process and in particular the importance of asymmetric mass-loss are not fully understood. Image reconstruction techniques can then be used to model non-simple source morphologies. Images for one of the closest and best studied oxygen-rich evolved star, W Hya, could be obtained in 25 wavelengths bins in the dust sensitive mid-IR. The appearance is clearly non-symmetric and wavelengths dependent. The photosphere, molecular layers and inner dust formation zone, where aluminum oxide condensates, could be resolved. The dust forms only along certain outflow directions.

PS26: Molecules in Planetary Nebula

Tatsuhiko Hasegawa (ASIAA)

Molecular abundances are observationally determined from observations for the Planetary Nebula NGC 6302. The molecular abundances are consistent with chemical models.

PS27: Periodogram Analysis and Space Motion of AZ Capricorni – A Low-Mass Member in the Beta Pictoris Moving Group

C. Y. Chen (陳長趯) *(Dept. of Physics, National Central University, Taiwan), W. P. Chen* (陳文屏) *(Dept. of Physics, National Central University, Taiwan, Institute of Astronomy, National Central University, Taiwan)*

AZ Capricorni (BD-17°6128), is an X-ray source and a variable star with uncertain variability. This star is one of the members in the Beta Pictoris moving group (BPMG). We had analyzed a three-year light curve of AZ Cap from 2010 to 2012. A 3.40 day period was found for the 2012 data, which is consistent with what is claimed in the literature. However, no such period was clearly seen in the 2011 data, during which the star seemed to display abrupt brightness changes. We also found that the star has a close companion. Here we present the periodogram analysis on different segments of the light curve of AZ Cap and clarify the space motion, hence the relation, with the companion.

PS28: Swift X-ray Source Catalog

Kwan Lok (Li)

Swift has been launched to the space and started to monitor the X-ray sky since 2004. With the five years data taken from November 2004 to March 2012, we are able to discover various compact objects by examining the X-ray images. In this work, we performed source detections on the large field of view Swift/XRT images and crosschecked the detected source candidates with various long-term optical databases including PTF and CRTS. Our goals are to 1) make a full X-ray sources catalog of Swift which could be useful for various studies; 2) identify the X-ray sources that could possibly be tidal disruption events (TDE), SSS/ULX transients, black hole binaries, and X-ray bursters.

PS29: Discovery of X-ray Pulsation from the Geminga-like Pulsar PSR J2021+4026

Kaiting Li (China Medical University), Chun-Yu Hsu (National Chung-Hsin University), Lupin Lin (China Medical University), Chin-Ping Hu (National Central University), Yi Chou (National Central University), Regina Huang (National Tsing-Hua University), Jason Wu (National Tsing-Hua University)

We report the discovery of X-ray periodicity of ～265.3 ms from a deep XMM- Newton observation of the radio-quiet gamma -ray pulsar, PSR J2021+4026, located at the edge of the supernova remnant G78.2+2.1 (gamma-Cygni). The detected frequency is consistent with the gamma-ray pulsation determined by the observation of Fermi Gamma-ray Space Telescope at the same epoch. The X-ray folded light curve has a sinusoidal-like profile, which is significantly different from the gamma-ray pulse profile. Together with the phase offset between the X-ray and gamma-ray pulse profiles, the X-rays and the gamma-rays from this pulsar are most likely originated from different regions in the magnetosphere. Both energy-resolved temporal analysis and the phase-averaged analysis suggest a thermal nature of the observed X-ray pulsation. This is the third member in the class of radio-quiet pulsars with the significant pulsations detected from both X-rays and gamma-ray regimes.

PS30: Simulating x-ray emission from the Fermi Bubbles at the Galactic center

Chung-Ming Ko (Institute of Astronomy, Department of Physics and Center for Complex Systems, National Central University, Jhongli, Taiwan 320, R.O.C.)

In the second half of 2010, a detail analysis of the Fermi LAT data discovered two giant gamma-ray bubbles above and below our Galactic center. The bubbles extend 50 degree above and low the Galactic plane and about 40 degree in longitude. The spatial distributions correlated with the ROSAT x-ray map at 1.5 keV and the WMAP haze near the Galactic plane. From the ROSAT data, the edge of the bubbles near the Galactic plane is around 3 to 4 kpc. In this contribution, we use the hydrodynamic code PLUTO to simulate the formation of the bubbles. We model the bubbles as the result of star captures by the central supermassive black hole. We compare the thermal bremsstrahlung of the bubbles from single capture and multiple captures.

PS31: A statistical study of ultraluminous X-ray sources and their host galaxies

Chun-Cheng Lin (National Tsing Hua University), A. K. H. Kong (National Tsing Hua University), Lin-Wen Chen (National Taiwan Normal University)

We present the statistical results of ultraluminous X-ray source (ULX) candidates (Lx $> 10^{39}$ erg/s) in terms of their host galaxy morphology. Our ULX samples are a collection of 5 different catalogs based on Chandra observations; there are 371 ULXs in 704 observations in total. In this presentation, we focus on the long-term X-ray variability function and X-ray luminosity function of ULXs. For the X-ray variability functions, we compute the ratios of maximum flux to munimum flux of a source between any two observations and show that the ULX variability functions of spiral galaxies are flatter than those of elliptical galaxies. This is consistent with previous works based on a small sample of galaxies (Feng & Kaaret 2006; Chiang & Kong 2011). For the X-ray luminosity functions, we select the maximum flux among different observations of a source estimated by the Portable, Interacitve Multi-Mission Simulator (PIMMS) and they can be fitted with an exponential cutoff power-law model in all types of galaxies. The cutoff luminosity of spirals is larger than that of ellipticals. We suggest that there may exist a different population of ULXs in spirals in the high luminosity end, which could not be fitted with an exponential cut-off power-law model.

PS32: Elliptical galaxies in different environments

Chen Jhen-Yu (陳振予) *(Institude of Astronomy, National Central University), Hwang Chorng-Yuan* (黃崇源) *(Institude of Astronomy, National Central University)*

We study the ellipticity distributions of elliptical galaxies in different dense regions. Our sample is selected from the SDSS DR9. We divide the sample into two groups with different surface density. We find the ellipticity distributions and colors of these elliptical galaxies are different in these two regions. We will discuss the implication of this result in galaxy formation.

PS33: A young low-mass extremely star formation galaxy class at z<2

Chen Fatt Lim (National Taiwan Normal University)

Although we know that stars are formed from molecular gas , the star-formation law of young galaxies, especially at high-redshift is still subject to debate. We also have evidences that the star-formation rate density (SFRD) decline steeply from z∼2 to the present and that the locus of star-formation migrate from massive and dense sites to low-mass more isolated galaxies today. We have recently developed a method based on braod-band photometry to isolate a class of rare, compact galaxies that display an extremely high equivalent width emission line up to z∼2. Those galaxies share similar properties with Blue compact dwarfs (BCDs) in the local Universe, UV-luminous galaxies (UVLGs) at low redshifts and Lyα emitters (LAEs) at high redshifts. They are low stellar mass, low metallicity and living in low density environment, but they display an extremely high SFR. This type of galaxy may simply be the last remnants of a star formation mode which common in the early Universe! We will discuss the selection and some of the properties of these objects, and describe our future plans , particularly the project to observe their gas content with ALMA to investigate their star-formation law.

PS34: Investigate the y-and images of merging galaxy systems

Lin Yi-Fan (National Central University), Hwang Chorng-Yuan (National Central University)

We study the y-band images of merging galaxies from the observations of the Panoramic Survey Telescope & Rapid Response System (Pan-STARRS). The merging systems were selected from the merging catalog of Hwang & Chang 2009, which were identified by checking the images of the Red-sequence Cluster Survey 2 from the observations of the Canada France Hawaii Telescope (CFHT). By using a homomorphic-aperture method developed by Huang & Hwang (in preparation), we determine the photometric results of these merging systems. To obtain results with accurate photometry, we calibrate the r- and z- band data to match the results of the SDSS DR9. To calibrate the y band data, we use the conversions between the Pan-STARRS1 photometric system and SDSS from Tonry et al. (2012). We investigate the physical properties of these merging galaxies using the z-y, r-z colors and identify particular merging galaxies with extreme colors.

PS35: Use the N-nearest Neighbours Method estimate the evolution of galaxy property and environment from z=0 2 with the data of UKIDSS-UDS

Kuan Chen (NTNU), Sebastien R.A. Foucaud (NTNU)

In a long-running debate, we are still unsure if the properties of today' s galaxy, in particular their morphology and star-formation rate, are the result of peer pressure by galaxy local environment, or natural secular evolution by internal processes (related to the galaxy mass). To investigate this problem further, we use the DR8 data of UKIDSS-UDS (the deepest NIR data for a significant volume to date) to select a mass-limited sample of galaxies. Using simple estimators of density at physical scales of 1Mpc (such as projected density, or N-nearest Neighbours Method), we investigate the evolution of galaxy colours as a function of their stellar masses and environments from z=0 to z=2. We discuss here the limitations of this methods and present some preliminary results.

PS36: The Relation between large scale structure and kinematic and photometric properties of galaxies.

Shou-Lun Cheng (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University)

We are conducting the investigation of the relationship between large scale structure(LSS) and properties of galaxies, using SDSS dr9. The large scale structure(LSS) forming is a huge distribution of galaxies on the space of universe, so if we know some relationship between the LSS and the kinematics properties of galaxies, maybe we can infer how LSS forming, or rewind the LSS forming. Our goal is to understand the formation and evolution of large scale structure(LSS) by investigating the relation between the kinematic and photometric properties of galaxies and their large scale environments.

PS37: K-band selected galaxy luminosity function in cluster

Chi-Chun Lung (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University)

We are constructing the investigation of the K-band selected galaxies luminosity function in clusters, and the data sets we will use the Sloan Digital Sky Survey(SDSS) DR9, and United Kingdom Infrared Digital Sky Survey (UKIDSS) of Large Area Survey (LAS) DR8. For the K-band galaxies luminosity function, it is a good tracer for the stellar mass, also the dust obscuration won't be affected. Furthermore, the galaxy in cluster can help us to environment between $0 < z < 0.5$. Our goals are to get the luminosity function and to know the environment galaxies in clusters to see what different in between $0 < z < 0.5$ and different environment.

PS38: Estimate Mass of Galaxy Clusters via Counting

Hao-Yuan Duan 段皓元 (ASIAA), Yen-Ting Lin 林彥廷 (ASIAA)

In this work we are developing a new way to estimate the mass of galaxy clusters. We present some templates of spatial profiles of total galaxy luminosity and number from our low-redshift ($z<0.2$) cluster sample, using data from the Sloan Digital Sky Survey. The mass of our clusters have been measured to high precision using deep Chandra observations. After binning clusters in different mass ranges, we produce luminosity profiles and surface density profiles for each cluster subsample, using a statistical background subtraction method. The result shows that the profiles are quite different for the mass bins, and thus these profiles can be used to estimate the mass of an unknown cluster. It will be very useful for large optical/infrared surveys.

PS39: Can MOND explain the velocity dispersion measurement in clusters of galaxies?

Chia-Jung Chuang (莊佳蓉) (Institute of Astronomy, National Central University, Jhongli, Taiwan 320, R.O.C.), Chung-Ming Ko (Institute of Astronomy, Department of Physics and Center for Complex Systems, National Central University, Jhongli, Taiwan 320, R.O.C.), Ting-Hung Peng (Institute of Astronomy, National Central University, Jhongli, Taiwan 320, R.O.C.)

Zwicky (1933) proposed that our Universe contains a large amount of unseen matter (a.k.a. missing mass problem) when he found a large discrepancy between the dynamical mass and the luminous mass in Coma cluster. Similar discrepancies in other scales were observed since then. Apparently, the dynamical mass is at least several times larger than the luminous mass for objects at the scale of galaxy or larger. Dark matter (in particular non-baryonic dark matter) is usually invoked to account for the discrepancy. MOND (MOdified Newtonian dynamic proposed by Milgrom in 1983) is an alternative explanation. In fact, MOND is more successful in the galaxy scale such as Tully-Fisher relation and rotation curves of spiral galaxies. Wojtak et al. (2011) used data of velocity of galaxies in 7800 clusters of galaxies from the Sloan Digital Sky Survey to compute the gravitational redshift. They claimed that MOND could be ruled out by their gravitational redshift result. We re-analyze their data on velocity dispersion. We fit the velocity dispersion (and the gravitational redshift) with Hernquist model in MOND and find that MOND is in the acceptable range.

PS40: Environmental effects on the relations between star formation history and clustercentric distance in the Shapley Supercluster

Pei-Li Ho (NTNU/CWB), Lin-Wen Chen (NTNU)

By using 4000 Å break strength (D4000) as an indicator of galaxy star formation history, we select galaxies within 5 r_{200} of host clusters/groups in the Shapley supercluster (SSC) and analyze the dependence of D4000−radius relations on properties of their host clusters/groups, as well as on galaxy stellar mass. A total of 69 clusters/groups are divided into two populations based on the difference in M_{200}, X-ray detection, and merging features, respectively. The selected galaxies are further divided into 4 subclasses based on K-band absolute magnitude M_k. Our results show that: (1) The variation patterns in D4000-radius relations are highly dependent on galaxy stellar mass for all examined populations. (2) For more massive, X-ray detected clusters, the mean strength of 4000 Å break is mostly stronger even out to $3-5r_{200}$ for all M_k ranges. (3) For galaxies located in clusters/groups with similar M_{200} or velocity dispersion, but different in X-ray detection, those in X-ray detected clusters/groups show stronger 4000 Å break strength, this may imply that clusters/groups with X-ray detection have accreted materials for a longer period of time. (4) In merging clusters, the faint low mass galaxies are younger than those in non-merging systems from cluster center out to $3-5r_{200}$, the enhanced star formation activity is possibly triggered by merging events. (5) The difference in D4000−radius relations between two populations shown in this study is most pronounced for low-mass galaxies, it means that low mass, gas-rich galaxies are most sensitive to their environments.

PS41: The Role of the Intra-group Medium on Group Galaxy Evolution

Zong-Xian Gao (高宗賢) *(Department of Earth Sciences, National Taiwan Normal University), Lin-Wen Chen* (陳林文) *(Department of Earth Sciences, National Taiwan Normal University)*

The disk galaxies in clusters or groups are expected to lose a certain amount of their halo gas through ram-pressure stripping of the intergalactic medium in these systems. While the intra-cluster medium is thought to be more efficient in the stripping process, different stages of the slower evolution of group galaxies affected by the intra-group medium (IgM) may be observable in galaxy groups across a range of redshifts. Some simulations have further suggested that the IgM stripping can subsequently reduce the pressure at disk/halo interface and metallicity, and finally result in an increase of the massive star birth rate in the next generation stars of the stripped galaxies. To investigate the role of the IgM in modifying the mass function of group galaxies, we select more than 100 galaxy groups (up to redshift $\sim$ 1) detected by XMM in the COSMOS field, and compare the average fractions of high-activity galaxies (indicated by NUV-R color index) in groups in different categories (defined by group mass and redshift). We also analyze the association of dusty galaxies (IR and sub-millimeter galaxies) with groups in the COSMOS field, which can provide a clue to how proto starburst galaxies formed in groups at high redshift and their detection rate by ALMA.

PS42: NIR AO imaging and lens model for UM673

Ekaterina Koptelova (Physics Department, National Taiwan University), Tzihong Chiueh (Physics Department, National Taiwan University)

We present high-resolution deep adaptive optics imaging of the double lensed quasar UM673A&B with the Subaru IRCS instrument. The quasar is lensed by a galaxy at z=0.49 which is very well-detected in the Subaru NIR images. We measure optical properties of the lensing galaxy and a bright nearby galaxy in the field of UM673. In the Subaru images of UM673 we also discover a previously undetected faint galaxy within 10 arcsec from UM673. We use optical properties of the lensing and nearby galaxies, positions of the quasar images, the flux ratio and time delay between the two images of UM673 measured by us, to construct the model of the lens. We find that, apart from the main lens, there is an additional lensing effect from the nearby galaxies in the field of view of UM673 which can be described with two parameters, the shear and its orientation. We also find that in order to explain the observed flux ratio and time delay between the two images of UM673 one has to assume the presence of another intervening galaxy on the line of sight to the quasar.

PS43: Determining the dust composition of AGN from Spitzer-IRS Spectroscopy

Huan-Ting Peng (NTNU, ASIAA), F.Markwick-Kemper (ASIAA), Srinivasan, Sundar (ASIAA), Sebastien Foucaud (NTNU)

Forming dust is difficult, it needs a high density and low temperature (<2000K) environment. Therefore, where the dust in the torus around Active Galactic Nuclei (AGN) comes from is an interesting question. It could be processed interstellar dust, or, as Elvis et al (2002) proposed, it could be formed in the wind lifting off the accretion disk. Assuming this is the case, we can analyze the composition of this dust using mid-IR spectroscopy (Markwick- Kemper et al. 2007). Silicate features have been detected in emission at 9.7 and 18 mum and have been seen in the spectrum of several quasars and AGN (Siebenmorgen et al.2005; Sturm et al.2005; Hao et al. 2005; Shi et al.2006; Markwick- Kemper et al. 2007). In this study, we fit the Spitzer Space Telescope InfraRed Spectrograph (IRS) data of AGN with a power-law continuum model, and an optically thin dust component. We use the opacities for six different species (Corundum(Al2O3), Periclase(MgO), PAHs, Amorphous Olivine, Mg-rich Amorphous Olivine, and Forsterite(Mg2SiO4)) calculated from laboratory data using a Continuous Distribution of Ellipsoids (CDE) or Mie Theory (MIE). Fitting the spectra with this model, we can identify the dust features in the spectrum determine the composition of the dust around AGN. We have successfully applied the model to PG2112+059.

PS44: The spatial distribution of AGNs in and outside of clusters.

Chia-Ju Hsu (National Taiwan Normal University)

We are conducting the investigation of the relationship between the AGNs and Clusters. Datasets are mainly taken from Sloan Digital Sky Survey (SDSS) DR7. Our goal is to know the environmental influence on the physical properties of AGNs, by comparing AGN populations inside and outside of clusters.

PS45: Investigation of the Relation Between Dust-to-Gas Ratio and Metallicity by Gamma Ray Burst Afterglow Extinction

郭子銘 *(Kuo, Tzu-Ming)* (中央研究院天文及天文物理研究所 / 國立臺灣大學物理學系), 平下博之 *(Hirashita, Hiroyuki)* (中央研究院天文及天文物理研究所)

We utilize the Gamma ray burst afterglow (GRBA) extinctions observed by Zafar et al. (2013) to investigate the the relation between dust-to-gas ratio and metallicity in GRB host galaxies. We attain that even though roughly there is a correlation between the metallicity (Z) and dust-to-das ratio (D) of the data points derived from the extinction curves of gamma-ray burst afterglows, in comparison with the theoretical results predicted by the models or the data points acquired from blue compact dwarf galaxies (BCDs) and spiral galaxies (SPs), the ones of GRBAs are actually excessively dust-rich.

PS46: First detection of the Ground State Alignment effect: A New Technique for Measuring Milligauss Magnetic Fields

Ren-Shiang Sung (National Tsing Hua University), Shih-Ping Lai (National Tsing Hua University)

We present the first detection of the Ground State Alignment (GSA) effect that has been proposed by Yan & Lazarian (2006, 2007, 2008) as a new technique for measuring milligauss magnetic fields. Based on Yan & Lazrian's theory, GSA occurs commonly in ISM when atoms' angular momentum are pumped by anisotopic illuminating light or modified by precession in a magnetic field, and they also show that GSA can gives the 3D field direction which cannot be achieved by other magnetic field measurement method for weak fields. We carried out spectropolarimetric observations three times in 2012 using ESPaDOnS of CFHT toward Jupiter's satellite Io whose a sodium corona has the highest sodium column density in the solar system. Because the sodium corona is highly variable and the GSA effect can be detectable only in the emission lines, we obtained a 3 sigma level detection only in the third observation when the emission line is detectable. We are proposing follow-up observations with CFHT. If our detection is repeatable, our observation is the first ever detection to demonstrate the GSA can be used for magnetic measurement.

PS47: Angular and Polarization Correlations of Double-Excitation Resonances in Mg

Cheng-Liang Lu (盧政良) *(Department of Physics, National Taiwan University, Taipei, Taiwan 106, Republic of China), Ju-Tang Hsiao* (蕭儒棠) *(Research Center for Testing and Assessment, National Academy for Educational Research, New Taipei City, Taiwan 237, R.O.C.), Hsin-Chang Chi* (紀信昌) *(Department of Physics, National Dong Hwa University, Hualien, Taiwan 974, R.O.C.), Keh-Ning Huang* (黃克寧) *(Institute of Atomic and Molecular Sciences, Academia Sinica, P.O. Box 23-166, Taipei, Taiwan 106, Republic of China)*

In many astrophysical systems, photoionization of atoms and ions is described as one of the fundamental process occurring. Magnesium is seen to be one of the most important metals in the interstellar medium (ISM) (Sofia *et al*. 2001). In addition, Mg is the newly discovered element in Mercury's exosphere (Killen *et al*. 2010). The magnesium atom has been detected also in solar and stellar photospheres by both $\Delta n = 1$ emission and absorption involving lower-l Rydberg levels (MacAdam *et al*. 2012). These considerations show that photoionization studies of Mg has been a challenge in connection with its key

role in the ISM. Photoionization parameters in magnesium are calculated in the multiconfiguration relativistic random-phase approximation to resolve the interplay between relativistic and correlation effects. The angular distribution and spin polarization of photoelectrons from valence subshell 3s show strong dependence on core-shielding effects. Precise energies and widths of all five Rydberg series of doubly-excited states $(3pns)\,^{1,3}P_1^o$, $(3pnd)\,^{1,3}P_1^o$, and $(3pnd)\,^3D_1^o$ between the $Mg^+[3s]$ and $Mg^+[3p]$ thresholds are given. Comparisons are made with previous theoretical works and experimental measurements.

PS48: How to make an astronomical CCD imager?

Kinoshita Daisuke (Institute of Astronomy, National Central University), Chen Tse-Chuan (Institute of Astronomy, National Central University)

We have developed a CCD imager "NCUcam-1" as an unit camera for our visible 4-color simultaneous imager "Dogioya". In order to have a good sensitivity even at longer wavelength, we chose a fully depleted CCD chip as a detector of the imager. The assembly of the camera system has been done in the laboratory in NCU main campus, and the first-light observation using 1-m telescope at Lulin observatory was achieved in summer 2011. We had several test observing runs since then, and also carried out a series of laboratory experiments to characterize NCUcam-1 using an integrating sphere. The whole system of Dogioya will be shipped to Hawaii this year, and will be operated with 2.2-m UH88 telescope at the summit of Mauna Kea. The instrument will be intensively used for follow-up observations for discoveries by large-scale surveys, such as Pan-STARRS and PTF. We report the design, development, and performance of NCUcam-1 as well as the overview of Dogioya system.

PS49: The ALMA Project: Status and Science

Yu-Nung Su (ASIAA), ALMA-T ARC (ASIAA)

In this poster, we present the latest status and progress of the Atacama Large Millimeter and submillimeter Array (ALMA) project. In 2013 March, ALMA was inaugurated at an official ceremony. This event marks the milestone of the completion of all the major systems of the giant telescope and the formal transition from a construction project to a fully-fledged observatory. Including Taiwan, ALMA is a partnership between Europe, North America and East Asia in cooperation with the Republic of Chile. ALMA is the most powerful telescope for observing the cool Universe. Since late 2011 ALMA has commenced early science observation for astronomers around the globe. The first round of observing session (named Cycle0 Early Science) ended in 2012 December, and Cycle 1 Early Science Observations have been started since early 2013. The next call for ALMA proposals will be issued in the third quarter of 2013. All Taiwanese physicists and astrophysicists are encouraged to submit their observing plans with ALMA.

PS50: Possible THz Single-Dish Science by Greenland Telescope

Hiroyuki Hirashita (ASIAA), Satoki Matsushita (ASIAA), Patrick M. Koch (ASIAA), GLT team (ASIAA)

We are planning to install an ALMA North America prototype antenna at the 3,200 m Summit Station in Greenland in collaboration with SAO, Haystack Observatory, and NRAO. The Greenland Telescope (GLT) is thus used for terahertz (THz) and submillimeter observations in an extremely good

atmospheric condition. Overall, ground-based THz observations are suitable to reveal "Star Formation – its Processes and Consequences" because the THz frequency range covers the emission from various interstellar tracers associated with star formation and the interstellar medium (ISM). More specifically, our possible targets are as follows: (i) observations of interstellar lines that can trace key molecular species (CH and HD_2^+) and ionized gas ([NII]); (ii) polarization studies of star-forming regions to reveal the role of magnetic fields; (iii) recycling of gas and formation of dust in stellar wind; (iv) spatial distribution and properties of dust in nearby galaxies; (v) high-excitation CO as a tracer of hot circum-AGN (active galactic nucleus) molecular gas; and (vi) star formation and metal (dust) enrichment in the history of the Universe. Because of the flexibility in the time allocation, monitoring of time-variable sources (AGNs, γ-ray bursts, etc.) is also an interesting target. From a scientific point of view, the atmospheric window at 1.5 THz would be suitable for the above interstellar emission lines. For continuum, the window at the highest frequency (1.5 THz) would also be favored since it is the nearest to the spectral peak of dust emission.

PS51: Status of Pan-STARRS data and servers in Taiwan

Jhen-Kuei Guo (Graduate Institute of Astronomy, National Central University), Wen-Ping Chen (Graduate Institute of Astronomy, National Central University), Yung-Hsin Chang (Graduate Institute of Astronomy, National Central University)

The Pan-STARRS project is operated by an international consortium. Located in Haleakala, Hawaii, the Pan-STARRS telescope system patrols the entire visible sky several times a month, thereby identifying and characterizing varying celestial objects or phenomena, in brightness (supernovae, novae, variable stars, etc) or in position (comets, asteroids, near-earth objects, X-planet etc.) The various sky surveys started in May 2010 and will last at the end of 2013. Every patch of sky observable from Hawaii has been observed in at least 5 bands (g', r', i', z', y') for 10 to 50 epochs. We have set up a data depository at NCU to serve the users in Taiwan. The massive amounts of Pan-STARRS data are downloaded from the Institute for Astronomy, University of Hawaii whenever new observations are obtained and processed. So far we have stored a total of 290 TB worth of data. In addition to star/galaxy catalogs, a postage-stamp server provides access to FITS images. The Pan-STARRS Published Science Products (PSPS) serves as the archive database and provides a user to query individual PS1 measurements. All the data up to February 2013 have been ingested into PSPS. By the end of 2014, all PS1 data products will be released to the public through the MAST Archive at the Space Telescope Science Institute (STScI). Here we will present the current status of Pan-STARRS data, the data servers in NCU, and the latest status of the PSPS interface.

PS52: Current Status of the Nuclear Compton Telescope (NCT)

Jeng-Lun Chiu (Institute of Astronomy, NTHU), Chien-Ying Yang (Institute of Astronomy, NTHU), Jie-Rou Shang (Institute of Astronomy, NTHU), Chao-Hsiung Tseng (Institute of Astronomy, NTHU), Hsiang-Kuang Chang (Department of Physics, NTHU), Steven E. Boggs (Space Sciences Laboratory, UC. Berkeley)

The Nuclear Compton Telescope (NCT) is a balloon-borne soft gamma-ray (0.2-10 MeV) telescope designed to study astrophysical sources of nuclear line emission and gamma-ray polarization. The heart of NCT is a compact array of cross-strip germanium detectors (GeDs), providing high spectral resolution ($\sim$ 0.3−0.9% FWHM at 662 keV for most channels) and capability of tracking each photon interaction

with full 3D position resolution to 2 mm^3. NCT has flown successfully on two conventional balloon flights to date, and the Crab Nebula was detected at a significance of 4σ in the second flight. The NCT instrument is being reconstructed and upgraded for a long-duration balloon flight from Kiruna, Sweden in June 2014. A new configuration of detector array is applied to enhance the efficiency of polarization measurement and hard X-ray imaging. Here we will present the achievements and current status of the joint effort among several institutions in Taiwan and in the US for this next-generation of Compton telescope.

PE01: Development of the Astronomy-themed Interdisciplinary Curriculum At Taipei First Girls' High School

Shan-Chien Yang (Taipei First Girls' High School), Yu-Mei Lin (Taipei First Girls' High School), Shih-Ping Lai (Department of Physics, National Tsing-Hua University), Albert Kong (Department of Physics, National Tsing-Hua University), Hsiang-Kuang Chang (Department of Physics, National Tsing-Hua University), Pin-Han Wu (Taipei First Girls' High School), Li-Fen Jan (Taipei First Girls' High School)

To explore the universe has been the greatest childhood fantasy for many people. To fulfill this dream, one needs to climb up the academic ladders to a graduate institute, for there is not any undergraduate program offered in any university in Taiwan. However, with the advent of space telescopes and the abundant data open to the public, members of the team firmly believe that without having to be a graduate student, senior high school students can now be endowed with access to the latest observational data collected by those cutting-edge telescopes. Therefore, we designed the curriculum in discussion. The team consists of 13 teachers in various fields, including math, physics, chemistry, English, computer science, and Earth science, making the fullest use of the teacher staff and facilities available on campus. Incorporating the basic knowledge has been taught in many required courses, We design a 24-hr curriculum with " Spectrum" as the main theme. The curriculum includes four modules: "properties of light and spectrum", "multi-wavelength observation, "evolution of stars, and "introduction of cosmology", which make use of several free online astronomical data bases, free software for data analysis, and teaching platforms of various types. Furthermore, many of the courses are inquiry-oriented, focusing on the hands-on experiments and discussion. Each module can be taught separately in the related existing courses, and the four modules can combined to form a pilot course for research project courses. For the past two years, the curriculum, funded by the National Science Council (High Scope Project), has drawn resources from the Graduate Institute of Astronomy at National Tsing Hua University, the Graduate Institute of Library, Information and Archival Studies at Cheng Chi University, and the Graduate Institute of Science Education. For the four modules, the team has designed 16 lesson plans, 23 pieces of teaching materials, 2 teaching instrument, and 18 worksheets. The numbers of the students participating in the pilot teaching are, respectively, 120 for Module 1, 380 for Module 2, 150 for Module 3, and 90 for Module 4. The development of the curriculum can make an empirical example for the designing and implementation of school-based feature curricula at TFG. On the other hand, other schools can also refer to it in practical teaching. The team, on this stage, is working on the making of evaluation tools as well as the modification of the teaching materials. We plan to promote the curriculum to other schools and hold demonstration camps in the third year of the project. As for the achievements we have made so far, two TFG students, by using online astronomical databases to explore the formation of a binary star, won third place at the National Science Fair in Taiwan. 23 students, inspired and empowered by the curriculum, took part in the Pan-STARRS (Panoramic Survey Telescope & Rapid Response System) Asteroid Search Campaign, and found seven asteroids. On

the next stage, we will continue to encourage students to join the Pan-STARRS, and also, they will be driven to carry out projects on topics such as the evolution and colors of galaxies, the distribution of large-scale galaxies in the universe, etc.

Participant List
與會名單

Last Name	First Name	姓名	單位 (Affiliation)	電子信箱 (Email)
Cemeljic	Miljenko	席門傑	中央研究院天文所(ASIAA)	miki@tiara.sinica.edu.tw
Chan	Li-Fen	詹莉芬	北一女中	leefengl126@gmail.com
Chang	Kai-Hsiang	張凱翔	新北市崇光女子高級中學、新北市立江翠國民中學	M97860006@mail.ntou.edu.tw
Chang	Wei-Yun	張瑋芸	北一女中	saturn58.0116@gmail.com
Chang	Yi-Wen	張逸雯	國立中央大學(NCU)	yiwenl988@gmail.com
chang	blacky	張敏悌	臺南市南瀛科學教育館	blacky@mail.tainan.gov.tw
Chang	Chan-Kao	章展誥	國立中央大學(NCU)	rex@astro.ncu.edu.tw
Chen	Wen-Ping	陳文屏	國立中央大學(NCU)	wchen@astro.ncu.edu.tw
Chen	Hung-Shuo	陳泓碩	中央研究院天文所(ASIAA)	r00244005@ntu.edu.tw
Chen	Kuan	陳寬	國立臺灣師範大學(NTNU)	60044023S@ntnu.edu.tw
Chen	Wan Fen	陳婉芬	桃園縣立迴龍國中小學教師	caro1_481021@yahoo.com.tw
Chen	Tzu-Ying	陳姿穎	國立臺灣師範大學(NTNU)	tychen31@gmail.com
Chen	Yen-chi	陳彥齊	中央研究院天文所(ASIAA)	mark86092@gmail.com
Chen	Hsiao-Chi	陳筱琪	中央研究院天文所(ASIAA)	hcchen@asiaa.sinica.edu.tw
Chen	Yen-Chen	陳彥蓁	國立東華大學(NDHU)	amy123254@hotmail.com
Chen	Cheng-Yan	陳正彥	國立東華大學(NDHU)	yencool1cool@hotmail.com
Chen	Chin-Wei	陳錦威	中央研究院天文所(ASIAA)	chinwei.chen@asiaa.sinica.edu.tw
Chen	I-Chenn	陳以忱	國立中央大學(NCU)	m94901l@astro.ncu.edu.tw
Chen	Chang-Yao	陳長趫	國立中央大學(NCU)	a.e.johnny@hotmail.com
Chen	Ying-Tung	陳英同	國立中央大學(NCU)	charles@astro.ncu.edu.tw
Chen	Jhenyu	陳振予	國立中央大學(NCU)	m969004@astro.ncu.edu.tw
Chen	Chaomin	陳昭敏	國立成功大學(NCKU)	airosprey@phys.ncku.edu.tw
Chen	Lin-wen	陳林文	國立臺灣師範大學(NTNU)	chenlw@ntnu.edu.tw
Cheng	Shou-Lun	鄭守倫	國立臺灣師範大學(NTNU)	jetaimemia@hotmail.com
Cheng	Yu Chi	鄭宇棋	國立中央大學(NCU)	m969005@astro.ncu.edu.tw
Cheng	Ming-Chung	鄭明忠	多尼爾有限公司	tommy@donelloptro.com
Chi	Hsin-Chang	紀信昌	國立東華大學(NDHU)	hsinchang@mail.ndhu.edu.tw
Chiang	Poshih		國立中央大學(NCU)	pschiang@gmail.com
Chin	Yi-nan	秦一男	淡江大學 (TKU)	einmann@mail.tku.edu.tw
Ching	Tao-Chung	慶道沖	國立清華大學(NTHU)	chingtaochung@gmail.com
Chou	Mei-Yin	周美吟	中央研究院天文所(ASIAA)	cmy@asiaa.sinica.edu.tw
Chou	Yi	周翊	國立中央大學(NCU)	yichou@astro.ncu.edu.tw
Chuang	Yo-Ling	莊幼玲	國立臺灣師範大學(NTNU)	ylchuang@std.ntnu.edu.tw
Chuang	Chia-Jung	莊佳蓉	國立中央大學(NCU)	m999002@astro.ncu.edu.tw
Chung	Yee-How	鍾乙豪	屏東縣枋寮高中	yeehow@seed.net.tw
Chung	Ting-An	鍾定安	國立中央大學(NCU)	dan02830223m@hotmail.com
Devost	Daniel		Canada-France-Hawaii Telescope (CFHT)	devost@cfht.hawaii.edu
Duan	Hao-Yuan	段皓元	中央研究院天文所(ASIAA)	hyduan@asiaa.sinica.edu.tw
Fabian	Andrew		University of Cambridge	
Foucaud	Sebastien	傅谷石	國立臺灣師範大學(NTNU)	foucaud@ntnu.edu.tw
Gao	Zong-Xian	高宗賢	國立臺灣師範大學(NTNU)	tzueng2001@gmail.com
Goldsmith	Donald		Interstellar Media	
Guo	Jhen-Kuei	郭鎮魁	國立中央大學(NCU)	jkguo@astro.ncu.edu.tw
Hasegawa	Tatsuhiko	長川谷辰彦	中央研究院天文所(ASIAA)	hasegawa@asiaa.sinica.edu.tw
Hashimoto	Yasuhiro	橋本康弘	國立臺灣師範大學(NTNU)	hashimot@ntnu.edu.tw
Hirashita	Hiroyuki	平下博之	中央研究院天文所(ASIAA)	hirashita@asiaa.sinica.edu.tw
Ho	Pei-Li	何佩勵	NTNU/CWB	hopeili@cwb.gov.tw
Hsiao	Ho	蕭赫	國立臺灣師範大學(NTNU)	699440194@ntnu.edu.tw
Hsieh	Hung-Wei	謝宏偉		o00000o00000@yahoo.com.tw
Hsieh	Chih-Chaing	謝智強	國立清華大學(NTHU)/中央研究院天文所(ASIAA)	cchsieh@asiaa.sinica.edu.tw
Hsieh	Tien-Hao	謝天	國立清華大學(NTHU)	shawinchone@gmail.com
Hsu	Chia-Ju	許嘉儒	國立臺灣師範大學(NTNU)	jazz77421@hotmail.com
Hsu	Su-O	許素娥	金門縣金城鎮中正國小	sophia@cnc.km.edu.tw
Hsu	Rue-Ron	許瑞榮	國立成功大學(NCKU)	rrhsu@phys.ncku.edu.tw
Hsu	Chih-Peng	許志鵬	國立馬公高中	phpon@ms9.hinet.net
Hsu	Yi-Hsiang	徐逸翔	國立臺灣師範大學(NTNU)	soaringl67@hotmail.com.tw
Hsu	Jen-Kai	許仁愷	國立中央大學(NCU)	tabriskai.hsu@gmail.com
Hsueh	Jen-Wei	薛人瑋	國立臺灣大學(NTU)	j35234@gmail.com
Hu	Yonghui	胡永輝	新北市正義國小	yohu@dhps.tp.edu.tw
Hu	Yu-Luen	胡毓倫	國立東華大學(NDHU)	simon19881006@gmail.com
Hu	Chia-Ling	胡佳伶	台北市立天文科學教育館(TAM)	selinehu@gmail.com
Hu	Juei-Hwa	胡瑞華	國立中央大學(NCU)	jhhuclaire@gmail.com
Huang	Hung-Jin	黃虹瑾	中央研究院天文所(ASIAA)/國立臺灣大學(NTU)	arcspatio@gmail.com
Huang	Fong Ching	黃鳳琴	北市教大附小	fching0123@gmail.com
Huang	Ming-Huey A.	黃明輝	國立聯合大學(NUU)	mahuang@nuu.edu.tw
Huang	Chung-Kai	黃鍾凱	國立中央大學(NCU)	chungkaihuang@gmail.com
Huang	Ting-Yu	黃廷宇	國立清華大學(NTHU)	stupidbrianpig@gmail.com
Huang	Li-Ching	黃立晴	國立中央大學(NCU)	lchuang@astro.ncu.edu.tw
Huang	Yun-Hsin	黃韻心	國立臺灣大學(NTU)	lusiawings@gmail.com
Hung	Jim	洪景川	台北市立天文科學教育館(TAM)	jimhungg@gmail.com
Hung	Chien-Lun	洪健倫	國立澎湖科技大學(NPU)	hung8282@npu.edu.tw
Keenan	Ryan	金萊恩	中央研究院天文所(ASIAA)	rkeenan@asiaa.sinica.edu.tw
Kim	Hyosun	金孝宣	中央研究院天文所(ASIAA)	hkim@asiaa.sinica.edu.tw
Kinoshita	Daisuke	木下大輔	國立中央大學(NCU)	daisuke@ncu.edu.tw

Last Name	First Name	姓名	單位 (Affiliation)	電子信箱 (Email)
Konar	Chiranjib	柯永生	中央研究院天文所(ASIAA)	chiranjib.konar@gmail.com
Kopte1ova	Ekaterina		國立臺灣大學(NTU)	ekaterina@phys.ntu.edu.tw
Kuan	Yi-Jehng	管一政	國立臺灣師範大學(NTNU)	kuan@ntnu.edu.tw
Kuo	Cheng-Yu	郭政育	中央研究院天文所(ASIAA)	ck2v@virginia.edu
Kuo	Wei-Ting	郭威廷	國立清華大學(NTHU)	steveair1991@yahoo.com.tw
Kuo	Tzu-Ming	郭子銘	中央研究院天文所(ASIAA)	b98202025@ntu.edu.tw
Lai	Chuan-Chin	賴傳錦	國立臺灣大學(NTU)	chuanchinlai@gmail.com
Lai	Ian-lin	賴彥霖	國立中央大學(NCU)	l_ianlin@msn.com
Lee	Chin-Fei	李景輝	中央研究院天文所(ASIAA)	cflee@asiaa.sinica.edu.tw
Lee	Chien-De	李建德	國立中央大學(NCU)	chien.de.lee@gmail.com
Leou	Lih-Lin	柳麗玲	臺北市金華國小	lihlin@mail.taipei.gov.tw
Li	I-Hsiu	李宜修	中央研究院天文所(ASIAA)	ihli@asiaa.sinica.edu.tw
Li	Kaiting	李凱庭	中國醫藥大學(China Medical University)	17410258@yahoo.com.tw
Li	Kwan Lok	李君樂	國立清華大學(NTHU)	lilirayhk@gmail.com
Liao	Nai-Hui	廖乃慧	國立中央大學(NCU)	eav4508040@yahoo.com.tw
Lim	Chen Fatt	林征發	國立臺灣師範大學(NTNU)	avril_love_bobby@hotmail.com
Lin	Chi-Feng	林琦峰	國立臺灣師範大學(NTNU)	chifeng@tam.gov.tw
Lin	Jing-Hua	林京樺	中央研究院天文所(ASIAA)	jhlin@asiaa.sinica.edu.tw
Lin	Chien-Cheng	林建爭	國立中央大學(NCU)	increaselin@gmail.com
Lin	Yu-Mei	林郁梅	北一女中	earthscience420@gmail.com
Lin	Shih-chao	林士超	國立大里高中	shichao.lin@gmail.com
Lin	Ming-Yi	林明儀	國立臺灣師範大學(NTNU)	acdo2002@gmail.com
Lin	Lupin	林峻哲	中國醫藥大學(China Medical University)	lupin@mail.cmu.edu.tw
Lin	Hsing-Wen (Edward)	林省文	國立中央大學(NCU)	m949008@astro.ncu.edu.tw
Lin	Zhong-Yi	林忠義	國立中央大學(NCU)	zylin@astro.ncu.edu.tw
Lin	Mei-Chun	林玫君	中央研究院天文所(ASIAA)	alwaysmayzi@gmail.com
Lin	Yi-Fan	林依梵	國立中央大學(NCU)	tingrainy@gmail.com
Lin	I-Ling	林怡伶	國立中央大學(NCU)	d96900l@astro.ncu.edu.tw
Lin	Daniel	林隼成	國立清華大學(NTHU)	universetennis@hotmail.com
Lin	Sheng-Jun	林聖鈞	國立清華大學(NTHU)	sebastian0117@gmail.com
Lin	Ya-Hong	林雅紅	國立成功大學(NCKU)	lnyhng@gmail.com
Liu	Sheng-Yuan	呂聖元	中央研究院天文所(ASIAA)	syliu@asiaa.sinica.edu.tw
Liu	Fang-Chun	劉芳君	中央研究院天文所(ASIAA)/國立臺灣大學(NTU)	auroar.liu@gmail.com
Liu	Yu-Cheng	劉昱成	臺北市立第一女子高級中學	liuyucheng.allen@gmail.com
Lo	Ching-Min	羅經閔	國立臺灣師範大學(NTNU)	lojimmy5@gmail.com
Lu	Cheng-Liang	盧政良	國立臺灣大學(NTU)	addie1u75@gmail.com
Lung	Chi-Chun	龍志鈞	國立臺灣師範大學(NTNU)	60044005s@ntnu.edu.tw
Lyu	Ming-Syuan	呂明軒	國立東華大學(NDHU)	f04863142000@hotmail.com
Neelamkodan	Naslim		國立臺灣大學(NTU)	naslimn@gmail.com
Ngeow	Chow-Choong	饒兆聰	國立中央大學(NCU)	cngeow@astro.ncu.edu.tw
Peng	Huan-Ting	彭渙婷	國立臺灣師範大學(NTNU)	htpengll08@gmail.com
Seok	Ji Yeon	石知沇	中央研究院天文所(ASIAA)	jyseok@asiaa.sinica.edu.tw
Shang	Jie Rou	商婕柔	國立清華大學(NTHU)	s101025503@ml01.nthu.edu.tw
Shen	Pei-min	沈沛旻	國立中央大學(NCU)	m1019002@astro.ncu.edu.tw
Shu	Chun Yu	許峻瑜	國立中興大學(National Chung Hsing University)	ts00776550@gami1.com
Sokolov	Vlas	蘇可洛	國立清華大學(NTHU)	vlasl45@gmail.com
Srinivasan	Sundar		中央研究院天文所(ASIAA)	sundar@asiaa.sinica.edu.tw
Su	Yu-Nung	蘇裕農	中央研究院天文所(ASIAA)	ynsu@asiaa.sinica.edu.tw
Sung	Ren-Shiang	宋仁翔	國立清華大學(NTHU)	kingsl023@hotmail.com
Ting	Starey	丁小強		Starey@gmail.com
Tsai	Sung-Hui	蔡松輝	金門縣金城國中	sunghui.tsai@gmail.com
Tsai	Anli	蔡安理	國立中央大學(NCU)	altsai@astro.ncu.edu.tw
Tsai	Cheng-Hung	蔡政宏	國立清華大學(NTHU)	arthur770410@gmail.com
Tsao	Chun Chieh	曹俊傑	國立高雄師範大學(NKNU)	itu904904@yahoo.com.tw
Tseng	Yao-Huan	曾耀寰	中央研究院天文所(ASIAA)	yhtseng@asiaa.sinica.edu.tw
Tseng	Chihyin	曾芝寅	中央研究院天文所(ASIAA)	cytseng@asiaa.sinica.edu.tw
Wang	Wen-Wei	王文暐	國立臺灣大學(NTU)	r96244001@ntu.edu.tw
Wang	Jia-Wei	王嘉瑋	國立清華大學(NTHU)	noonethere94@hotmail.com
Wang	Shu-Wei	王書瑋	中央研究院天文所(ASIAA)	swwang@asiaa.sinica.edu.tw
Wang	Andrew	汪仁鴻	中央研究院天文所(ASIAA)	andrew@asiaa.sinica.edu.tw
Wu	Ching Chou	吳景州	雲林縣廉使國小	jow522@gmail.com
Wu	Chi Ju	吳季儒	國立中央大學(NCU)	1ul9900213@gmail.com
Wu	Hung Kit	胡雄傑	國立清華大學(NTHU)	jason19888@gmail.com
Wu	Yi-Shan		國立清華大學(NTHU)	astronomyphysicsl7@gmail.com
Yang	Shan-Chien	楊善茜	台北市立第一女子高級中學	yshanchien@gmail.com
Yang	Yujie	楊雨潔	樹人醫護管理專科學校(SZMC)	tomato8534@gmail.com
Yang	Chun-Hui	楊淳惠	中央研究院天文所(ASIAA)	chyang@asiaa.sinica.edu.tw
Yang	Chien-Ying	楊千瑩	國立清華大學(NTHU)	s100025505@m100.nthu.edu.tw
Yen	Ethan	顏易程	永光儀器有限公司	astrochild@gmail.com
Yu	Ya-Wen	游雅雯	國立臺灣師範大學(NTNU)	tiana310625@gmail.com
Zhao-Geisler	Ronny	趙家驊	國立臺灣師範大學(NTNU)	zhaogeisler@gmail.com