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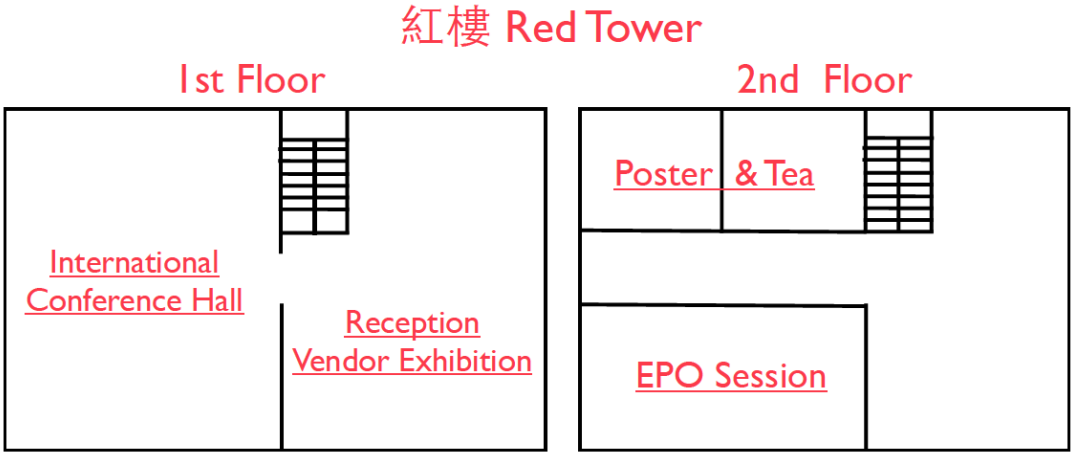
General Information
會議資訊

1. 年會會場 / Meeting Venue

A. 國立臺灣大學實驗林管理處 溪頭自然教育園區 紅樓一樓 國際會議廳
International Conference Hall, 1F, Red Tower
Xitou Nature Education Area, National Taiwan University Experimental Forest



B. 溪頭自然教育園區導覽圖
Xitou Nature Education Area Map

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)
D) 第25屆理監事選舉 (Councilor Election of the 25th Council)

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 / Social Events

A) 團體參訪 Excursion (May 25th, Saturday 13:30-18:30)
行程 A (Tour A):
溪頭自然教育園區導覽 (Xitou Nature Education Area Guided Tour)
行程 B (Tour B1/B2):
鳳凰山天文台導覽(+鳳凰林道)
(Mt. Fenghuang Overlook and Astronomical Observatory)
B1 – 13:30 紅樓出發 (Departure from the Red Tower)
B2 – 15:20 紅樓出發 (Departure from the Red Tower)

B) 大會晚宴 Banquet (May 25th, Saturday 18:30-20:30)
明山森林會館 (Ming Shan Resort):
南投縣鹿谷鄉內湖村興產路2-3號 (電話: 049-2612121)
(離溪頭自然教育園區第二入口處約100公尺;
Located around 100m away outside of the 2nd entrance of the Nature Education Area)

6. 廠商展示 / Vendors

A) 上宸光學國際有限公司
新竹縣縣政二路456號
電話:(03) 656- 6306
(http://www.telescopes.com.tw)
感謝上宸光學國際有限公司贊助大會抽獎獎項

B) 鴻宇光學科技有限公司
電話: (0800)-03-1234
(http://www.galuxe.com.tw)

C) 信達光電科技有限公司
台北市基隆路二段189號2F
電話: (02)-2735-7555
(http://www.skywatcher.com.tw)

D) 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

林啓生先生
中大鹿林天文台

Program
會議議程

Day 1 (May 23, Friday)			第一天（5月23日, 星期五） **Venue /地點：NTUEF/國立台灣大學實驗林溪頭自然教育園區**
12:00 – 14:00	**Registration 註冊報到**		
14:00 – 14:15	**Opening remarks 大會開幕致詞** **Chair: Yi-Jehng Kuan** Welcome remark by Director Ya-Nan Wang (NTUEF) 來賓致詞：王亞男 處長（台灣大學 實驗林管理處）		
14:15 – 16:20	**Scientific oral session S1 科學論文宣讀 S1 Chair: Yi-Nan Chin** **Star Formation**		
S1.1 (20 min) **14:15 – 14:35**	Youngest protoplanetary disk discovered with ALMA	Shih-Ping Lai	NTHU
S1.2 (15 min) **14:35 – 14:50**	Velocity-Resolved [Ne III] Emission from X-ray Irradiated Sz 102 Microjets	Chun-Fan Liu	ASIAA
S1.3 (20 min) **14:50 – 15:10**	Disk Accretion around the massive protostar IRAS 20126+4104	Vivien Chen	NTHU
S1.4 (20 min) **15:10 – 15:30**	ALMA observations of the protostellar jet HH 212	Chin-Fei Lee	ASIAA
S1.5 (18 min) **15:30 – 15:48**	Magnetic fields in dark globules: a case study towards LDN1225	C. Eswaraiah	NCU
S1.6 (12 min) **15:48 – 16:00**	The origin of the absorption dip toward IRAS 4A2	Hung-Jin Huang	ASIAA
S1.7 (18 min) **16:00 – 16:18**	CFHT/WIRCam survey of young stellar objects in Ophiuchus Cloud	Chi-Hung Yan	ASIAA
16:20 – 16:50	**Coffee break and poster installation 茶敘及壁報張貼**		
16:50 – 18:30	**Scientific oral session S2 科學論文宣讀 S2 Chair: Yi Chou** **Compact Stellar Objects and Stars**		
S2.1 (20 min) **16:50 – 17:10**	The birth of radio millisecond pulsars and their high-energy signature	P. H. Thomas Tam	NTHU
S2.2 (20 min) **17:10 – 17:30**	Luminosity of rotation-powered, millisecond pulsars	Kouichi Hirotani	ASIAA
S2.3 (12 min) **17:30 – 17:42**	A torus and outflow in proto-planetary nebula IRAS 17150-3224	Tzu-Ying Chen	NTNU
S2.4 (18 min) **17:42 – 18:00**	Imaging black hole event horizon with the Greenland Telescope: progress update on the theoretical predictions of the shadow Image	Hung-Yi Pu	ASIAA
S2.5 (18 min) **18:00 – 18:18**	Be stars in the young open cluster NGC 663	Po-Chieh Yu	NCU
S2.6 (12 min) **18:18 – 18:30**	The mass-loss from asymptotic giant branch stars in M33	Shao-Yu Lai	ASIAA
18:30 – 21:00	**Welcome reception and poster session P1 歡迎茶會及壁報欣賞 P1**		

Day 2 (May 24, Saturday)	第二天（5月24日, 星期六） **Venue /地點：NTUEF/國立台灣大學實驗林溪頭自然教育園區**		
09:00 – 10:00	**Plenary talk (I)　大會講演(I)（科研類）**　**Chair: Sheng-Yuan Liu** "*Progress in Understanding the Formation of Low Mass Stars*" Prof. Neal Evans (University of Texas at Austin)		
10:00 – 10:50	**ASROC Awards Presentation Ceremony　頒發首屆天文學會獎** **Chair: Yi-Jehng Kuan**		
10:00 – 10:10	**Introduction　天文學會獎簡介** Presentation of the 1st ***Heaven Quest Award*** and ***Heaven Talk Award*** **頒發天文學會第一屆「天問獎」及「譚天獎」**		
10:10 – 10:25	***Heaven Quest Award*** acceptance speech　**「天問獎」得獎致辭** Director Paul T.P. Ho (ASIAA)　**賀曾樸所長 (中研院天文所)**		
10:25 – 10:40	***Heaven Talk Award*** acceptance speech　**「譚天獎」得獎致辭** Director An-Le Chen in the person of Taipei Astronomical Museum **台北市立天文教育館－陳岸立館長代表**		
10:40 – 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 – 12:25	**Scientific oral session S3　科學論文宣讀 S3　Chair: Shiang-Yu Wang** **Solar System and Exoplanets**		
S3.1 (20 min) **11:30 – 11:50**	Planet Hunters: Assessing the Kepler TCE Inventory	Megan Schwamb	ASIAA
S3.2 (15 min) **11:50 – 12:05**	Application of Palomar Transient Factory (PTF) project: the opposition effect on Solar System objects	Yu-Chi Cheng	NCU
S3.3 (18 min) **12:05 – 12:23**	On the color distribution of sub-km size main belt asteroids	Hsing Wen Lin	NCU
12:25 – 13:30	**Lunch break and poster session P3　午餐及壁報欣賞 P3**		
13:30 – 18:30	Group discussions　**分組討論/自由參訪**		
18:30 –20:30	**Banquet　大會晚宴**		

Day 3 (May 25, Sunday) 第三天（5月25日, 星期日）			
Venue /地點：NTUEF/國立台灣大學實驗林溪頭自然教育園區			
09:00 – 10:00	**Plenary talk (II)　大會講演(II)（科普類）　Chair: Jiun-Huei Proty Wu** "*How will we find another Earth?* " Prof. Debra Fischer (Yale University)		
10:00 – 11:00	General Assembly, best-poster awards & presentations, councilor election of the 25th Council **會員大會、頒發最佳壁報論文獎及得獎論文口頭報告、選舉第25屆理監事** **Chair: Yi-Jehng Kuan**		
11:00 – 11:30	**Coffee break and poster session P4　茶敘及壁報欣賞 P4**		
11:30 – 12:20	**Scientific oral session S4** **科學論文宣讀 S4**	**Education & Public Outreach session E1** **天文教育及業餘天文活動報告 E1**	
Scientific oral session S4　科學論文宣讀 S4　Chair: Shih-Ping Lai **Extragalactic (I)**			
S4.1 (20 min) **11:30 – 11:50**	Current-driven kink instability in magnetically dominated rotating relativistic jet	Yosuke Mizuno	NTHU
S4.2 (18 min) **11:50 – 12:08**	The PAN-STARRS1 Medium-Deep Survey: the relation of the specific star forming rate-stellar mass-groupcentric radius in galaxy groups and clusters	Hung-Yu Jian	NTU
S4.3 (12 min) **12:08 – 12:20**	Are quasar jets conical?	Ting-Yu Huang	NTHU
Education & Public Outreach session E1　天文教育及業餘天文活動報告 E1 **Chair: Wenping Chen**			
E1.1 (30 min) **11:30 – 12:00**	Exploration of outer Solar System (invited)	Shiang-Yu Wang	ASIAA
E1.2 (20 min) **12:00 – 12:20**	The encounter of planets with symphony 當天文遇上交響樂－霍爾斯特《行星組曲》育藝深遠校外教學音樂會	Jim Ching-chuan Hung	TAM
12:30 – 13:30	**Lunch break and poster session P5　午餐及壁報欣賞 P5**		
13:30 – 15:00	**Scientific oral session S5** **科學論文宣讀 S5**	**Education & Public Outreach session E2** **天文教育及業餘天文活動報告 E2**	
Scientific oral session S5　科學論文宣讀 S5　Chair: Chin-Fei Lee **Extragalactic (II) and Instrumentation**			
S5.1 (20 min) **13:30 – 13:50**	Spectroscopy of the afterglow of gamma ray burst 130606A: reionization at z ~ 6	Tomo Goto	NTHU
S5.2 (15 min) **13:50 – 14:05**	Modeling the formation of polar ring galaxies	Yu-Heng Ho	NTHU

S5.3 (13 min) **14:05 – 14:18**	Environment effects of the stellar mass luminosity function inside the sixty clusters of galaxies at low redshift	Chi-Chun Lung	NTNU
S5.4 (12 min) **14:18 – 14:30**	Study of X-ray luminosity functions of ultraluminous X-ray sources and the properties of their host galaxies	Chun-Cheng Lin	NTHU
S5.5 (13 min) **14:30 – 14:43**	The polarimetric performance of the Compton spectrometer and imager	Chien-Ying Yang	NTHU
S5.6 (12 min) **14:43 – 14:55**	Application of coded mask of the Compton spectrometer and imager	Jie-Rou Shang	NTHU
Education & Public Outreach session E2　天文教育及業餘天文活動報告 E2 **Chair: Vivien Chen**			
E2.1 (25 min) **13:30 – 13:55**	International Astronomical Union Office of Astronomy Outreach	Sze-leung Cheung	IAU
E2.2 (20 min) **13:55 – 14:15**	Translation of astronomical terminology in Taiwan	Chia-Ling Hu	TAM
E2.3 (20 min) **14:15 – 14:35**	Climate change , black hole universe and the future sustainable energy for all	Lih-Lin Leou	TPCU
E2.4 (25 min) **14:35 – 15:00**	Outreach application of citizen science projects in classroom	Mei-Yin Chou	ASIAA
15:00 –	**Departure　賦歸**		

Poster Presentation
壁報論文目錄

A. Solar System

PS1	**Discovery of a High-flying Potentially Uranian Trojan** Ying-Tung Chen (ASIAA), J. J. Kavelaars (HIA), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU)
PS2	**The Super Fast Rotating Asteroid** Chan-Kao Chang (NCUIA), Adam Waszczak (Caltech), Wing-Huen Ip (NCUIA), Tom Prince (Caltech), the PTF Team (NCUIA), the PTF Team (Caltech)
PS3	**The Asteroid Spin Rate Study by Using iPTF Data** Chan-Kao Chang (NCUIA), Wing-Huen Ip (NCUIA), Hsing-Wen Lin (NCUIA), Chow-Choong Ngeow (NCUIA), Ting-Chang Yang (NCUIA), Adam Waszczak (Caltech), the PTF Team (Caltech)
PS4	**Complex Organic in Comets** Yo-Ling Chuang (National Taiwan Normal University), Yi-Jehng Kuan (National Taiwan Normal University)
PS5	**Taxonomical Classification of the Hungaria Asteroids by Using the PTF Data** Zhi-Xuan Zhu (Institute of Astronomy, National Center University), Chan-Kao Chang (Institute of Astronomy, National Center University), Yu-Chi Cheng (Institute of Astronomy, National Center University), Wing- Huen Ip (Institute of Astronomy, National Center University)

B. Star Formation

PS6	**A preliminary study of infrared variability in young stellar objects from Spitzer's Gould's Belt Cloud** S.-P. Lai (NTHU), Chia-Cheng Ni (Affiliated Senior High school of National Chung-Hsin University), Hsuan-Ju Peng (SHCH), Shih-Chao Lin (SHCH)
PS7	**Extreme High Velocity Components of the Protostellar Jet in NGC 1333 IRAS 2A** Cheng-Hung Tsai (NTHU), Huei-Ru Chen (NTHU), Chin-Fei Lee (ASIAA), Naomi Hirano (ASIAA), Hsien Shang (ASIAA)
PS8	**Observational constraints on the model of the accretion disk** Ekaterina Koptelova (Institute of Astronomy, National Tsing Hua University)
PS9	**Interstellar Urea: an ALMA Search** Ya-Wen Yo (Department of Earth Sciences, National Taiwan Normal University), Yi-Jehng Kuan (Department of Earth Sciences, National Taiwan Normal University)
PS10	**Simulating the collapse of a molecular cloud** Sheng-Jun Lin (NTHU), Shih-Ping Lai (NTHU)
PS12	**Small-scale kinematics in massive star forming cores** Kuo-Song Wang (ASIAA; Leiden Observatory), Michiel Hogerheijde (Leiden Observatory), Floris van der Tak (SRON, Groningen University), Pamela Klaassen (Leiden Observatory
PS13	**Probing kinematics of the filaments around the infalling envelope in W3(OH) massive star-forming region** Wei-Ting Kuo (Department of Physics and Institute of Astronomy, National Tsing Hua University), Vivien Chen (Department of Physics and Institute of Astronomy, National Tsing Hua University)
PS14	**Probing the evolutionary stages of IRDC cores** Vlas Sokolov (National Tsing Hua University), Vivien Chen (National Tsing Hua University), Sheng-Yuan Liu (Institute of Astronomy & Astrophysics, Academia Sinica), Yu-Nung Su (Institute of Astronomy & Astro- physics, Academia Sinica)

C. Stars, Star Clusters and Interstellar Dust

PS15	**Identifying and Characterizing Stellar Clusters Toward the Galacitc Anti-Center from Pan-STARRS1 3π Survey Data** Chien-Cheng Lin (National Central University), Wen-Ping Chen (National Central University)
PS16	**Infrared-to-X-ray ratios of supernova remnants in the Large Magellanic Cloud** Ji Yeon Seok (ASIAA), Hiroyuki Hirashita (ASIAA), Bon-Chul Koo (Seoul National University)
PS17	**The Properties of Be stars with Infrared Excess from the Wide-field Infrared Survey Explorer (WISE) Survey** Chien-De Lee (Institute of Astronomy, National Central University), Chih-Hao Hsia (Department of Physics, University of Hong Kong), Wen-Ping Chen (Institute of Astronomy, National Central University)
PS18	**Long-Term Photometric Behavior of the Young Abrupt Variable GM Cepheids** Po-Chieh Huang (Institude of Astronomy, National Central University), Chang-Yao Chen (Department of Physics, National Central University), Chia-Ling Hu (Taipei Astronomical Museum), Wen-Ping Chen (In- stitude of Astronomy, National Central University)
PS19	**Molecules in Planetary Nebula NGC 6302 II** Tatsuhiko Hasegawa (ASIAA), Sun Kwok (Hong Kong University)
PS20	**Oscillator strengths of Zn I and Ga II for Astrophysical Modeling** Hsin-Chang Chi (Department of Physics/National Dong Hwa University)
PS21	**Searching for Possible Members of the Beta Pictoris Moving Group** Chang-Yao Chen (Department of Physics, National Central University, Taiwan), Wen-Ping Chen (Institute of Astronomy, National Central University, Taiwan)
PS22	**Search and Follow-Up Observations of Ultra Long Period Cepheids Candidate in M31 using PTF, P60 and LOT** Chow-Choong Ngeow (National Central University), Chien-Hsiu Lee (University Observatory Munich / Max Planck Institute for Extraterrestrial Physics), Hsiang-Yao Hsiao (National Central University), Chi- Sheng Lin (National Central University), Wing-Huen Ip (National Central University)
PS23	**Characterization of faint photometric and kinematic members in the open cluster NGC752** Chung-Kai Huang (Graduate Institute of Astronomy, National Central University), Chien-Cheng Lin (Grad- uate Institute of Astronomy, National Central University), Pei-Yi Chen (Graduate Institute of Astronomy, National Central University), Wen-Ping Chen (Graduate Institute of Astronomy, National Central Univer- sity)
PS24	**The Transit Observations of XO-1 Planetary System** Yi-Ling Lin (NTHU), Ing-Guey Jiang (NTHU), Chien-Yo Lai (NTHU), He-Feng Hsieh (NTHU)
PS25	**Deep H Survey and New Supernova Remnant Candidates in the Large Magellanic Cloud** Hsuan-Ju Chen (IANCU), Wei-Hao Wang (ASIAA)
PS26	**Reconstructing the Light Curves of Galactic Cepheids in PanSTARRS 1 System: Preliminary Results** 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), Jhen-Kuei, Guo (Graduate Institute of Astronomy, National Central University, Jhongli City, 32001, Taiwan), Chien-Cheng Lin (Graduate Institute of Astronomy, National Central University,

	Jhongli City, 32001, Taiwan)
PS27	**Molecular hydrogen emission in diffuse interstellar medium of the Large Magellanic Cloud** Naslim Neelamkodan (ASIAA), Kemper, F (ASIAA)
PS28	**A study of flare activities of M-type star in the Kepler data archive** Han-Yuan Chang (National Central University, Institute of Astronomy), Li-Ching Huang (National Central University, Institute of Astronomy), Chi-Ju Wu (National Central University, Institute of Space Science), Wing-Huen Ip (National Central University, Institute of Astronomy, National Central University, Institute of Astronomy)
PS29	**Investigating Wolf-Rayet stars in M 31 with the Palomar Transient Factory H Survey** Yu, Po-Chieh (Graduate Institute of Astronomy, NCU), Ip, Wing-Huen (Graduate Institute of Astronomy, NCU)
PS30	**Characterization of the Galactic Open Cluster NGC 752: Distance, Age, and Metallicity** Pei-Yi Chen (Graduate Institute of Astronomy, National Central University), C. K. Huang (Graduate Insti- tute of Astronomy, National Central University), Chien-Cheng Lin (Graduate Institute of Astronomy, Na- tional Central University), Ali Luo (National Astronomical Observatory of China), W. P. Chen (Graduate Institute of Astronomy, National Central University)
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PS32	**The contribution from circumstellar dust of to the spectral energy distribution of the Large Magellanic Cloud** Mei-Chun Lin (ASIAA), Ciska Kemper (ASIAA), Naslim Neelamkodan (ASIAA), Sundar Srinivasan (ASIAA), Valsamo Antoniou (Harvard CfA), Massimo Marengo (Iowa State University), Jean-Philippe Bernard (IRAP), Margaret Meixiner (STSci)
PS33	**Search for p-mode oscillations in white dwarfs by using high speed photometry cameras** Yi-Shan Wu (Institute of Astronomy, National Tsing Hua University), Hsiang-Kuang Chang (Institute of Astronomy, National Tsing Hua University), Chih-Yuan Liu (Institute of Astronomy, National Tsing Hua University), Wen-Cheng Huang (Institute of Astronomy, National Tsing Hua University)
PS34	**Long-term Variation Study of Cataclysmic Variable with Palomar Transient Factory** Michael Ting-Chang Yang (National Central University), Yi Chou (National Central University), Chin-Ping Hu (National Central University), Yi-Hao Su (National Central University)
PS35	**The starspot sizes of solar-type stars with and without superflares** Li-Ching Huang (Institute of Astronomy, National Central University), Wing-Huen Ip (Institute of Astronomy, National Central University and Institute of Space Science, National Central University), Chi-Ju Wu (Institute of Space Science, National Central University), Han-Yuan Chang (Institute of Astronomy, National Central University)

D. X-ray Astronomy

PS36	**On the Complex Variability of the Superorbital Modulation Period of LMC X-4** Chin-Ping Hu (Institute of Astronomy, National Central University), Yi Chou (Institute of Astronomy, National Central University), Ting-Chang Yang (Institute of Astronomy, National Central University), Yi-Hao Su (Institute of Astronomy, National Central University), Hung-En Hsieh (Institute of Astronomy, National Central University), Po-Sheng Chuang (Institute of Astronomy, National Central University), Ching-Ping Lin (Institute of Astronomy, National Central University)
PS37	**The orbital ephemeris of the partial eclipsing X-ray binary X1822-371** Hung-En Hsieh (Institute of Astronomy, National Central University), Yi Chou (Institute of Astronomy, National Central University), Chin-Ping Hu (Institute of Astronomy, National Central University), Ting-Chang Yang (Institute of Astronomy, National Central University), Yi-Hao Su (Institute of Astronomy, National Central University), Ching-Ping Lin (Institute of Astronomy, National Central University), Po-Sheng Chuang (Institute of Astronomy, National Central University), Nai-Hui Liao (Institute of Astronomy, National Central University)
PS38	**The updated orbital ephemeris of dipping low mass X-ray binary 4U 1624-49** Nai-Hui Liao (National Central University), Yi Chou (National Central University), Ting-Chang Yang (National Central University), Chin-Ping Hu (National Central University), Yi-Hao Su (National Central University), Hung-En Hsieh (National Central University), Po-Sheng Chuang (National Central University), Ching-Ping Lin (National Central University)
PS39	**Swinging between accretion and rotation-powered states for millisecond pulsar binaries** K. L. Li (National Tsing Hua University), A. K. H. Kong (National Tsing Hua University), J. Takata (University of Hong Kong), G.C.K. Leung (University of Hong Kong), K.S. Cheng (University of Hong Kong)
PS40	**Characterizing the lifetime of the 4 Hz Quasi-Periodic Oscillation around the Black Hole X-ray Binary XTE J1550-564** Y. H. Su (Institute of Astronomy, National Central University), Y. Chou (Institute of Astronomy, National Central University), C. P. Hu (Institute of Astronomy, National Central University), T. C. Yang (Institute of Astronomy, National Central University), H. E. Xie (Institute of Astronomy, National Central University), P. S. Chuang (Institute of Astronomy, National Central University), C. P. Lin (Institute of Astronomy, National Central University), N. H. Liao (Institute of Astronomy, National Central University)
PS41	**Numerical Simulation of Standard Keplerian Disc around a Black Hole** Kinsuk Giri (Institute of Astronomy, National Tsing Hua University), Hsiang- Kuang Chang (Institute of Astronomy, National Tsing Hua University)

E. Extragalactic Studies

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PS43	**Constraining dust formation in high-redshift young galaxies** Hiroyuki Hirashita (ASIAA, Taiwan), Andrea Ferrara (SNS, Italy), Pratika Dayal (University of Edinburgh, UK), Masami Ouchi (University of Tokyo, Japan)
PS44	**An Adaptive Homomorphic Aperture Photometry Algorithm for Merging Galaxies** Jen-Chao Huang (IANCU), Chorng-Yuan Hwang (IANCU)

PS45	**A class of low-mass but extremely star-forming galaxy at z~2** Chen Fatt Lim (National Taiwan Normal University), Sébastien Foucaud (Department of Physics & Astronomy, Shanghai JiaoTong University), Hashimoto, Yasuhiro (National Taiwan Normal University)
PS46	**Planetary nebulae in elliptical galaxies in the framework of MOND** Yong Tian (National Central University), Mu-Chen Chiu (Shanghai Normal University), Chung-Ming Ko (National Central University)
PS47	**Fundamental plane and gravitational lensing in MOND** Mu-Chen Chiu (Shanghai Normal University), Yong Tian (National Central University), Chung-Ming Ko (National Central University)
PS48	**Reddening Material of Red QSOs** Chen, I-Chenn (IANCU), Hwang, Chorng-Yuan (IANCU)
PS49	**Mid-Infrared Properties of Optically Selected Red QSOs** Tsai, An-Li (NCU), Hwang, Chorng-Yuan (NCU)
PS50	**Method of finding high redshift quasar** Ji-Jia Tang (ASIAA), Youichi Ohyama (ASIAA)
PS51	**The relationship between large scale environments and properties of galaxies** Shou-Lun Cheng (National Taiwan Normal University), Yasuhiro Hashimoto (National Taiwan Normal University)

F. Instrumentation

PS52	**Status of Pan-STARRS1 data and data servers in Taiwan** Jhen-Kuei Guo (Graduate Institute of Astronomy, National Central University), Wen-Ping Chen (Graduate Institute of Astronomy, National Central University)
PS53	**Data Reduction and Preliminary Results from Commissioning Data** Andreas Ritter (National Central University), Chow-Choong Ngeow (National Central University), Nick Konidaris (California Institution of Technology), Wing-Huen Ip (National Central University), Hsing-Wen Lin (National Central University), Yu-Chi Cheng (National Central University)
PS54	**NCU Moving Object Detection System** 林省文（國立中央大學），章展告（國立中央大學），葉詠烜（國立中央大學）
PS55	**Fast Photometry of SN 2014J in the Nearby Galaxy M82** Mei-Ying Lee (Taipei First Girls High School), Albert Kong (National Tsing Hua University), Yu-Mei Lin (Taipei First Girls High School), Kwan Lok Li (National Tsing Hua University), Pin-Han Wu (Taipei First Girls High School), Shih-Ping Lai (National Tsing Hua University), Shan-Chien Yang (Taipei First Girls High School), Cheng-Yuan Chen (Taipei First Girls High School)
PS56	**Current Status of Compton Spectrometer and Imager (COSI)** Tseng, Chao-Hsiung (NTHU, Institute of Astronomy)
PS57	**短暫發光現象之自動化觀測系統建置與臺灣流星觀測網** 賴楷翔 (高雄師範大學物理系), 曹俊傑 (高雄師範大學物理系), 吳秉勳 (中央大學天文所), 林東毅 (東 華大學物理系), 柯景元 (高雄師範大學物理系), 林志隆 (台中科學博物館), 紀信昌 (東華大學物理系), Shinsuke Abe (日本大學理工學部航空宇宙工學科), 楊義清 (台東大學應用科學系)
PS58	**短暫發光現象之自動化光譜拍攝系統** Chun-Chieh Tsao (國立高雄師範大學)
PS59	**Measuring double asteroid in Taipei Astronomical Museum with speckle interferometry methods.** Alan Yang (Taipei Astronomical Museum), Nancy Chan (Taipei Astronomical

	Museum)
PS60	**The Compton Spectrometer and Imager (COSI)** Jeng-Lun Chiu (Institue of Astronomy, National Tsing Hua University), Chien-Ying Yang (Institue of Astronomy, National Tsing Hua University), Jie-Rou Shang (Institue of Astronomy, National Tsing Hua University), Chao-Hsiung Tseng (Institue of Astronomy, National Tsing Hua University), Hsiang-Kuang Chang (Institue of Astronomy, National Tsing Hua University), Steven E. Boggs (Space Sciences Laboratory, UC. Berkeley)

G. Education and Public Outreach

PE1	**利用二段式診斷工具探查國小教師有關 星星、月亮之迷思概念** 張哲誠（國立台北教育大學自然科學教育所), 鄭宏文（國立台北教育大學自科學教育系）
PE2	**Subsequent Development and Accomplishments of TFG's High Scope Project** Yu-Mei Lin (Taipei First Girls High School), Pin-Han Wu (Taipei First Girls High School), Jim-Hong Su (Taipei First Girls High School), Yu-Cheng Liu (Taipei First Girls High School), Kuo-Chu Yang (Taipei First Girls High School), Li-Fen Jan (Taipei First Girls High School), Fang-Lan Huang (Taipei First Girls High School), Ruolan Jin (Taipei First Girls High School), Shih-Ping Lai (National Tsing Hua University), Jia-Wei Wang (National Tsing Hua University)
PE3	**3D Printer implementation in astronomical education activity** Alan Yang (Taipei Astronomical Museum), KL Chang (Taipei Astronomical Museum)
PE4	**From the Quasi-society Astro-club to Non-formal Education Programs Accreditation Astronomy Courses in Community College (從類社團到非正規教育課程認證的社區 大學天文課程)** Jim Ching-chuan Hung (洪景川) (Taipei Astronomical Museum(臺北市立天文科學教育館))

Heaven Awards
「天問獎」與「譚天獎」

中華民國天文學會天文研究獎「天問獎」設置辦法

（2013 年 5 月 4 日理事會通過）

第一條 本學會爲表彰對天文研究有卓越貢獻者或團體，特設置「天問獎」。

第二條 本獎之頒發，以本學會會員五人以上之提議，理監事聯席會議之議決爲之，由本會於學會年會中頒給獎章。

第三條 獲獎者或團體以一次爲限。

第四條 本辦法經理事會通過並於會員大會中報告後實施，修正時亦同。

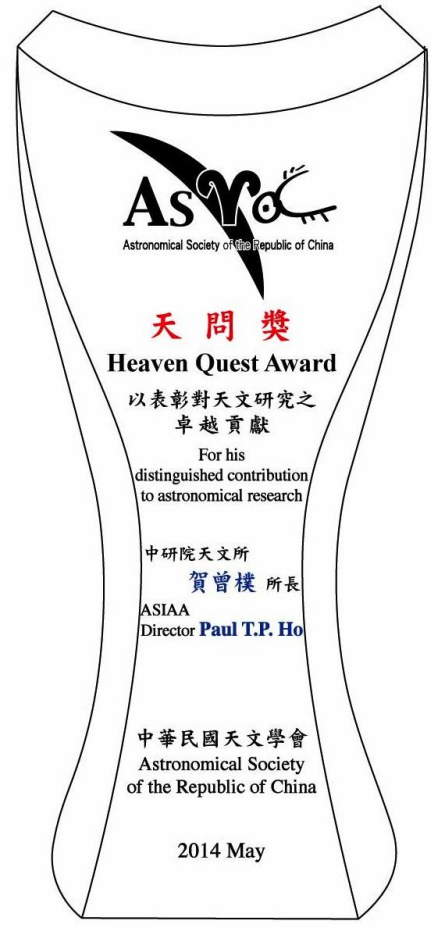
第一屆天問獎得獎者 (103 年五月)： **賀曾樸**

Heaven Quest Award

(established: May 2013)

For her/his distinguished contribution to astronomical research.

The 1st **Heaven Quest Award** recipient (2014 May): **Paul T.P. Ho**



中華民國天文學會普及天文獎「譚天獎」設置辦法

（2013 年 5 月 4 日理事會通過）

第一條 本學會爲表彰對天文教育推廣與天文知識普及有卓越貢獻者或團體，特設置「譚天獎」

第二條 本獎之頒發，以本學會會員五人以上之提議，理監事聯席會議之議決爲之，由本會於學會年會中頒給獎章。

第三條 獲獎者或團體以一次爲限。

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第一屆譚天獎得獎者 (103 年五月)： 臺北市立天文科學教育館

Heaven Talk Award

(established: May 2013)

For her/his outstanding contribution to astronomy education and popularization of astronomy

The 1st **Heaven Talk Award** recipient (2014 May): **Taipei Astronomical Museum**

Invited Speakers
大會邀請演講講者

Professor Neal Evans

Astronomy Department
University of Texas at Austin

Prof. Neal Evans II, the Edward Randall, Jr. Centennial Professor in Astronomy of University of Texas at Austin, is the world leading expert in low-mass star formation. He has published more than 250 refereed papers including a review article on star formation in the Annual Review of Astronomy & Astrophysics. Recently Prof. Evans used the Spitzer and Herschel infrared/submillimeter space telescopes to study individual low-mass stars and their planetary systems.

EDUCATION:

A.B. Physics, University of California, Berkeley, California, 1968
Ph.D. Physics, University of California, Berkeley, California, 1973

PROFESSIONAL EXPERIENCE:

Edward Randall, Jr. Centennial Professor, 1994 - present.
Professor, University of Texas at Austin, Astronomy Department, 1987 - 1994.
Associate Professor, University of Texas at Austin, Astronomy Department, 1981 - 1987
Assistant Professor, University of Texas at Austin, Astronomy Department, 1976 - 1980.
Research Associate, University of Texas at Austin, Astronomy Department, 1975.
Research Fellow, California Institute of Technology, 1973 - 1975.
Research Assistant, University of California, Physics Department, 1971.

FELLOWSHIPS AND HONORS:

Phi Beta Kappa, 1967
Magna cum Laude with Honors in Physics, 1968
Physics Department Citation, 1968
National Science Foundation Fellow, 1968 - 1971
First Prize, Griffith Observer Essay Contest, 1974
Graduate Teaching Award, 1991
Fulbright Scholar, 2000
Fellow AAAS 2012
Oort Professorship, Leiden University 2014

PROFESSIONAL SOCIETIES:

American Astronomical Society
International Union of Radio Science (URSI)
International Astronomical Union
American Association for the Advancement of Science
Association for Women in Science

Professor Debra Fischer

Department of Astronomy
Yale University

Prof. Debra Fischer of Yale University, a Fellow of the American Academy of Arts and Sciences, is a well-known astronomer and one of the pioneers in extrasolar planet search. Prof. Fischer has discovered hundreds of extrasolar planets including the first known multiple planet system in 1999. Prof. Fischer also led an international consortium searching for extrasolar gas giant planets and detected more than 30 new hot Jupiters orbiting metal-rich stars.

EDUCATION:

1998	Ph. D. Astrophysics University of California, Santa Cruz
1992	M.S., Physics, San Francisco State University
1975	B.S., University of Iowa

PROFESSIONAL EXPERIENCE:

2009 -	Professor, Dept Astronomy Yale University
2008 – 2009	Associate Professor, Dept of Physics and Astronomy San Francisco State University
2003 – 2008	Assistant Professor, Department of Physics and Astronomy San Francisco State University
2000 - 2003	Research Astronomer, Department of Astronomy University of California, Berkeley
1999 – 2000	Post doctoral Fellow, Department of Astronomy University of California, Berkeley
1998 – 1999	Postdoctoral Fellow, Department of Astronomy San Francisco State University

HONORS AND AWARDS:

2012	American Academy of Arts and Science
2010	Connecticut Academy of Science and Engineering
2009	Fellow: Radcliffe Institute for Advanced Studies
2005-2007	Cottrell Science Scholar
2004	Professional Astronomer for the Communication of Science, Amateur Astronomer Society of Northern California
2004	Benjamin Dean Lecturer, California Academy of Science
2002	Carl Sagan Award, American Astronautical Society
1997	California Space Grant, NASA
1994	Marilyn C. Davis Scholarship, UCSC
1993	Graduate Student Fellowship, NSF

Abstracts
論文摘要

Plenary Talk I: Progress in Understanding the Formation of Low Mass Stars

Prof. Neal Evans (University of Texas at Austin)

I will review recent progress in understanding the formation of individual low mass stars and their planetary systems. In particular, results from Spitzer and Herschel will be highlighted.

Plenary Talk II: How will we find another Earth?

Prof. Debra Fischer (Yale University)

Since 1995, hundreds of planets have been discovered orbiting other stars. The first detections came from ground-based Doppler searches that were sensitive only to massive planets. For a few lucky cases, the detected planets transited in front of their host stars and the combination of techniques provided a measurement of mass, radius and mean density.

The launch of the NASA Kepler mission in March 2009 dramatically expanded our knowledge with the detection of almost 5000 exoplanet transiting candidates. A statistical analysis of these data have shown that at least 1 in 5 stars has an Earth-sized world orbiting at a distance from the host star where liquid water might pool on the surface. However, the stars in the Kepler field are hundreds of light years away, making follow-up observation and confirmation difficult. Now the race is now on to identify Earth like planets orbiting nearby stars. This lecture will discuss why we think small rocky worlds are the best places to search for life and the next generation of exoplanet searches, designed to find close analogs of our Earth.

S1.1: Youngest protoplanetary disk discovered with ALMA

Shih-Ping Lai (National Tsing Hua University)

Rotationally supported disks are critical in the star formation process. The questions of when they form and what factors influence or hinder their formation have been studied but are largely unanswered. Observations of early-stage YSOs are needed to probe disk formation. VLA1623 is a triple non-coeval protostellar system, with a weak magnetic field perpendicular to the outflow, whose Class 0 component, VLA1623A, shows a disk-like structure in continuum with signatures of rotation in line emission. We aim to determine whether this structure is in part or in whole a rotationally supported disk, i.e. a Keplerian disk, and what its characteristics are. ALMA Cycle 0 Early Science 1.3 mm continuum and C18O (2□1) observations in the extended configuration are presented here and used to perform an analysis of the disk-like structure using position – velocity (PV) diagrams and thin disk modeling with the addition of foreground absorption. The PV diagrams of the C18O line emission suggest the presence of a rotationally supported component with a radius of at least 50 AU. Kinematical modeling of the line emission shows that the disk out to 180 AU is actually rotationally supported, with the rotation described well by Keplerian rotation out to at least 150 AU, and the central source mass is $\sim$ 0.2 M_{sun} for an inclination of 55deg. Pure infall and conserved angular momentum rotation models are excluded. VLA1623A, a very young Class 0 source, presents a disk with an outer radius R_{out} = 180 AU with a Keplerian velocity structure out to at least 150 AU. The weak magnetic fields and recent fragmentation in this region of ρ Ophiuchus may have played a leading role in the formation of the disk.

S1.2: Velocity-Resolved [Ne III] Emission from X-ray Irradiated Sz 102 Microjets

Chun-Fan Liu (ASIAA/TIARA/NTU), Hsien Shang (ASIAA/TIARA), Frederick M. Walter (Stony Brook University), Gregory J. Herczeg (KIAA/PKU)

Neon emission lines are good indicators of high-excitation regions close to a young stellar system because of their high ionization potentials and large critical densities. We have discovered [Ne iii] λ3869 emission from the microjets of Sz 102, a low-mass young star in Lupus III. Spectroastrometric analyses of two-dimensional [Ne iii] spectra obtained from archival high-dispersion ($R \approx 33,000$) Very Large Telescope/Uves data suggest that the emission consists of two velocity components spatially separated by $\sim 0''.3$, or a projected distance of ~ 60 AU. The stronger redshifted component is centered at $\sim +21$ km s^{-1} with a line width of ~ 140 km s^{-1}, and the weaker blueshifted component at ~ -90 km s^{-1} with a line width of ~ 190 km s^{-1}. The two components trace velocity centroids of the known microjets and show large line widths that extend across the systemic velocity, suggesting their potential origins in wide-angle winds that may eventually collimate into jets. Optical line ratios indicate that the microjets are hot ($T \leq 1.6 \times 10^4$ K) and ionized ($n_e \geq 5.7 \times 10^4$ cm^{-3}). The blueshifted component has $\sim 13\%$ higher temperature and $\sim 46\%$ higher electron density than the redshifted counterpart, forming a system of asymmetric pair of jets. The detection of the [Ne iii]λ3869 line with the distinct velocity profile suggests that the emission originates in flows that may have been strongly ionized by deeply embedded hard X-ray sources, most likely generated by magnetic processes. The discovery of [Ne iii] λ3869 emission along with other optical forbidden lines from Sz 102 support the picture of wide-angle winds surrounding magnetic loops in the close vicinity of the young star. Future high sensitivity X-ray imaging and high angular-resolution optical spectroscopy may help confirm the picture proposed.

S1.3: Disk Accretion around the Massive Protostar IRAS 20126+4104

Vivien Chen (National Tsing Hua University), Sheng-Yuan Liu (ASIAA), Qizhou Zhang (CfA), Eric Keto (CfA)

Whether accretion disks play an important role in the formation process of massive stars remains a controversial issue. Although Keplerian disks have been observed around low-mass protostars, such structures are difficult to resolve around massive protostars due to their large distances. The lack of strong observational evince casts some doubts on disk accretion scenario for high-mass star formation. Using the SMA, we have resolved the accretion disk around the nearby (1.64 kpc) luminous (10^4 $L_\odot$) massive (12 $M_\odot$) protostar, IRAS 20126+4104, with a resolution of 650 AU. Comparing multiple lines of CH_3CN and CH_3OH emissions, the disk clearly shows a spin-up kinematics resembling the Keplerian motions. The observed data cubes are compared with synthetic image cubes generated from radiative transfer models that include a collapsing rotating envelope around a flared Keplerian disk. Instability of this disk will be discussed in details.

S1.4: ALMA observations of the protostellar jet HH 212

Chin-Fei Lee (ASIAA)

I will present the ALMA observations of the well-defined protostellar jet HH 212 in CO and SiO at high angular resolution. I will discuss the physical relationship between the CO and SiO emissions, and then the driving mechanism of the jet.

S1.5: Magnetic fields in dark globules: a case study towards LDN1225

Eswaraiah, C (Institute of Astronomy, National Central University, Taiwan), Chen, W. P (Institute of Astronomy, National Central University, Taiwan)

Isolated dark globules, which are potential sites for low mass star-formation, are of greatest interest as they form the simplest laboratories to study the early Evolutionary stages that precede core collapse and subsequent star formation. A study of projected magnetic field geometry of the molecular clouds in relation with their other properties like the structure, kinematics, and alignment of bipolar outflows, can give great insight into the role played by the magnetic field in shaping the structure and dynamics of theses regions. Optical polarimetry of background stars towards dark globules will provide projected line-of sight averaged magnetic field geometry in the less reddened outer parts of the cloud region. Polarimetry can also provide important information regarding the distribution of dust and magnetic fields (and hence the nature of dust grain alignment) along the line of sight. We have performed R-band polarimetry of nearly 300 stars that are distributed in an area of 25×25 arcmin^2 towards LDN 1225. Preliminary analysis suggests that the foreground and background stars exhibit different degree and direction of polarization, there by indicating changes in the orientation of the magnetic fields in the foreground and in the cloud region. The results based on our detailed analysis will be presented.

S1.6: The origin of the absorption dip toward IRAS 4A2

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

IRAS 4A2 is a nearby, well-studied Class 0 low-mass protostellar system resides in the NGC 1333 molecular cloud in Perseus cluster. With detections of inverse P-Cygni profile, this target has been identified as a good infall candidate in several studies. In addition, motions of outflow and rotation are also observed. We decompose these different gas motions in aids of high resolution SMA observation and through radiative transfer modeling. Combining Compact-North, Extended and Very Extended configuration data from SMA, an inverse P-Cygni line profile together with a wide and strong absorption dip over a broad range of area is seen toward 4A2 in ^{13}CO J=2-1. From our radiative transfer modeling, an infalling envelop with a compact disk structure inside, together with a forgeground cold layer at 8 km/s can be used to interpret the observed spectrum and PV diagram of 4A2. The upper mass limit of the protostellar disk can also be derived while fitting the absorption dip.

S1.7: CFHT/WIRCam Survey of Young Stellar Objects in Ophiuchus Cloud

Dr. Yan, Chi-Hung (Academia Sinica), Prof. Kuan, Yi-Jehng (National Taiwan Normal University), Dr. Wang, Shiang-Yu (Academia Sinica), Prof. Lai, Shih-Ping (National Tsing Hua University)

Understating how stars are formed is an important topic in astrophysics. Detailed study of young stellar population in star-forming regions is important for understating physical process during star formation, such as star formation rate and lifetimes of young stellar objects (YSOs) in different evolutionary stages. These are key parameters to study the physical mechanism of star formation in Milky Way. In the past few years, we have carried out multi-wavelength observations, toward star forming regions in Ophiuchus cloud using CFHT/WIRCam and archived data from Spitzer. Our goal is to study the star formation activities in the low-mass forming region. We have developed a new YSO identification method based on YSO SED fitting and source filters. A validity test using SWIRE and known YSOs is carried out. The method is able to recover 92% of c2D YSOs and the false detection rate is less than 1%. Based on this new method, we have detected 432 YSOs in Ophiuchus cloud, which is about 45% more than that of c2D project. The newly detected YSOs are fainter than c2D YSOs. There is a large increments of Class I and Flat YSOs because the deep NIR observation. The star formation efficiency (0.09) is higher than c2D estimation, while the star formation rate is lower because the lifetimes adopted is longer. Moreover, the Kenncutt-Schmidt relation derived using our value is consistent with c2D project. The follow-up observations toward these faint YSOs should provide more information on the formation processes of very low mass stars.

S2.1: The birth of radio millisecond pulsars and their high-energy signature

P. H. Thomas Tam (NTHU), Ray K. L. Li (NTHU), Albert Kong (NTHU), Gene Leung (HKU), Jumpei Takata (HKU), K. S. Cheng (HKU)

Millisecond pulsars (MSPs) are believed to form in low-mass X-ray binaries (LMXBs) through matter accretion from the companion star onto the neutron star. In this paradigm, a radio MSP was born when the system switches from an accretion-powered to a rotation-powered object. Exactly what happens during the transition time was poorly understood until very recently. Recent observations have revealed a few objects that not only switched from one state to the other (as predicted in the above paradigm), but also have swung between the two states within time scales that are comparable to or even shorter than the duration of a PhD study. In this talk, I will present observations of these transition objects and a theoretical framework that tries to explain their high-energy radiation.

S2.2: Luminosity of rotation-powered, millisecond pulsars

HIROTANI, Kouichi (ASIAA/TIARA)

We analytically examine the electrodynamics of the particle accelerator that arises in the higher altitudes of a rotating neutron-star magnetosphere. Imposing a condition for the accelerator to be self-sustained, we find that the gamma-ray and the X-ray luminosities of millisecond pulsars are solely determined by only three parameters, period, period derivative, and magnetic inclination angle with respect to the rotation axis. This indicates that the emission properties of a millisecond pulsar little depends on whether it is in a globular cluster or in the galactic field. Moreover, the solution crucially depends on the magnetic field strength at the light cylinder, instead of that at the neutron star surface. It is found that the calculated gamma-ray luminosity is consistent with the Fermi/LAT observations, and that the magnetospheric synchrotron X-ray component dominates the heated magnetic polar-cap component if the spin-down luminosity is above 10^{35} ergs s^{-1}. It is also found that the conversion efficiency of the spin-down energy into the heated polar-cap X-rays, into the secondary magnetospheric X-rays, and into the wind kinetic energy, reside between 10^{-5} and 10^{-3}.

S2.3: A Torus and Outflow in Proto-Planetary Nebula IRAS 17150-3224

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

IRAS 17150-3224 is a bipolar Proto-planetary nebula (PPN) with a series of dust shells in the optical image. 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 stellar evolution. We have mapped it in CO J = 2-1 with the Submillimeter Array (SMA) at about 1 $''$ resolution. In low-velocity CO map, a dusty torus is seen perpendicular to the outflow axis. Also, we could find that the inner part of the torus is seen in continuum. With the Position-Velocity diagram (PV diagram), the torus is expanding at 12 km s^{-1} away from the central star. In order to obtain more precise physical properties, including the structure, density, temperature, and velocity distributions, a radiative transfer model is needed. Because of the optical and SMA observations, the model assumes two components: a envelope which is like torus, and a bipolar outflow. From the structure and the speed of outflow, it shows the last 1600 year history of mass ejection from the central star. We think the mass ejection is isotropic first, and then the star is surrounded by a dense torus, which results in the bipolar outflow. There are a few ways to form the torus, including: magnetic field, binary system, ect. Hu et al, in 1993, indicates that magnetic field exists in I17150. With the model estimate, the mass-loss rate is about 9 x 10^{-4} $M_{\odot}$ yr^{-1}.

S2.4: Imaging Black Hole Event Horizon with the Greenland Telescope: Progress Update on the Theoretical Predictions of the Shadow Image

Hung-Yi Pu (ASIAA), Keiichi Asada (ASIAA), Yosuke Mizuno (NTHU), Masanori Nakamura (ASIAA), Kinwah Wu (UCL), Ziri Younsi (UCL), GLT Team (ASIAA,SAO,MIT,NRAO)*

Direct imaging of the "shadow" cast by the black hole event horizon is one of the ultimate goals in modern submillimeter Very Long Baseline Interferometry (VLBI) astronomy. The ongoing Greenland Telescope (GLT) project in ASIAA play a crucial role in this exciting area by significantly improving the angular resolution (micro arcsec) to a level which the shadow of the supermassive black hole (SMBH) at the center of M87 can be resolved. Before the first light of GLT in 2016-2017, theoretical understanding of the shadow image is important. In this talk, I will summary our current progress on the theoretical predictions of the shadow image of the SMBH in M87, resulting from either the accretion flow or the jet in the vicinity of the black hole. *The GLT Project is a collaborative project between Academia Sinica Institute of Astronomy and Astrophysics, Smithsonian Astrophysical Observatory, MIT Haystack Observatory, and National Radio Astronomy Observatory.

S2.5: Be Stars in the Young Open Cluster NGC 663

Yu, P. C. (Graduate Institute of Astronomy, NCU), Lin, C. C. (IANCU), Lee, C. D. (IANCU), Chen, W. P. (IANCU), Ip, W. H. (IANCU)

We have initiated a program to study the Be phenomena in clusters of different ages. As a pilot project, we have identified 42 emission-line star candidates in the young open cluster NGC 663 (31 Myr, 2.1 kpc) by using the Hα photometry with the Palomar Transient Factory (PTF) Survey. This was done by studying difference between the magnitude of stars obtained from the Hα (central wavelength: 6563Å) and the short-red (central wavelength: 6630Å) filter. The membership of our candidates was verified by 2MASS near-infrared color-magnitude diagram and PPMXL proper motions. Previous studies suggested that there are 29 Be stars in this cluster, in which 10 stars are saturated in PTF images. With our method, we re-identified a total of 14 of remaining 19 known Be-stars. We also discovered two of 29 known Be stars might not be the members of NGC 663 due to their high proper motions. Since our preliminary results increase the number of Be-stars up to about 30% in this cluster, this completeness limit is significant to study properties of the coeval Be-stars.

S2.6: The mass-loss from Asymptotic giant branch stars in M33

Shao-Yu Lai (ASIAA), Ciska Kemper (ASIAA), Sundar Srinivasan (ASIAA), Masaaki Otsuka (ASIAA)

Asymptotic giant branch (AGB) stars eject a significant amount of dust and gas into the surrounding interstellar medium (ISM), driving the chemical evolution of the dust reservoir in galaxies. Therefore, it is important to get a complete census of the population of dust-forming AGB stars in a galaxy and to measure the total AGB dust input to the ISM. Although AGB mass loss is an important feedback mechanism, the detailed dependence of the mass loss on parameters such as the dust properties and metallicity are not well known. In this presentation, we focus on AGB stars in M33. We analyze archived optical, near-IR, and mid-IR data of M33 taken by CFHT, UKIRT, and the Spitzer Space Telescope. M33 was chosen for this study as it is the second nearest spiral galaxy, and the third largest and brightest galaxy in the Local Group, after the Andromeda galaxy and the Milky Way. As such, it is an important analogue for the Milky Way, in which dust production by AGB stars cannot be directly measured due to extinction in the Galactic Plane. From the J-K versus K magnitude diagram, we identify AGB candidates. For these candidates, we fit their spectral energy distribution with the theoretical radiative transfer models from the Grid of RSG and AGB ModelS (GRAMS, Sargent B. A., Srinivasan S., Meixner M., 2011, ApJ, 728, 93; Srinivasan S., Sargent B. A., Meixner M., 2011, A&A, 532, A54) in order to investigate their chemical type (O-rich or C-rich), luminosities, dust-production rates, and compute the total AGB dust budget in M33. This is the first time that such a population-wide analysis has been done for M33.

S3.1: Planet Hunters: Assessing the Kepler TCE Inventory

Megan E Schwamb (ASIAA), Chris J. Lintott (University of Oxford/Adler Planetarium), Debra A. Fischer (Yale University), Arfon M. Smith (GitHub), Tabetha S. Boyajian (Yale University), John M. Brewer (Yale University), Matthew J. Giguere (Yale University), Stuart Lynn (Yale University), Kevin Schawinski (ETH Zurich), Joseph Schmitt (Yale University), Robert J. Simpson (University of Oxford), Ji Wang (Yale University)

NASA's *Kepler* spacecraft has spent the past 4 years monitoring over 160,000 stars for the drop in light due to a transiting exoplanet. Planet Hunters (http://www.planethunters.org), part of the Zooniverse's (http://www.zooniverse.org) collection of citizen science projects, uses the World Wide Web to enlist the general public to identify planet transits in the public *Kepler* data that may be missed by automated detection algorithms looking for periodic events. Referred to as 'crowdsourcing' or 'citizen science', the combined assessment of many non-expert human classifiers with minimal training can often equal or best that of a trained expert and in many cases outperform the best machine-learning algorithm. We have demonstrated the success of a citizen science approach with the project's 40 planet candidates, the discovery of PH1b, a transiting circumbinary planet in a quadruple star system, and the discovery of PH2-b, a confirmed Jupiter-sized planet in the habitable zone of a Sun-like star. The *Kepler* team's planet candidate list is produced through expert assessment of the detections from several runs of the automated Transit Planet Search (TPS) algorithm; to test the completeness of this list we have now undertaken an independent crowd-sourced effort to perform a systematic search of the 18,406 potential transit signals or threshold-crossing events (TCEs) identified in the first twelve quarters (1000 days) by TPS. With the Internet we can obtain multiple assessments of each TCE. Planet Hunters volunteers evaluate whether a transit is visible in the *Kepler* light curve folded on the expected period, with 10 independent assessments per TCE. Classifications were obtained over a 2 month period with contributions from 439 Planet Hunters volunteers. I will present the results of this analysis, a significant extension to existing Planet Hunters efforts. I will compare our results to the *Kepler* team's *Kepler* Object of Interest list and examine how these differences may impact the estimated frequency of exoplanets in the *Kepler* field. Acknowledgements: This research has made use of the NASA Exoplanet (NExSci) Archive and the Mikulski Archive for Space Telescopes (MAST). This research was supported in part by an Academia Sinica Postdoctoral Fellowship. We acknowledge support from NASA ADAP12-0172 grant to PI Fischer.

S3.2: Application of Palomar Transient Factory (PTF) Project: The Opposition Effect on Solar System Objects

Yu-Chi Cheng (Institute of Astronomy, National Central University), Chan-Gao Chang (Institute of Astronomy, National Central University), Jhi-Xuan Jhu (Institute of Astronomy, National Central University), Wing-Huen Ip (Institute of Astronomy, National Central University)

Palomar Transient Factory (Law et al., 2009; Rau et al., 2009) is a synoptic surveying project which is design for discovering the time domain transient events like GRB, supernovae, variables… etc. The survey field is specifying on some selected area which is covered and can be well calibrated by the SDSS catalog (York et al., 2000). A wide field camera system is mounted on the Palomar 48-inch Schmidt telescope with about 7.3 deg^2 FOV and using g' , R, H-alpha filter for this survey. A typical 60s exposure can reach the limit magnitude 20.6 (5 sigma) under 1" sky condition (Law et al. 2009). The high cadence observation area and high precise photometric data provide a good opportunity to study the passing asteroid. The opposition effect, which can be characterize the physical properties of the asteroid surface feature and chemical composition. The H-G two-parameter system (Bowell, et al., 1989) is the wide used method to estimate the absolute brightness of an asteroid. The G value is varies depend on the taxonomy so we can roughly identify the surface properties of an asteroid (Lagerkvist and Magnusson, 1990). The linear relation between phase (α) and apparent brightness (so called the phase coefficient β) above $\alpha > 7$ degree is also an identifier to estimate the surface reflectance (Belskaya and Shevchenko, 2000). In this work, we extract the PTF detections on some specific asteroid family: Hungaria, Hilda, etc. to analyze the long-term multi-phase variation: the H-G parameter and phase coefficient (β) to study the behavior of the opposition effect. In our preliminary result, Hungarians has relative low phase coefficient ($\beta \sim 0.22$, 37 samples) compare to the Hilda population ($\beta \sim 0.35$, 26 samples). The larger β means higher albedo. It is consist with our current knowledge on both asteroid families.

S3.3: On the color distribution of sub-km size main belt asteroids

林省文 (國立中央大學), *Fumi Yoshida (NAOJ)*, 陳英同 (中央研究院天文所), 葉永烜 (國立中央大學)

The small asteroids are probably the collisional fragments of larger asteroids. Therefore they have fresh and unweathered surface compared with larger asteroids. Here we present the color distribution of sub-km size main-belt asteroid. We detected 150 main-belt asteroids from Subaru/Suprime-cam images with BVRI colors. The result shows the different color distribution in Hv < 20 and Hv > 20 objects. Moreover we found the significant number of Q-type asteroids which should be rare in main-belt but common in near Earth space. We also found some of the objects may not belong to the any current known spectra type.

S4.1: Current-Driven Kink Instability in Magnetically Dominated Rotating Relativistic Jet

Yosuke Mizuno (National Tsing-Hua University), Yuri Lyubarsky (Ben-Gurion University), Ken-Ichi Nishikawa (Univ. of Alabama in Huntsville), Philip E. Hardee (Univ. of Alabama)

We have investigated the influence of jet rotation and differential motion on the linear and nonlinear development of the current-driven (CD) kink instability of force-free helical magnetic equilibria via three-dimensional relativistic magnetohydrodynamic simulations. In this study, we follow the temporal development within a periodic computational box. Displacement of the initial helical magnetic field leads to the growth of the CD kink instability. We find that, in accordance with the linear stability theory, the development of the instability depends on the lateral distribution of the poloidal magnetic field. If the poloidal field significantly decreases outward from the axis, then the initial small perturbations grow strongly, and if multiple wavelengths are excited, then nonlinear interaction eventually disrupts the initial cylindrical configuration. When the profile of the poloidal field is shallow, the instability develops slowly and eventually saturates. We briefly discuss implications of our findings for Poynting-dominated jets.

S4.2: The PAN-STARRS1 Medium-Deep Survey: The relation of the specific star forming rate-stellar mass-groupcentric radius in galaxy groups and clusters.

Hung-Yu Jian (National Taiwan University), Lihwai Lin (Academia Sinica), Tzihong Chiueh (National Taiwan University)

We make use of a large optically selected sample of group galaxies drawn from the Pan-STARRS1 Medium-Deep Survey to study the specific star formation rate (SSFR)-stellar mass (M_*) relation density relation at different projected group-centric radiuses (r_p), as well as the quiescent fraction as functions of M_* and r_p. The PS1 data can provides us a large sample suitable for the stack analysis and enables us to explore the relation down to the group scale. We find that at a fixed stellar mass, the SSRF of star-forming galaxies is independent of r_p in both groups and clusters, implying a uniform distribution of star-forming galaxies independent of environment. The uniformity in radius also supports that a fast quenching mechanism acts on the star-forming group galaxies and transforms those galaxies into quiescent ones in a relatively short timescale to maintain the uniform distribution.

S4.3: Are Quasar jets conical ?

Ting-Yu (Huang), Yosuke (Mizuno), Masanori (Nakamura), Keiichi (Asada)

AGN jets are often argued to have a conical structure (Blandford & Königl 1979). However, recent results from observations of M87 suggest that within the Bondi radius (around $2 \times 10^5 R_s$), the jet is parabolic rather than conical (Asada & Nakamura 2012). Our aim is to probe whether it is possible to apply such a structure to blazars and derive some associated physical quantities.We study the source OH-010 which is a quasar at a redshift $z\sim0.87$. Using the full set of VLBA data from the MOJAVE archive, we tracked the motion of jet components, derived the jet opening angle, and checked for consistency with a classical jet model proposed by Marscher & Gear (1985). We also analyzed integrated flux light curves at 6 different frequencies, and observed double-peak features in some frequencies. Such features have been observed in various sources but there lacks proper explanation.We propose that double-peaks in the light curves are originated from changes in opacity and a reason for a second bump may be due to a re-collimation region situated between the radio core and a stationary feature $\sim$0.3 mas away. Estimates on the position of the re-collimation region suggest that it might correspond to the Bondi radius where the jet structure transition takes place. This implies that the jet structure in M87 is not a lone phenomenon but might also apply to quasars.

S5.1: Spectroscopy of the afterglow of gamma ray burst 130606A: reionization at z∼6

Tomo Goto (NTHU), Olga Hartoog (University of Amsterdam), Daniele Malesani (Dark Cosmology Centre), Johan Fynbo (Dark Cosmology Centre), Thomas Krühler (Dark Cosmology Centre), VLT X-shooter team (European Southern Observatory)

The reionization of the universe is a process that is expected to end around $z \sim 6$. Spectroscopic evidence for this comes from the analysis of Gunn-Peterson troughs seen against intrinsically bright and distant background sources. Observations of only a handful of gamma-ray bursts (GRBs) quasars (QSOs) have enabled this kind of analysis. For GRB130606 at $z = 5.913$ we obtained high S/N spectrum at intermediate spectral resolution with VLT/X-shooter, which allowed us a detailed study of the intergalactic medium. We use the afterglow of GRB130606 as a background source to measure the ionized fraction of the intergalactic medium between $z = 4.95 - 5.85$. Our measurements of the Lyman-forest optical depth are consistent with previous measurements with QSOs. However, our measurements have much smaller uncertainty than these because of relatively flat, and simple synchrotron emission continuum of GRB afterglows. Our optical depth measurements confirm that the Universe is becoming more neutral at $z > 5.6$. However, escaping flux is still detected, showing the Universe is still predominantly ionized at the redshift range probed in this work. Our result shows that GRBs are useful probes of the IGM state of the early Universe. However, the scatter in optical depth in the sample is much larger than individual measurement errors, especially for small errors from GRBs. We need a larger statistical sample to conclude robustly about the IGM state of the Universe.

S5.2: Modeling the Formation of Polar Ring Galaxies

Yu-Heng Ho (NTHU), Ing-Guey Jiang (NTHU)

The gas-star-halo systems in hydrostatic equilibrium are built and used to model the formation of polar ring galaxies(PRGs) through N-body simulations. We will introduce the scenarios of PRG formation, and present the models and results of our simulations.

S5.3: Environment Effects of the Stellar Mass Luminosity Function inside the Sixty Clusters of Galaxies at Low Redshift

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

We are conducting the investigation of the k-band selected stellar mass luminosity function inside the clusters, and the data sets we use the Sloan Digital Sky Survey (SDSS) DR10, United Kingdom Infrared Digital Sky Survey (UKIDSS) of Large Area Survey (LAS) DR9. For the cluster selection, we use the XMM-Newton Cluster Survey Catalogue, because we interest in what is the difference between the dynamical stable and dynamical unstable clusters. For the k-band selected stellar mass luminosity function inside the clusters of galaxies, they are good tracers for the stellar mass, also the dust obscuration would not be affected. Furthermore, the luminosity function can help us to understand the inside clusters of galaxies environment between $0 < z < 0.3$. Our first goal is to get the luminosity function. From the result, we can analysis the clusters of galaxies environment, and find out what is the different between clusters and clusters. Also, from the different clusters, or say different environments, we could figure out what reason is affected the clusters of galaxies dynamical status for redshift between the $0 < z < 0.3$.

S5.4: A Study of X-ray Luminosity Functions of Ultraluminous X-ray Sources and the Properties of their Host Galaxies

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

We present a study of X-ray luminosity functions (XLFs) of ultraluminous X-ray source (ULX) candidates (Lx 10^{39} erg/s) and their host galaxy properties. Our ULX samples are a collection of 5 different catalogs based on Chandra observations with a total of 339 ULXs within 100 Mpc. In addition to the XLFs of ULXs, we also report X-ray spectral fitting results with power-law and disk blackbody models. To characterize the host galaxy properties, we estimate galaxy-wide star formation rate (SFR) based on IRAS observations, while stellar mass is estimated from the corrected B magnitude (B_T^0) corrected for galactic and internal extinction, and for redshift in the Third Reference Catalog of Bright Galaxies (RC3). We calculate the distance to the center of the host galaxy by considering inclination angle based on major-to-minor ratio in the RC3. Based on the host galaxy properties, we select ULXs to construct the corresponding XLFs and find that the XLFs are significantly different for high and low SFRs while it is suggestive that the distance to the galactic center may play a role for different ULX populations. On the other hand, the stellar mass does not have major impact on the ULX populations. In terms of galaxy morphology, the XLFs are different for elliptical and irregular/peculiar galaxies while spirals and irregulars/peculiars are quite similar. We will discuss implications of our results in context of the environmental impacts on the ULX populations.

S5.5: The Polarimetric Performance of the Compton Spectrometer and Imager

Chien-Ying Yang (National Tsing Hua University), Jeng-Lun Chiu (National Tsing Hua University), Hsiang-Kuang Chang (National Tsing Hua University)

The COmpton Spectrometer and Imager (COSI), known as the Nuclear Compton Telescope (NCT) before, is a balloon-borne soft gamma-ray (0.2-5 MeV) telescope. COSI consists of twelve germanium strip detectors that are 3D position-sensitive. NCT had a successful balloon flight in 2009, and the upgraded instrument as COSI will be launched for an ultra-long duration balloon (ULDB) flight (30-100 days) in Antarctica in December, 2014. The most important change is the configuration of germanium detector array, which becomes 2x2x3 instead of 2x6 in NCT. As a Compton telescope, COSI is intrinsically sensitive to polarization. To assess COSI's polarization performance, we will measure a partially polarized point source and compare the results with those from Monte-Carlo simulations. I will consider the magnitude of false modulation patterns and assess COSI's performance throughout its field of view. In the 2014 ULDB flight, our main targets are Gamma-ray bursts (GRB), which are expected to be observed more than once in our observation depending on its fluence and the flight duration. I will estimate the minimum detectable polarization (MDP) of these GRBs with Monte-Carlo simulations, considering a revised mass model as well as the contribution of cosmic and atmospheric background.

S5.6: Application of Coded Mask of The Compton Spectrometer and Imager

Jie-Rou Shang (National Tsing Hua University), Yi Chou (National Central University), Hsiang-Kuang Chang (National Tsing Hua University), C-L Chiu (National Tsing Hua University)

The Compton Spectrometer and Imager (COSI) is a soft γ-ray (0.2 MeV$\sim$ 10 MeV) telescope with twelve germanium detectors (GeDs), which are designed to detect the cosmic γ-ray photons by using the Compton scattering technique to locate the incident photons. A coded mask technique is planned to be applied on this instrument, so that the incoming non-scattered photons below 200 keV can be imaged instead of being excluded in the existing Compton imaging approach. The imaging capability of COSI is then expected to extend to the hard X-ray band (40-100 keV) to enable more possibilities on scientific purposes. With a basic mask pattern designed for COSI, which is a 33×31 pixels array with a pixel size of 4 mm^2 (the spatial resolution of the GeDs is 2 mm), we set up a data reduction pipeline for the coded mask pattern and tested the analytic method by performing Monte-Carlo simulations to get the instrumental parameters and found the best-performed mask geometry and material. The effects from the Caroli-factor and pixel shuffling were considered in the simulations. From the simulation results, we decided to use Tin (Sn) which absorbs effectively below 100 keV but is well transmitted at high energy range, as the mask material. Here I will present results of this coded-mask study.

E1.1: Exploration of outer Solar System (invited)

Shiang-Yu Wang (ASIAA)

E1.2: The Encounter of Planets with Symphony 當天文遇上交響樂 – 霍爾斯特《行星組曲》育藝深遠校外教學音樂會

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

This school year (2013-2014) Taipei Symphony Orchestra "Profound Arts Concert" features Holst "The Planets" as the theme, invited Taipei Astronomical Museum (TAM) to co-operate the program. During the concert, the planetarium astronomical films produced by TAM were projected above the stage at the same time. Meanwhile, TAM staff acts as a professional and scientific guide who plays as a planetarium keynote speaker. Through the help of planets videos and photos provided or shot by TAM, the powerful visual guidance not only enrichs children's imagination, but also opens their knowledge of astronomy. The combination of title music with space science will surely deepen students' minds even more, making them to enjoy the experience of concert-attending. "Profound Arts Concert" art and science education program not only exercises down rooting of literacy in the form of philosophy, science and education activities, but also helps the fifth graders in Taipei city to enjoying the beauty of music through instrumental demonstration. Furthermore, pupil can thus simultaneously learn something new and correct about planets in our Solar system.

本（102）學年度臺北市立交響樂團育藝深遠音樂會以霍爾斯特《行星組曲》為主題，特別邀請臺北市立天文科學教育館共同合作，在樂團演奏的同時，於舞台上方投影出天文館所製作的星象影片，並由天文館專業導覽員擔任主講人。透過視覺的引導與天文館所提供和自行拍攝的行星影片與照片，不但能豐富學童的想像力，亦將開啟他們對於天文星象的認識。而且可讓標題音樂透過科學影像的輔助，在學童的腦海中更形深化，使他們首次聆賞交響樂團音樂會的經驗更為深刻。不僅如此，「育藝深遠－教育與藝術結合方案」力行文化素養向下紮根之理念，透過科教活動及樂器演奏示範，讓臺北市的國小五年級學童都有機會聆賞音樂之美並能同時學習星空與天體的新知。

E2.1: International Astronomical Union Office of Astronomy Outreach

Sze-leung Cheung (IAU/NAOJ)

The IAU Office for Astronomy Outreach (OAO) is IAU's hub for coordinating its public outreach activities around the world. The aim is to build networks to support and disseminate information to the amateur astronomy and public outreach communities. OAO is responsible for IAU's interaction with the general public. There are two major campaigns run by OAO in the coming year, namely the International Year of Light 2015 and the public naming of exoplanets.

E2.2: Translation of Astronomical Terminology in Taiwan

Chia-Ling Hu (Taipei Astronomical Museum), Wen-Ping Chen (National Central University), Kuei-Lan Chang (Taipei Astronomical Museum), Lin-Wen Chen (National Taiwan Normal University), Yi-Nan Chin (Tamkang University), Yi Chou (National Central University), Fan-Lin Tao (Taipei Astronomical Museum)

Here we present the work in translation of astronomical terminology in Taiwan. As translation of astronomical terms from English to Chinese has been very divergent, it might cause confusion in understanding and difficulty in searching of the terms. The authorization of the translation can be traced back to the publication of "Astronomical Terminology" in 1992 by National Institute for Compilation and Translation, which contains 6091 terms. In the past few years, the astronomical society in Taiwan collaborated with that in China to compile and compare the translation of astronomical terms. The work was published as "Cross-Strait Astronomical Terminology" in 2013, which contains 5697 terms, while 2835 of them are in the previous glossary and 3132 are new. At the same time, the astronomical society in China has developed a web-based glossary with increasing amount of astronomical terms, collecting 22342 terms up to present. With the fast progress in astronomy, there are more and more new astronomical terms emerging. Accordingly, National Academy for Educational Research has established a committee to revise and update the translation of astronomical terms. On behalf of the committee, we will present our working plan and the current progress.

E2.3: Climate Change, Black Hole Universe and the Future Sustainable Energy For All

柳麗玲 *(Taipei Chengshih University of Science & Technology)*

Earth is undergoing climate change; global warming, a catastrophe caused by the current state of depletion of natural resources. In the meantime, the universe is undergoing a period of accelerated expansion of the black hole universe caused by inhalation of outside matter forming a supermassive black hole. Energy supply is influenced by climate change, this article aims to explore the potential energy of the universe in the field of the Earth can be made use of ? Could black hole energy become a sustainable source of energy supply? Therefore, document analysis is used to investigate the true nature of the universe of black holes. In addition, according to Einstein logical inference based on analysis of a causal relationship with the planet' s energy. Conclusion: Universe is a sphere of liquid and constitution of stars and planetary systems. The critical part of cyclic universe evolution, it requires high energy mechanism. Stars in galaxies are strongly influenced by the movement of their core massive black holes, and galaxy clusters in the universe has also been extended impact by the expansion of the universe. The universe has a deceleration interface after an acceleration interface, the expansion velocity depends on the velocity that the universe inhales matter from outside, and is able to produce a cyclic universe. The quasars release huge of energy restrain to star formation and further black hole growth. That resolves approaching 100 million years lifetime of the quasar interface and explain the relationship between black hole mass and the stellar rapid dispersion. The extreme events: pollution, fossil-fuel emissions, earthquakes and hurricanes, Illness , starvation, education, communications, health, global warming and energy due to human caused climate change will solve with global approach, when the planet is viewed as a whole. Improvement in Black hole universe model, the Einstein static model and Cosmological model, then sustainable energy for all.

Keywords climate change • black hole universe • sustainable energy

E2.4: Outreach Application of Citizen Science Projects in Classroom

Mei-Yin Chou (ASIAA)

I will briefly introduce Zooniverse, one of the citizen science web portal projects. Zooniverse initiated from the original Galaxy Zoo projects in 2009, and now has launched dozens of science projects. These projects include many disciplines such as astronomy, ecology, biology and humanity. Since ASIAA has translated two of the Zooniverse projects in Traditional Chinese characters, I will especially focus on these projects, Galaxy Zoo and Planet Four, and how they can be used in classroom.

PS01: Discovery of a High-flying Potentially Uranian Trojan

Ying-Tung Chen (ASIAA), J. J. Kavelaars (HIA), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU)

Trojan asteroids show a stable orbital evolution at Lagrangian points, L4 and L5, of the planet. Beyond Jovian Trojan orbit, a large number of Neptunian and Uranian Trojan were expected to exist, even though only few Trojans were found at present. We investigated the dynamical evolution of a high inclination Centaurs that was discovered by the Next Generation Virgo Cluster Survey. This Centaur's orbital evolution indicates that the long-lived stability of high inclination Centaurs is probable, and may exist the possibility of quasi-Trojan orbit. The orbital stability also hints the existence of large population at region near Uranus orbit.

PS02: The Super Fast Rotating Asteroid

Chang, Chan-Kao (NCUIA), Waszczak, Adam (Caltech), Ip, Wing-Huen (NCUIA), Prince, Tom (Caltech), the PTF Team (NCUIA), the PTF Team (Caltech)

There is a 2.2-hour 'spin barrier' is held by 'rubble-pile' asteroid (i.e., gravitationally bounded aggregations). However, asteroids of diameter < 150 m may rotate faster than that 'spin barrier' and are likely monolithic objects. One exceptional example, 2001 OE84, which has a diameter of 0.9 km and a rotation period of 29.19 min (Pravec et al. 2002). Subsequently, Holsapple (2007) suggested a size-dependent strength for asteroids and predicted the existence of kilometer size super-fast-rotators. Although several asteroid rotation surveys had been conducted, none of them reported any discovery of km size super-fast-rotator. If Holsapple's prediction is correct, there should be more km size super-fast-rotators and their population at least should be as much as the tail in the fast end of the spin rate distribution. Therefore, we conduct iPTF/ZTP asteroid rotation study to find super-fast-rotator candidates. In our 2014 Feb run, we detected one such super-fast-rotator candidate and had a followup observation in March 25th, 2014. The super fast spin rate of the candidate has been confirmed in the preliminary result. The detail analysis is still ongoing and will be published soon.

PS03: The Asteroid Spin Rate Study by Using iPTF Data (poster)

Chang, Chan-Kao (NCUIA), Ip, Wing-Huen (NCUIA), Lin, Hsing-Wen (NCUIA), Ngeow, Chow-Choong (NCUIA), Yang, Ting-Chang (NCUIA), Waszczak, Adam (Caltech), the PTF Team (Caltech)

The asteroid spin rate distribution helps to understand its evolution depending on different mechanisms (i.e., collision and YORP effect). The asteroid spin rate limit helps to know its interior structure. Moreover, the binary asteroid is important to measure asteroid mass. These properties are able to be obtained by asteroid light curves. In order to have a clear picture of small asteroid (D < 10 km) spin rate distribution and spin rate limit, we have carried out two dedicated observation in Jan and Feb, 2014. Both observations had a 12-field covering on the ecliptic plane and were observed in four consecutive nights with 20 min cadence. Our preliminary result shows around 1,500 asteroid rotation periods with high quality, in which one highly possible super-fast-rotation was found. The follow up observation had been carried out on March 25th, 2014 by using 200-inch Hale telescope of Palomar Observatory. The analysis is still ongoing and the detail results are expected to be shown in ASROC 2014.

PS04: Complex Organic in Comets

Yo-Ling Chuang (National Taiwan Normal University), Yi-Jehng Kuan (National Taiwan Normal University)

Many interstellar complex organic molecules were observed in hot molecular cores in massive star-forming regions and hot corinos in low-mass young stellar objects within molecular clouds. It is thus essential astrobiologically to find complex organic molecules in protoplanetary disks as the next steps. However, observations of cometary comas reveal that compositions of comet nuclei are a mixture of products of interstellar chemistry and nebular chemistry. Therefore comets may provide the important information con- necting interstellar clouds and Sun-like young stellar objects with associated proto-planetary disks, or Solar Nebula in our own case. Observing important cometary organic molecules may provide clues fundamental to our knowledge on the formation of prebiotically significant organic molecules in the Solar Nebula, hence, the origin of life in the Solar System and on the Early Earth. We have thus used (sub)millimeter telescopes to look for large organic molecules in recent bright comets such as 73P/S□W 3, Hartley 2, Lulin, Garradd and F6/Lemmon. In this presentation, we will report some of the interesting results of our most recent findings.

PS05: Taxonomical Classification of the Hungaria Asteroids by Using the PTF Data

Zhi-Xuan Zhu (Institute of Astronomy,National Center University), Chan-Kao Chang (Institute of Astronomy,National Center University), Yu-Chi Cheng (Institute of Astronomy,National Center University), Wing-Huen Ip (Institute of Astronomy,National Center University)

Hungaria asteroids represent a very interesting population of small bodies in the inner solar system. Their orbits with semi-major axes (a) between 1.78 AU and 2.0 AU are characterized by low eccentricity ($e<0.18$) and high inclination (I 16o-34o). The orbits of the Hungaria asteroids are also very stable and might thus very well be the remnants of the planet-building blocks left behind since the formation of the solar system. On the other hand, their high inclinations remain a puzzle and large-scale migration of protoplanets has been proposed to explain this dynamical feature. Another special thing about the Hungaria population is that it might have been responsible for the late heavy bombardment event of the Moon and the inner planets. These considerations suggest that an in-depth understanding of the dynamical origin and composition/mineralogy is essential for the study of many key episodes of solar system evolution. There are over 5000 known Hungaria asteroids. Only a handful of them have been classified according to the nomenclature in asteroidal taxonomy by photometric color measurements or spectral observations. It is therefore important to produce a comprehensive survey of the taxonomical types of the Hungaria asteroids to examine possible correlation with sub-families or other physical parameters. In this work, we report on our test project in using the archived data of the Palomar Transient Factory (PTF) project to address this need. Specifically, we use the photometric measurements of individual objects obtained at different times and orbital locations to compile phase curves and determine the H-G functions. Some first results will be described.

PS06: A preliminary study of infrared variability in young stellar objects from Spitzer's Gould's Belt Cloud

S.-P. Lai (NTHU), Chia-Cheng Ni (Affiliated Senior High school of National Chung-Hsin University), Hsuan-Ju Peng (SHCH), Shih-Chao Lin (SHCH)

We present the results of a preliminary study of infrared variability in the young stellar objects (YSOs) in molecular clouds observed by Gould' s Belt Spitzer Legacy teams. These observations were obtained with IRAC 1∼4 and MIPS 1&2. By Multi-dimension method, we can identify 1794 YSOs from tail of Serpens in Gould Belt Cloud. And we also characterize the possible YSOs by Spectral Energy Distribution (SED) by model fitting. The online model can access SED models of YSOs.,is built by T. P. Robitaille and B. Whitney (2006 & 2007). In the end, we want to develop YSOs of different evolutionary stages in this molecular clouds. We will conclude by exploring potential causes of any observed infrared variability.

PS07: Extreme High Velocity Components of the Protostellar Jet in NGC 1333 IRAS 2A

Cheng-Hung Tsai (NTHU), Huei-Ru Chen (NTHU), Chin-Fei Lee (ASIAA), Naomi Hirano (ASIAA), Hsien Shang (ASIAA)

The quadrupolar outflow driven by NGC 1333 IRAS 2A (d = 220 pc) shows an extended shell structure in the north-south direction and a collimated jet-like structure in the east-west direction. We have mapped the north-south bipolar outflow in 230 GHz dust continuum, CO $J = 2-1$, SiO $J = 5-4$, and SO $J = 6_5 - 5_4$ emission at $\sim 1''.5$ resolution with the Submillimeter Array. At velocities close to the systemic velocity, the CO emission traces the shell structure that is swept by the protostellar jet in H_2 emissions. On the other hand, we discovered extreme high velocity (EHV, $v > 25$ km s^{-1}) components in CO emission close to the shocked H_2 emissions at a distance of $\sim 80''$ (0.08 pc) on both side of the outflow. In the southern EHV components, we observed bow-shock structures with large velocity spreads and intrinsic jet components with increasing velocities along the jet axis. It suggests that the faster upstream jet is overtaking the slower jet/ambient medium in the downstream. On the other hand, the northern EHV component only shows a bow-shock structure, suggesting a post-shock gas clump. In addition, the central microjet that shows in previous studies were detected in our CO, SiO, and SO emission as two unresolved EHV components. These central components in the southern lobe display a velocity gradient across the jet axis. The orientation of this velocity gradient is similar to a rotating envelope in previous studies, and may arise from rotation of the protostellar jet.

PS08: Observational constraints on the model of the accretion disk

Ekaterina Koptelova (Institute of Astronomy, National Tsing Hua University)

The time lags between brightness variations in different optical bands represent the travel time of light between different continuum emitting regions of the quasar' s accretion disk. The standard model of the accretion disk predicts that the time lag is proportional to the wavelength with a power index of 4/3. In this work the relation between the time lag and wavelength is tested based on multiwavelength observations of quasars and Seyfert galaxies at a broad range of redshifts.

PS09: Interstellar Urea: an ALMA Search

Ya-Wen Yo (Department of Earth Sciences, National Taiwan Normal University), Yi-Jehng Kuan (Department of Earth Sciences, National Taiwan Normal University)

Urea, (N2H)2CO, is a prebiotically important complex organic molecule (COM) and is fundamental to prebiotic chemistry. Based on the knowledge learned from our previous searches of other COMs, we used the high sensitivity and high angular-resolution ALMA (Atacama Large Millimeter/submillimeter Array) to search for interstellar urea in the Orion KL hot molecular core. Our search is astrobiologically essential to looking for biomolecules beyond the terrestrial atmosphere.

PS10: 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 very early stage of star formation by considering the thermal dynamics of the parent clouds. As a start, we use FLASH code to simulate the single star formation and compare the results to the inside-out collapse model. We choose to use FLASH code developed by Flash Center, which is based at the University of Chicago and involves a collaboration with Argonne National Laboratory, because it is a grid-based non-ideal magnetohydrodynamics code that can deal with thermal properties 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.

PS12: Small-scale kinematics in massive star forming cores

Kuo-Song Wang (ASIAA; Leiden Observatory), Michiel Hogerheijde (Leiden Observatory), Floris van der Tak (SRON, Groningen University), Pamela Klaassen (Leiden Observatory)

Unlike the formation of Solar-type stars, the formation of massive stars (M>8 Msun) is not yet well understood. For Solar-type protostars, the presence of circumstellar or protoplanetary disks which provide a path for mass accretion onto protostars is well established. However, to date only few cases of young massive stars show the evidence of circumstellar disks which might support the idea that a scaled-up version of low-mass star formation could be applied to young massive stars. To what extend this hypothesis can be applied is still unclear and more observational evidences are required to characterize the physical properties of the disk-like structures around massive stars in order to understand how exactly massive stars gain their masses in the equatorial regions. In this poster, we present high resolution (sub)millimeter interferometric observations of three massive star-forming regions: AFGL 2591, S255IR and W3 IRS5. We suggest that massive stars may form via disk accretion in some relatively isolated star-forming cores. However, in the central part of massive star-forming clusters, we suggest that massive stars may form through competitive accretion in star-forming cores. Our studies serve as the basis for the coming Atacama Large Millimeter/submillimeter Array (ALMA) studies of massive star formation at very high angular resolution, which is the only instrument that can resolve the sources with great details and provide hints on how exactly massive stars can be formed.

PS13: Probing kinematics of the filaments around the infalling envelope in W3(OH) massive star-forming region

Wei-Ting Kuo (Department of Physics and Institute of Astronomy, National Tsing Hua University), Vivien Chen (Department of Physics and Institute of Astronomy, National Tsing Hua University)

Recent Herschel observations have revealed that many star-forming regions are associated with filamentary structures (Andre 2014 and reference therein). How these filaments affect the process of star formation is still unclear. Therefore, probing the kinematic structure of these filaments is critical to advance our understanding on the connection between star formation and environments. We have observed emissions of HCO+ (1-0) and N2H+ (1-0) toward the W3(OH) massive star-forming region, which is in the course of a developing OB stellar group. The HCO+ (1-0) spectra show the blue-skewed infall asymmetry in the circumcluster envelope, suggesting a large-scale ongoing collapse over 50" (0.4 pc). The N2H+ (1-0) emission traces dense and quiescent gas in two filaments around the infalling envelope. To describe the infall motions, we utilize RATRAN (Hogerheijde & van der Tak 2000) to analyze our HCO+(1-0) data cube. To derive the kinematic structure in N2H+ (1-0) filaments, we extract centroid velocity and line width from hyperfine line fitting for each pixel. The kinematic properties of both filaments will be discussed.

PS14: Probing the evolutionary stages of IRDC cores

Vlas Sokolov (National Tsing Hua University), Vivien Chen (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), dense and dark silhouettes against bright Galactic background, are thought to be the cradles of massive star and cluster formation, being cold, dense, and massive enough to harbour massive protostars. Previous studies show great diversity of IRDCs, ranging from dense quiescent clouds on the verge of star formation burst to relatively evolved regions with embedded massive protostars driving outflows and forming HII regions. Determining reliable tracers of IRDC evolution will establish a coherent picture of IRDC diversity and their evolutionary sequence. In particular, the trend in deuterium fractionation vs. dust temperature, luminosity, line width, and CO depletion factor may be an indicator of embedded protostar evolution. In this study, we present dust temperature and column density maps of 11 IRDCs derived from publicly available Herschel far-infrared data. By comparing the results with previous deuterium fractionation measurements we discuss the IRDC cores in terms of their evolutionary sequence.

PS15: Identifying and Characterizing Stellar Clusters Toward the Galacitc Anti-Center from Pan-STARRS1 3π Survey Data

Chien-Cheng Lin (National Central University), Wen-Ping Chen (National Central University)

Star clusters play an important role not only in our Milky Way galaxy, but also in other galaxies because they are relative easier to determine ages, distances, and size than a single star. The current sample of star clusters is still incomplete beyond 1.8 kpc due partly to dust extinction in the Galactic plane, and partly to a lack of comprehensive all-sky searches for distant systems. The Pan-STARRS1

with its wide field of views and sensitive cameras provides us an opportunity to identify and characterize star clusters as much as possible. By using a star counting algorithm, we obtained a total of 1008 star cluster candidates in a field of $20^\circ \times 20^\circ$ toward the Galactic anti-center, of which 62 are known star clusters. The remaining 946 candidates are being verified with age, distance, and reddening values. On the basis of the number density of known star clusters and the completeness limit of our data, we estimate that half of these candidates are star clusters.

PS16: Infrared-to-X-ray ratios of supernova remnants in the Large Magellanic Cloud

Ji Yeon Seok (ASIAA), Hiroyuki Hirashita (ASIAA), Bon-Chul Koo (Seoul National University)

An infrared-to-X-ray flux ratio (IRX) traces the relative importance of dust cooling to gas cooling in astrophysical plasma. Dust grains are predicted to be a dominant coolant in the lifetime of a supernova remnant (SNR). We derive the IRXs of SNRs in the Large Magellanic Cloud (LMC) using Spitzer and Chandra SNR surveys. IRXs of all remnants in our sample are moderately greater than unity, indicating that dust is more efficient coolant than gas although gas cooling is not negligible. Comparison to IRXs of Galactic SNRs shows that IRXs of the LMC SNRs are systematically lower than those of the Galactic SNRs. As both dust cooling and gas cooling are pertaining to properties of the interstellar medium, the lower IRXs of the LMC SNRs reflect the characteristics of the LMC, and the low dust-to-gas ratio (one-forth of the Galactic value) is likely to be the most significant. The observed IRXs are compared to theoretical predictions, which prove to overproduce the observed IRXs by an order of magnitude. This may originate from the dearth of dust in the remnants either due to severe dust destruction via sputtering or due to the local variation of the dust abundance in the preshock medium as compared to the global dust abundance. Finally, we discuss implications for the dominant cooling mechanism in extreme low metallicity galaxies.

PS17: The Properties of Be stars with Infrared Excess from the Wide-field Infrared Survey Explorer (WISE) Survey

Chien-De Lee (Institute of Astronomy, National Central University), Chih-Hao Hsia (Department of Physics, University of Hong Kong), Wen-Ping Chen (Institute of Astronomy, National Central University)

The classical Be stars are thought to be a class of B-type main-sequence stars with hot circumstellar gas discs, which reveal emissions and moderate near infrared (IR) excesses. A few of classical Be stars with large IR excess (or called "FS CMa type stars") are always mis-classified as Herbig Ae/Be stars associated with star formation regions. Here, we report a multi-wavelength study of classical Be stars and Herbig Ae/Be stars. We present the mid-IR photometric results in four bands at 3.4 (W1), 4.6 (W2), 12 (W3) and 22 μm (W4) extracted from the Wide-field Infrared Survey Explorer (WISE) for 657 known classical Be stars, 36 Herbig Ae/Be stars, and 4 classical Be stars with large IR excess. The statuses of these sources were confirmed by the [3.4]-[12] versus [4.6]-[22] diagnostic diagram. Based on the locations of these objects in the [3.4]-[12] versus [4.6]-[22] diagnostic diagram, we conclude that these sources may have different evolutionary stages and/or are located in various circumstellar environment. Furthermore, we also note that most of classical Be stars with large mid-IR excess show strong Hα/Hβ emissions and fine-structure lines, which are not associated with star forming regions. Thus, we propose that they are not classified as Herbig Ae/Be stars. The optical and infrared characteristics of these interesting objects

are discussed, and the spectral energy distributions (SEDs) for four of them with extensive archival data are constructed.

PS18: Long-Term Photometric Behavior of the Young Abrupt Variable GM Cephei

Po-Chieh Huang (Institude of Astronomy, National Central University), Chang-Yao Chen (Department of Physics, National Central University), Chia-Ling Hu (Taipei Astronomical Museum), Wen-Ping Chen (Institude of Astronomy, National Central University)

GM Cep is an active pre-main sequence star in the young (4 Myr) open cluster Trumpler 37. It is a UXor type variable, i.e., with abrupt brightness variations caused by obscuration by circumstellar dusty clumps, signifying the initial grain growth in a protoplanetary disk to eventual planet formation. We present multi-color light curves of the star from 2009 to Jan 2014, thereby extending the century-long photometric behavior of this interesting young object. We will show periodicity analysis and polarization measurements at different phase of the eclipsing light curve.

PS19: Molecules in Planetary Nebula NGC 6302 II

Tatsuhiko Hasegawa (ASIAA), Sun Kwok (Hong Kong University)

Many molecules have been detected in the bright planetary nebula NGC 6302. Chemical models have been developed to replicate the observed molecular abundances and physical conditions.

PS20: Oscillator strengths of Zn I and Ga II for Astrophysical Modeling

Hsin-Chang Chi (Department of Physics/National Dong Hwa University)

Zinc and gallium are of astrophysical interest. The scenario for the production of Zn I is still controversial. The discrepancies in Ga abundance for HgMn stars, as derived from UV and optical lines of Ga II, also remains open.Accurate oscillator strengths of Zn I and Ga II are crucial for the final resolution of these problems. We have applied the second-order relativistic many-body perturbation theory (RMBPT) to calculate the oscillator strengths for the spin-allowed electric-dipole (E1) transitions in Zn I and Ga II. We have studied 11 transitions among the first 13 levels of Zn I and Ga II. Radiative lifetimes of some levels in Zn I and Ga II are also evaluated. The transition amplitudes obtained in different gauges agree within 2% and the oscillator strengths agree well with experiment. The present calculations provide accurate atomic data for astrophysical modeling of abundance analysis.

PS21: Searching for Possible Members of the Beta Pictoris Moving Group

Chang-Yao Chen (Department of Physics, National Central University, Taiwan), Wen-Ping Chen (Institute of Astronomy, National Central University, Taiwan)

Most if not all stars are formed out of a molecular cloud in a clustered environment. Star clusters eventually dissolve and supply the disk stellar population. Stellar moving groups are living fossils of how the disintegration process takes place. So far there are a handful of moving groups known, including the Beta Pictoris moving group (BPMG), which consists of 28 known stellar systems sharing

the similar space moving motion as Beta Pictoris, the prototypical star with a planetary debris disk. Based on the mean space motion of known members, we calculated the heliocentric distance, and hence the proper motion and radial velocity expected for a member toward any line of sight in the whole sky. With the UCAC and PPMXL proper motion datasets and photometric distances, we identify possible member candidates of BPMG. We present the results of a pilot study of a search in a few patches in the sky, and discuss our observing plans to secure the properties of these candidates to constrain the membership.

PS22: Search and Follow-Up Observations of Ultra Long Period Cepheids Candidate in M31 using PTF, P60 and LOT

Chow-Choong Ngeow (National Central University), Chien-Hsiu Lee (University Observatory Munich / Max Planck Institute for Extraterrestrial Physics), Hsiang-Yao Hsiao (National Central University), Chi-Sheng Lin (National Central University), Wing-Huen Ip (National Central University)

The ultra Long Period Cepheids (ULPCs) are defined as classical Cepheids with pulsation period longer than 80 days. It has been proposed that ULPC can be used to determine the Hubble constant in " one-step" (Bird et al 2009). ULPCs have been identified in Magellanic clouds and nearby dwarf galaxies, however no ULPC has been identified in the nearest spiral galaxy – the Andromeda galaxy (M31). Hence, we have conducted a search of ULPC in M31 using the R-band time series images taken from the Palomar Transient Factory (PTF). Our search found 8 ULPC candidates, but only three of them are likely to be ULPC based on the analysis of the R-band light curves. To further verify their ULPC nature, time-series follow-up observations in V and I band are necessary. Here, we reported preliminary results based on two years (2012 and 2013) follow-up observations using the Palomar 1.5m (P60) and Lulin 1.0m (LOT) telescopes. Preliminary V and I band light curves, based on these observations, suggest that only two (out of three) of them are truly ULPCs. Other candidates are either low amplitude pulsators or long period variables. We briefly discuss the implication of our finding in distance scale work.

PS23: Characterization of faint photometric and kinematic members in the open cluster NGC752

Chung-Kai Huang (Graduate Institute of Astronomy, National Central University), Chien-Cheng Lin (Graduate Institute of Astronomy, National Central University), Pei-Yi Chen (Graduate Institute of Astronomy, National Central University), Wen-Ping Chen (Graduate Institute of Astronomy, National Central University)

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. As a pilot program to identify and study low-mass members in open clusters, perhaps extending to substellar objects in nearby clusters, we present the analysis of NGC752 by using the PPMXL proper motion and Pan-STARRS photometric data to characterize the low-mass members. Some bright stars also have been measured radial velocities by the LAMOST, rendering further constraints on membership determination.

PS24: The Transit Observations of XO-1 Planetary System

Yi-Ling Lin (國立清華大學),*Ing-Guey Jiang* (國立清華大學), *Chien-Yo Lai* (國立清華大學), *He-Feng Hsieh* (國立清華大學)

We present three newly observed transit light curves of the XO-1 planetary system, one of them is obtained from the Wise Observatory, the others are obtained from the ARIES. We have analyzed these data together with others from literature, and will measure the possible transit timing variations (TTVs).

PS25: Deep Hα Survey and New Supernova Remnant Candidates in the Large Magellanic Cloud

Hsuan-Ju Chen (IANCU), Wei-Hao Wang (ASIAA)

Because of its distance, the Large Magellanic Cloud (LMC) is an ideal place to obtain a large sample of supernova remnants (SNRs). By far, there are already 56 identified SNRs in the LMC. We used deep Hα images from Cerro Tololo Inter-American Observatory (CTIO) to look for new SNRs in the LMC. The goal is to identify new SNR candidates from our Hα images, and then compare their Hα data with data from other wavebands such as X-ray, radio, and infrared. Hα images are also suitable for searching for young stellar objects (YSOs). We will investigate the distribution of YSOs around SNRs in the future. We display parts of our images and discuss the new SNR candidates in this poster.

PS26: Reconstructing the Light Curves of Galactic Cepheids in PanSTARRS 1 System: Preliminary Results

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Cepheids are standard candles that can be used to determine distances to nearby galaxies by using well-calibrated period-luminosity (P-L) relations. Properties of Cepheids are well examined in BVI filters; however they are not well studied in grizy filters. Therefore, we carried out a project to investigate and characterize the known Galactic Cepheids, by reconstructing their light curves and deriving their mean magnitudes in Pan-STARRS1 (PS1, the Panoramic Survey Telescope and Rapid Response System) grizy photometry system. PS1 is a multi-band and multi-epoch survey project by using a dedicated 1.8 meter wide field telescope (located at Mount Haleakela, Mauna Kea, Hawaii). PS1 telescope is equipped with a CCD camera that has with 1.4 billion pixels, composed with 60 Orthogonal Transfer Arrays (OTAs), to form a field of view of 7 degree square. The OTA consists of 8 x 8 array of 600 x 600 pixels CCDs. The camera includes a set of 5 filters: g, r, i, z, and y . PS1 science goals range from Solar System to cosmology. Considering the depth and coverage area requirements are different for various science goals, five distinct survey programs are performed: the 3π sky survey (covering the northern sky to -30 ° in declination), the median-deep survey of selected areas (MD survey), the Solar System sweep spot survey, the stellar transit survey, and a deep survey of M31 (PAndromeda survey). Observed data are reduced and analyzed by IPP (Image Processing Pipeline) team. Because the data points of our

targeted Cepheids in 3π sky survey are sparse and highly clumped. Therefore, we need to construct template light curves by selecting the 1440 fundamental mode (FM) Cepheids in M31 observed in the r- and i- band from PS1 PAndromeda survey. We first queried the periods, the epochs of maximum brightness, and the mean magnitudes of all sampled Cepheids in the r- and i- band. Then we fitted a Fourier expansion to the normalized and folded light curves based on the observed data points for all targets. Finally, we stacked similar light curves to construct template light curves in the r- and i- band. Using these template light curves, we present the reconstructed r- and i-band light curves of Galactic FM Cepheids in 3π sky survey, as well as their mean magnitudes based on the template light curves fitting.

PS27: Molecular hydrogen emission in diffuse interstellar medium of the Large Magellanic Cloud

Naslim Neelamkodan (ASIAA), Kemper, F (ASIAA)

We present molecular hydrogen emission toward ten diffuse interstellar regions in the Large Magellanic Cloud. The low-resolution infrared spectra of total 12 regions were obtained with Spitzer IRS as part of SAGE spectroscopic program. The low-J rotational transitional lines of H_2 at 28.2 and $17.1\mu m$ are detected for all ten regions and higher transitions are mostly upperlimit measurements except for three regions a 3σ detection threshold achieved for lines at 12.2 and $8.6\mu m$. The rotational diagrams of detected H_2 transitions are used to determine warm H_2 gas mass and temperature. Single-temperature fit through lower transition lines show temperature in the range $80 - 150\,K$. Since, the gas appear to be composed of more than one temperature, we performed a two-temperature fit including the upperlimit column densities for non-detected lines which gave an upperlimit temperature for the hot gas as 1500 K. Bulk of warm molecular gas is in low temperature and warm H_2 contribute a significant fraction to total gas mass. The warm H_2 gas mass fraction ranges between 5-20% of total gas mass derived from CO, HI and Hα observations. H_2 excitation temperature and mass do not show noticeable trend with cold dust physical parameters, while there is a moderate positive correlation found with warm dust mass. A strong correlation between H_2 and aromatic band emission by PAH is detected, indicating that both are excited by FUV radiation in low-density PDRs. The ratio H_2/PAH ranges between $0.0006 - 0.004$ which agree well with the SINGS normal galaxy samples. The ratio H_2/TIR fluxes are almost consistent with excitation of H_2 emission in PDRs as suggested for starforming galaxies.

PS28: A study of flare activities of M-type star in the Kepler data archive

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

Since its launch in 2009, the Kepler telescope found over 1000 exoplanets until the end of mission in 2013. Some exoplanet are in the habitable zone (HZ). Compare with G-type stars like our sun, the habitable zone of M type stars are closer to the host star. Therefore, the magnetic activities of host stars may affect the habitability of their exoplanets. Flares are one of such energetic processes, which can be identified from light curves. In this study, we will make case of the public data archive of the NASA Kepler mission. The selection criterion of M-type stars is based on Teff less than 3500 K and log (g) less

than 4. We check flux variations caused by flare activities of host star in their light curves. According to this condition, 19 M-type stars can be identified. Out of them, nine show signs of flare activity, their physical characteristics will be described.

PS29: Investigating Wolf-Rayet stars in M 31 with the Palomar Transient Factory Hα Survey

Yu, Po-Chieh (Graduate Institute of Astronomy, NCU), Ip, Wing-Huen (Graduate Institute of Astronomy, NCU)

We present the Hα images of Wolf-Rayet stars (WRs) in M31 acquired using the Palomar Transient Factory (PTF) Hα Survey. These images are used to investigate the morphology of the shell/rings-like structures. By examining continuum-subtracted images, we study the size/morphology of shells in a sample of 130 spectroscopically confirmed WRs. We also compare the size of shell/ring-like of nitrogen-rich (WN) and carbon-rich (WC) WRs. Our preliminary results indicate that the radius distribution of WN and WC stars are similar. This might be not consistent with the suggested evolutionary sequence of WRs.

PS30: Characterization of the Galactic Open Cluster NGC 752: Distance, Age, and Metallicity

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As a part of our ongoing efforts to identify member stars in Galactic open clusters, we present here the results of NGC 752, the closest (450 pc) intermediate-age (1-2 Gyr) star cluster. By analysis of the 2MASS and Pan-STARRS photometry and PPMXL proper motion data, plus LAMOST radial velocity measurements for some bright stars, a list of members with high confidence is obtained down to very low stellar masses, which in turn is used to derive the age, distance, spatial extent, mass function, and metallicity more accurately than available in the literature. The member list also allow us to put different stellar evolution models to test, and serves a secured input stellar sample to study the chemical abundances and rotation/activity in this cluster.

PS31: Measuring Rotational Speed by High-Dispersion Spectra of Classical Be Stars with Infrared Excess

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Classical Be stars are B-type stars with the characteristic emission spectra and infrared excess. These stars are distinct from the pre-main sequence Herbig Ae/Be stars and are known to be rapid rotators, some perhaps close to break-up. They are surrounded by gaseous disks, which are responsible for many of the observed properties, including plausibly the dust condensation in the ejected cooling

envelopes. We present the echelle spectra taken by Tai National Telescope (TNT) of NARIT to derive the projected rotational speed (v sin i) of three classical Be stars, HD50138 (92.481±4.923 km/s), HD 45677 (85.975±2.317 km/s), and HD 62532 (294.118±9.517 km/s). We are in the process of estimating the instrumental broadening, but these stars rotate very fast, so we expect the effect to be relatively small. We discuss how fast rotation may have played a role in the Be phenomena.

PS32: The contribution from circumstellar dust of to the spectral energy distribution of the Large Magellanic Cloud

Mei-Chun LIN (ASIAA), Ciska Kemper (ASIAA), Naslim Neelamkodan (ASIAA), Sundar Srinivasan (ASIAA), Valsamo Antoniou (Harvard CfA), Massimo Marengo (Iowa State University), Jean-Philippe Bernard (IRAP), Margaret Meixiner (STSci)

Unresolved distant galaxies can typically only be studied through their spectral energy distributions (SEDs). An SED model of a galaxy usually consists of contributions due to starlight (in the UV/optical and near-infrared) and thermal emission of interstellar dust (in the far-infrared). Present-day SED models use stellar population synthesis models combined with stellar spectral libraries. However, they do typically not accounted for dusty envelopes. This might be acceptable for starburst galaxies with a relatively large population of young stars, but it might not accurately represent galaxies with a significant population of dusty Asymptotic Giant Branch (AGB) stars. In order to estimate the contribution from circumstellar dust, we disentangle the SED of the Large Magellanic Cloud (LMC) in its spatially resolved components. Specifically we identify the contribution due to AGB stars from the MCPS, 2MASS, SAGE and HERITAGE surveys. We plan to compare the integrated SED to a population-synthesis-based modeled SED, which is 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. Also, we will separate evolved stars into 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.

PS33: Search for p-mode oscillations in white dwarfs by using high speed photometry cameras

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Oscillations detected in the pulsating white dwarf until now are well interpreted as g-mode oscillations, which are more related to outer-layer properties. On the other hand, p-mode oscillations in white dwarfs are important in understanding white dwarf's inner-core properties. P-mode oscillations in white dwarf propagate mainly in the interior, therefore the p-mode periods are more sensitive to the internal structure and constituents of a white dwarf. Detection of p-mode oscillations definitely brings more information and insight to the study of white dwarfs. White dwarf's p-mode oscillations have not yet been detected. The non-detection of white dwarf p-mode oscillations is likely due to their low amplitudes and their high frequency. The main goal of this project is to search for p-mode oscillations in white dwarfs by using high speed photometry cameras and to investigate the so far unexplored high

frequency domain. We have employed the MIOSOTYS instrument mounted on the Calar Alto 1.2-m telescope and are trying to use CMOS camera on LOT. I will report the current status of this effort.

PS34: Long-term Variation Study of Cataclysmic Variable with Palomar Transient Factory

Michael Ting-Chang Yang (National Central University), Yi Chou (National Central University), Chin-Ping Hu (National Central University), Yi-Hao Su (National Central University)

We made use of the Palomar Transient Factory (PTF) to study the long-term variability of the cataclysmic variables. 344 known cataclysmic variables are studied. About 30-40 of sources has been found to have significant long-term periodicities ranging from several ten days to hundreds of days. These maybe caused by different mechanisms. Like outburst cycle, precessing of accretion disk, magnetic field changes in companion stars, or triple star system. We are going to show the classification and some supporting evidences in this poster.

PS35: The starspot sizes of solar-type stars with and without superflares

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Kepler space telescope was launched at 2009 and had observed a fixed area (116 square degrees) near Lyra and Cygnus for 4 years (March, 2009 – May, 2013). Kepler Mission is designed for search exoplanets by light transits, so there are continuously, frequently exposures of the targets in their field. We analyzed these data of solar-type stars (5300 K $<$ Teff $<$ 6000K, log(g) $>$ 3.5) to find the relation between the starspot size and the occurrence of the superflares. According to Shibata et al. (2013), the energy released from a superflare event is proportional to the starspot size of the star (E(flare) 7 * 10^{32}[erg] * (f/0.1) * [(B/(10^3)*G)2] * (A(spot)/3 X 10^{19} cm^2)^1.5, where B is the average spot magnetic field strength in Gauss and A is the amplitude of the stellar lightcurve due to the star spot.) Maehara et al. (2012) found 148 solar-type stars with superflares, and all of them are not found with exoplanets. This result is opposite against Rubenstein and Schaefer's research (2010), which proposed that the superflares on solar-type stars are caused by magnetic reconnection between the primary star and the high magnetic activity hot-Jupiters in the system. We compare the starspot sizes of 148 solar-type stars in Maehara's report and 200 solar-type stars without exoplanets and superflares. We found that the spotsizes of the stars without superflares are usually lower than the stars with superflares, but few of them still with extremely large spot sizes (as high as 10% coverage of the hemisphere of the stellar disk).

PS36: On the Complex Variability of the Superorbital Modulation Period of LMC X-4

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LMC X-4 is an eclipsing high-mass X-ray binary exhibiting a superorbital modulation with a period of ~ 30.5 days. We present a detailed study on the variation of superorbital modulation period with a time baseline of ~ 18 years. The period determined in the light curve collected by the Monitor of All-sky X-ray Image (MAXI) is significantly deviate from that observed in the All Sky Monitor (ASM) onboard the Rossi X-ray Timing Explorer (RXTE). Using the data collected by RXTE/ASM, MAXI, and the Burst Alert Telescope (BAT) onboard Swift, we found a significant period derivative, $\dot{P} = (1.95 \pm 0.14) \times 10^{\square 5}$, of the superorbital modulation period. Furthermore, the O − C residual shows a complex long time-scale evolution of the superorbital period, and the ones for individual cycle in MAXI light curve also shows short-term variations. Thus, the superorbital modulation in LMC X-4, which is thought to be caused by a stable mode 0 warping of accretion disk, still exhibits complicated unstable behaviors.

PS37: The orbital ephemeris of the partial eclipsing X-ray binary X1822-371

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X1822-371 is a low mass X-ray binary with accretion disk corona exhibiting partial eclipses and pulsations in the X-ray band. We update its orbital ephemeris by combining the new RXTE observations and historical records, with total time span of 34 years. There were 11 RXTE observations in 2011 but the eclipsing profile can be seen in only 4 of them. The eclipsing center times were obtained by fitting the profile with the same model as previous studies. Combined with the eclipsing center times reported by Iaria et al (2011), the O-C analysis was processed. A quadratic model was applied to fit the O-C results and obtained the mean orbital period derivative of dP/dt=1.339(25)$\times 10^{-10}$s/s, which is slightly smaller than previous records. However, we found that the cubic model is better to describe the orbital phase change with about 98% confidence level from F-test. The updated orbital parameters from eclipsing profile will be further compared with the ones from pulsar timing.

PS38: The updated orbital ephemeris of dipping low mass X-ray binary 4U 1624-49

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We present our analysis results for updating the orbital ephemeris of the dipping low mass X-ray binary 4U 1624-49 using the light curve collected by the all sky monitor (ASM) on broad Rossi X-ray Timing Expoloer (RXTE). To make clear dip profiles, the light curve was divided into ten 500d segments and fold with the linear ephemeris proposed by 0.869907(12)d. The phases of dip center were determined by the method adopted from Hu et al. (2008). The phase drift then fitted with a straight line and obtained the updated orbital of 0.869900(3) d and the phase zero epoch MJD2450837.5682(92).

PS39: Swinging between accretion and rotation-powered states for millisecond pulsar binaries

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It is generally accepted that millisecond pulsars (MSPs) are spun up in low-mass X-ray binaries (LMXBs) through sustained accretions from their low-mass donor in which angular momentums transfer from the disks to the neutron stars by the disk matter accreting onto the compact objects. This scenario implies possible state changes of a LMXB associated MSP to a disk-free rotation-powered MSP, or vice versa. Two recent state change discoveries of the MSPs PSR J1023+0038 (a.k.a. the missing link pulsar, from rotation to accretion-powered) and XSS J12270-4859 (from accretion to rotation-powered) show concrete evidences for the proposed MSP evolutionary picture. Here we present the multi-wavelength observations of XSS J12270-4859 and PSR J1023+0038. In particular, a theoretical model for PSR J1023+0038 is developed to explain the enhanced X-/Gamma rays and disappearance of the radio signal during the accretion state. We predict that the missing radio pulses may be blocked by the evaporated winds from the disk and the pulsar is still powered by rotation.

PS40: Characterizing the lifetime of the 4 Hz Quasi-Periodic Oscillation around the Black Hole X-ray Binary XTE J1550-564

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We present the analysis results from Lomb-Scargle spectrograms and Hilbert-Huang transform (HHT) for the 4 Hz quasi-periodic oscillations (QPO) around the black hole X-ray binary XTE J1550-564. Comparing with these two time-frequency analysis methods, Hilbert spectra show better resolution and demonstrate that the QPO is composed of a series of intermittent signals appearing occasionally. We further found these intermittent oscillations averagely have a 3s lifetime with random phase by utilizing autocorrelation function. We conclude that the intermittent feature of the QPO rules out interpretations of continual frequency modulation.

PS41: Numerical Simulation of Standard Keplerian Disc around a Black Hole

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We show results of rigorous two dimensional axisymmetric numerical simulation of a transonic flow having spatially distributed viscosity parameter (being highest in the eqatorial plane) and optical dependent cooling processes to show that the flow indeed segregates into two distinct components as it approached the black hole.The component on the equatorial place has the properties of a standard Keplerian disc of Shakura and Sunyaev. We compared our simulated results with analytical model of Shakura and Sunyaev.

PS42: Feathering Instability in Spiral Galaxies

Wing-Kit Lee (ASIAA)

Optical images of nearby grand-design spiral galaxies reveal details of the spiral substructure near the spiral arms. In particular, the dust lanes that jutting out perpendicular to the spiral arms (i.e., feathers) are found to coincide with dense molecular gas and are thought to be related to star formation along the arm. We proposed a formation mechanism of the feathers due to the instability of the spiral shock (Lee and Shu 2012). Such feathering instability is parasitic to the spiral structure and is basically a gravitational instability due to gas self-gravity. I will review some recent work on understanding the instability by using a parameter study (Lee 2014).

PS43: Constraining dust formation in high-redshift young galaxies

Hiroyuki Hirashita (ASIAA, Taiwan), Andrea Ferrara (SNS, Italy), Pratika Dayal (University of Edinburgh, UK), Masami Ouchi (University of Tokyo, Japan)

Core-collapse supernovae (SNe) are believed to be the first significant source of dust in the Universe. Such SNe are expected to be the main dust producers in young high-redshift Lyman α emitters (LAEs) given their young ages, providing an excellent testbed of SN dust formation models during the early stages of galaxy evolution. We focus on the dust enrichment of a specific, luminous LAE (Himiko, $z \simeq 6.6$) for which a stringent upper limit of 52.1 μJy (3σ) has recently been obtained from ALMA continuum observations at 1.2 mm. We predict its submillimetre dust emission using detailed models that follow SN dust enrichment and destruction, and obtain a robust upper limit to the dust mass produced by a single SN: $m_{\rm d,SN} < 0.15 - 0.45$ M$_\odot$, depending on the adopted dust optical properties. Although these upper limits are mostly consistent with values derived from nearby SN remnant observations, they are smaller than those deduced for SN 1987A, implying that dust in SN 1987A ejecta will be destroyed by reverse shocks in the future. Finally, we provide a recipe for deriving $m_{\rm d,SN}$ from submillimetre observations of young, metal poor objects wherein condensation in SN ejecta is the dominant dust formation channel.

PS44: An Adaptive Homomorphic Aperture Photometry Algorithm for Merging Galaxies

Jen-Chao Huang (IANCU), Chorng-Yuan Hwang (IANCU)

We present a new automatic adaptive aperture photometry algorithm for measuring the total magnitudes of merging galaxies with irregular shapes. We use morphological pattern recognition routines with Dilation image operation to obtain an aperture that is quasi-homomorphism to the shape of the irregular source. We apply our technique to the merging galaxies in images of the Canada-France-Hawaii Telescope (CFHT) and the Sloan Digital Sky Survey (SDSS). We discuss the implication of our measurements.

PS45: A class of low-mass but extremely star-forming galaxy at z $\sim$ 2

Chen Fatt Lim (National Taiwan Normal University), Sébastien Foucaud (Department of Physics & Astronomy, Shanghai JiaoTong University), Hashimoto, Yasuhiro (National Taiwan Normal University)

Molecular gas forms stars, according to star-formation law. However 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$\sim$2 to the present and that the locus of star-formation migrate from massive and dense sites to low-mass more isolated galaxies today. We have recently developed a method based on broad-band photometry to isolate a class of rare, compact galaxies that display an extremely high equivalent width emission line up to z$\sim$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 more detail about the selection and some properties comparison within these young galaxies and the nearby similar objects. We also propose to observe their gas content with radio interferometer to reveal their star-formation law.

PS46: Planetary nebulae in elliptical galaxies in the framework of MOND

Yong Tian (National Central University), Mu-Chen Chiu (Shanghai Normal University), Chung-Ming Ko (National Central University)

Planetary nebula in elliptical galaxies posed a problem in dark matter theory. Using data from Planetary Nebula Spectrograph (PN. S), Romanowsky et al. (2003) reported that less than expected dark matter were found in three elliptical galaxies. We attempt to explain similar observations on elliptical galaxies by Modified Newtonian Dynamics (MOND). We collect 22 elliptical galaxies with planetary nebulae from the public web data of PN. S. We investigate the dynamical behavior by analyzing the line-of-sight velocity dispersion in the framework of MOND. In this contribution, we will present some preliminary results.

PS47: Fundamental plane and gravitational lensing in MOND

Mu-Chen Chiu (Shanghai Normal University), Yong Tian (National Central University), Chung-Ming Ko (National Central University)

We analyze the SLACS Einstein rings to test lensing effects in MOdified Newtonian Dynamics (MOND). The lens galaxies of all these systems are elliptical galaxies. We estimate their masses both from gravitational lensing and velocity dispersion in the framework of MOND. We compare the fundamental planes formed by these mass and the one by luminosity. Discussion on mass-to-light ratio and different interpolation functions will be made in this contribution.

PS48: Reddening Material of Red QSOs

Chen, I-Chenn (IANCU), Hwang, Chorng-Yuan (IANCU)

It is generally believed that red QSOs are obscured (reddened) by the dust in their host galaxies. Nevertheless, our preliminary results show that some variable red QSOs show variable colors similar to dust reddening, which is a phenomenon implying a shorter-time-scale mechanism of reddening, and hence a smaller-size of the reddening material. This suggest that not all red QSOs have similar origins of reddening mechanisms. Thanks to Pan-STARRS Medium Deep Survey's long-term but short-time-separation scheduling, we plan to check for color variations for 37 red QSOs, defined with K-corrected SDSS g-i larger than 0.3. We'll show our preliminary results.

PS49: Mid-Infrared Properties of Optically Selected Red QSOs

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

We investigate the Mid-Infrared properties of a sample of red QSOs using the data from the WISE all-sky source catalog. These QSOs are selected from the SDSS 7 quasar catalog which overlaps the radio observations of the VLA FIRST data. We select quasars with redshifts between 0.6 and 2.0 in order to avoid strong emission lines. We define red QSOs and normal QSOs based on QSO differential color, and define radio-loud QSOs (RLQs) and radio-quiet QSOs (RQQs) based on radio-to-optical ratio. Our 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. These red color is not caused by the obscuration from the surrounding dusty torus of a normal QSO but is caused by excess warm dust.

PS50: Method of finding high redshift quasar

Ji-Jia Tang (ASIAA), Youichi Ohyama (ASIAA)

The goal of this project is developing a method to find high redshift quasar candidates. Two data sets are used in this project. One of them is u, g, r, i, z in CFHTLST0007 and J, K in UKIDSSDR7 of CHFTLS D1. The other is u, g, r, z in CFHT Mega Pipe and J in UKIRT of ELAIS-N2. The method of finding high redshift quasar is using color-color diagram selection criteria, which can show dropout sources of quasar candidates. The point source objects need to be defined first, then extended sources can

be removed. To define point source objects, we create synthetic point source objects with various flux counts on the original image, and then run the SEXTRACTOR to reclaim them. Based on the flux and the full width half maximum (FWHM) of reclaimed synthetic sources, the region for point source objects in the flux-FWHM diagram can be fitted. After point source objects are defined in each wavebands, the smallest FWHM among different wavebands is the best one to determine whether one object is a point source or not. We expect that this method can successfully apply to the regions mentioned above.

PS51: The relationship between large scale environments and 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 environments and properties of galaxies. Our goal is to understand the properties of galaxies in different large scale environments by investigating the relation between the kinematic and photometric properties of galaxies and measure their large scale environments.

PS52: Status of Pan-STARRS1 data and data servers in Taiwan

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

The Pan-STARRS1 project is operated by an international consortium. Located in Haleakala, Hawaii, the Pan-STARRS1 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 ended in April 2014. In four years surveys, every patch of sky observable from Hawaii has been observed in at least 5 bands (g', r', i', z', y') for 20 to 60 epochs. We have set up a data depository at NCU to serve the users in Taiwan. The massive amounts of the Pan-STARRS1 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 400 TBytes 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 March 2014 with a total of 26.5 billion detections 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 present the current status of the Pan-STARRS1 data and the data servers in NCU.

PS53: Data Reduction and Preliminary Results from Commissioning Data

Andreas Ritter (National Central University), Chow-Choong Ngeow (National Central University), Nick Konidaris (California Institution of Technology), Wing-Huen Ip (National Central University), Hsing-Wen Lin (National Central University), Yu-Chi Cheng (National Central University)

The Spectral Energy Distribution Machine (the SED Machine) is a low resolution spectrograph that allows fast acquisition of target's spectra on 1-2 meter class telescopes. The SED Machine employs

a lenslet-based Integral-Field Unit (IFU) with a Field-of-View (FoV) of 26" ×26" and 3,600 hexagonal ∼0.675" spaxels. It also consist of a 4-band Rainbow Camera (RC) for flux calibration. The nearly constant resolution of R 100 over an extremely wide wavelength range 370-920 nm is sufficient to effectively classify transients (such as supernovae) and the asteroid taxonomic classifications. Using off-the-shelf CCD cameras the costs of the instrument are moderate. Data reduction pipeline for SED Machine has been developed at the National Central University, which include a separate reduction process for the IFU and RC. The IFU reduction pipeline includes over-scan and scattered-light subtraction, optimal extraction, wavelength calibration, sky subtraction, and flux calibration. The RC reduction pipeline includes over-scan subtraction, flat-fielding, astrometric refinement and matching to SDSS stellar catalogs for measuring throughput in ugri filters. Here, we present preliminary results based on the commissioning data taken from the Palomar 60-inch (P60) telescope, which include spectra for few known asteroids.

PS54: NCU Moving Object Detection System

林省文 (國立中央大學), 章展告 (國立中央大學), 葉詠烜 (國立中央大學)

The on going intermediate Palomar Transient Factory (iPTF) is one of the most effective sky survey to discover huge number of transient events, include large number of solar system objects. In this poster we propose a new design system to detect and storage the known and new discovery moving objects for iPTF survey data. The design combine the advantages of ANN search and Hough transform to clean the raw data and detect the possible moving object candidates in the survey. Our goal is to achieve the on-the-fly processing when receiving the data. Thus, we are able to search and track the very fast moving Near Earth Objects in iPTF survey.

PS55: Fast Photometry of SN 2014J in the Nearby Galaxy M82

Mei-Ying Lee (Taipei First Girls High School), Albert Kong (National Tsing Hua University), Yu-Mei Lin (Taipei First Girls High School), Kwan Lok Li (National Tsing Hua University), Pin-Han Wu (Taipei First Girls High School), Shih-Ping Lai (National Tsing Hua University), Shan-Chien Yang (Taipei First Girls High School), Cheng-Yuan Chen (Taipei First Girls High School)

On 2014 January 21, a very bright supernova (SN) 2014J was serendipitously discovered in M82 and was subsequently classified as Type Ia. At a distance of 3.5 Mpc, SN 2014J is the nearest Type Ia SN in several decades. With an optical peak at about 10.5 mag, it provides us a very rare opportunity to study a Type Ia SN in great detail. Fast timing study on timescale of seconds for SNe is uncommon and SN 1987A is the only known SN that was observed in optical with such a timing resolution. While we do not expect to see brightness variation of a SN with a timescale of seconds because of the large expanding shell after the explosion, some hot spots on the shell may cause flares on short timescales. Here, we report our effort to carry out the first ever fast photometry observations for a Type Ia SN with the Lulin 1m telescope during the rise and decay of SN 2014J. We observed SN 2014J on January 28 for 5 hours and February 26 for 2 hours in V-band. The typical exposure of each image is about 5 sec with a readout time of about 2 sec. By performing differential photometry, we do not find any flare or dip, and conclude that SN 2014J steadily increases (decreases) in brightness during the rising (decay) stage. This research is supported by the National Science Council under TFG's High Scope Project, "Astronomy Curriculum with E-learning".

PS56: Current Status of Compton Spectrometer and Imager (COSI)

Tseng, Chao-Hsiung (NTHU, Institute of Astronomy)

The Compton Spectrometer and Imager (COSI), formerly known as the Nuclear Compton Telescope (NCT), is a balloon-borne soft gamma-ray telescope ($0.2 - 5$ MeV) designed to study astrophysical sources. There are 12 Ge detectors to form a detector array as the heart of COSI. Each one has 37 strips on both anode and cathode sides, and provides good tracking capability on photon interaction, which requires precise energy and depth calibrations. In the history of COSI, it has flown successfully on two conventional balloon flights to date, and next balloon flight is expected to happen in Antarctica this December (2014) with new detector configuration and instrument upgrades. The primary science goal is to observe gamma-ray bursts (GRB) during our ultra-long-duration balloon flight ($>$ 30 days). Here we will demonstrate the current states of COSI with most integrations and preliminary calibrations completed right before a thermal vacuum test in Ohio, USA.

PS57: 短暫發光現象之自動化觀測系統建置與臺灣流星觀測網

賴楷翔 (高雄師範大學物理系), 曹俊傑 (高雄師範大學物理系), 吳秉勳 (中央大學天文所), 林東毅 (東華大學物理系), 柯景元 (高雄師範大學物理系), 林志隆 (台中科學博物館), 紀信昌 (東華大學物理系), Shinsuke Abe (日本大學理工學部航空宇宙工學科), 楊義清 (台東大學應用科學系)

使用高感度電荷耦合裝置(high-sensitive CCD)與影像記錄程式(UFO Capture)，所架設起來的自動化觀測系統，拍攝台東與高雄兩地高空的短暫發光現象。經人工篩選排除非流星影像事件，並將挑選出來的影像以UFO Analyzer分析該流星體運動軌跡、亮度、方位。蒐集兩地拍攝的影像，以三角定位計算出更為精確的速度、高度，並回推太陽運行的軌道及母體來源。並於2012年起結合台灣各地自動化觀測系統建置臺灣流星與高空閃電觀測網(TaiWan Elegant MEteor and TLE Network，簡稱TWEET)。

關鍵字：流星、短暫發光現象、三角定位

PS58: 短暫發光現象之自動化光譜拍攝系統

Chun-Chieh Tsao (國立高雄師範大學)

由於物質對於特定頻率的光會有吸收或輻射，藉由吸收或輻射光譜的譜線，可以知道物質的成份。因此，在我們團隊觀測流星軌跡的同時，也對流星的組成成份感到好奇。為記錄流星體燃燒所產生的光譜線，我們在拍攝的監視器前置上光柵，拍攝流星體輻射光的繞射譜線，並應用影像處理軟體Spotlight 分析繞射譜線[1]。我們再將光譜分析的結果比對NIST原子光譜數據資料庫[2]，得知流星體的組成物質。未來我們將會收集更多的數據加以研究分析，希望瞭解流星的資訊及來源，探討來自外太空所帶來的秘密。

[1] Spotlight, http://microgravity.grc.nasa.gov/spotlight [2] NIST Atomic Spectra Database, http://physics.nist.gov/physRefData/ASD

PS59: Measuring double asteroid in Taipei Astronomical Museum with speckle interferometry methods.

Alan Yang (Taipei Astronomical Museum), Nancy Chan (Taipei Astronomical Museum)

Speckle interferometry has been deployed into different fields from its' first application. In this post we try to implement the speckle interferometry techniques into double asteroid measurements. We recorded the speckle image with Taipei Astronomical Museum 45cm telescope and real time CCD TIS DFK51AG02-AS. The focal lenth is 5400mm and resolving power extended to 0.26", estimated magnitude in visual band limit about 15.2m. The CCD equiped wiht 1/1.8" chip and pixel resolution 1600x1200. And we employed GNU DATA Language platform for data analysis. Most of the project is still undergoing.

PS60: The Compton Spectrometer and Imager (COSI)

Jeng-Lun Chiu (Institue of Astronomy, National Tsing Hua University), Chien-Ying Yang (Institue of Astronomy, National Tsing Hua University), Jie-Rou Shang (Institue of Astronomy, National Tsing Hua University), Chao-Hsiung Tseng (Institue of Astronomy, National Tsing Hua University), Hsiang-Kuang Chang (Institue of Astronomy, National Tsing Hua University), Steven E. Boggs (Space Sciences Laboratory, UC. Berkeley)

The Compton Spectrometer and Imager (COSI), which was formerly known as the Nuclear Compton Telescope (NCT), is a balloon-borne soft gamma-ray telescope (0.2-5 MeV) designed to study astrophysical sources of nuclear line emission and gamma-ray polarization. The heart of COSI is a compact array of cross-strip germanium detectors (GeDs), providing excellent spectral resolution (2.5 keV) and capability of tracking individual photon interactions with full 3D position resolution to 1.6 mm^3. COSI is built upon considerable heritage from the previous NCT balloon instrument, which has flown successfully on two conventional balloon flights to date. The Crab Nebula was detected at a significance of 6-σ in the second flight, which is the first reported detection of an astrophysical source by a compact Compton telescope. COSI has been upgraded from the previous NCT instrument to be an Ultra Long Duration Balloon (ULDB) payload, utilizing a new detector configuration optimized for polarization sensitivity and employing a cryocooler to remove consumables (LN2) for ULDB flights. The instrument is being integrated for an LDB flight in December 2014 from Antarctica on a superpressure balloon. Here we will present the achievements to date and the redesign of the instrument for the following flights.

PE01: 利用二段式診斷工具探查國小教師有關 星星、月亮 之迷思概念

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摘要：本研究主要是針對國小教師在自然科星星及月亮單元在宇宙觀與地球觀的問題中，具有什麼樣的迷思概念。主要研究目的如下：1.探討國小教師對於星星及月亮單元有關問題的認知情形。2. 不同學科背景的國小教師對星星及月亮單元的迷思概念，是否存有顯著的差異。。3. 國小自然教師是否擔任過自然教師在診斷測驗中的表現，是否存有顯著的差異。 本研究主要從treagust(1986)發展二段式診斷工具的步驟，改良為三階段14步驟，經過開放式問卷方式收集國小教師之星星、月亮迷思概念類型，作為本研究國小教師星星、月亮概念二段式（two-tier）診斷工具發展之基礎。正式施測以大台北地區國小教師共173名為研究對象，藉以了解不同背景的教師，在此診斷測驗上迷思概念的分布情形為何。取得資料後進行二階段式診斷性測驗結果分析，所使用的統計方法包括描述統計、T檢定等方法。經分析後歸納出教師對星星、月亮概念的迷思概念為何，本研究所得知結論如下： 一、 教師在星星亮度、星座盤、星星的移動、四季星座、月亮大小及月亮的轉動等概念，存有許多迷思概念，教師對於各月形出現的日期、月亮升起時間的規則等無法做合理的預測。 二、 不同學科背景的教師在二段式問卷的得分差異未達顯著水準，顯示對星星、月亮的迷思概念在「學科背景」上並無顯著的差異。 三、教師教過自然與否的在二段式問卷的得分差異達顯著水準，顯示對星星、月亮的迷思概念在「是否教過自然」上具有顯著的差異。

關鍵字：迷思概念、二段式診斷工具、月亮、星星

PE02: Subsequent Development and Accomplishments of TFG's High Scope Project

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As a participating school of the National Science Council's "High Scope Project," Taipei First Girls' Senior High School recruited teachers of various subjects and enlisted the assistance from professors of related fields to design an astronomy-themed curriculum. The 24-lesson curriculum, based on the application of spectrum to astronomy, consists of four curricular modules. During the past two years, our team has finished the designing and pilot teaching of the courses. When designing the curriculum, we incorporated information technology into the courses, and aimed to cultivate students' ability to conduct astronomy-related projects as well as analyze data independently. Students, therefore, were encouraged to perform the processing and analyzing of large quantities of data, and even explore more by themselves. Through the development of this curriculum, together with other practical courses such as "Practical Lessons for Astronomical Observation," "Preparation for Observation," and "On-site Observation and Measurement," students had many opportunities to collect first-hand data and gained hands-on experiences. They even experienced the beauty of the starry night sky in person. In the curriculum, they were taught to make use of free software to process and synthesize the photos of the stars observed in various wavelengths. For example, under the guidance of the professors on the team, the teachers and students observed the supernova SN2014J for several hours on end, and conducted scientific analyses and discussions. To make known our results, we shared our experience and reflections on the curriculum and observations in the magazines *Taipei Skylight* and *Science Study Monthly*. In the third year of TFG's High Scope Project, our team is dedicated to promoting the curriculum and sharing

experience with teachers from other schools. We have communicated to them our concepts of design behind these hands-on lessons in the four modules. In addition, we have held several workshops on the content of the curriculum. Every activity we organized all gathered several dozen schoolteachers from across Taiwan. Last but not the least, we have received widespread accolade from these teachers on the content and feasibility of the curriculum we designed.

PE03: 3D Printer implementation in astronomical education activity

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General processes when we try to construct the prototype device include many parts from scratch. Describing the problem, finding the fitted solution, constructing the prototype model and then assembling the parts to test. While modeling process dominant the major part of innovation and construction. And 3D printer has been revealed as an excellent assistant tool in constructing prototype models. We try to deploy some standard reference in educational activity for experiment purpose. The construction line will be separated into stages and be modularized for replacement possibility.

PE04: From the Quasi-society Astro-club to Non-formal Education Programs Accreditation Astronomy Courses in Community College (從類社團到非正規教育課程認證的社區大學天文課程)

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從1998年9月全國第一所社區大學成立以來，以追求知識放為共同追求目標的社區大學迄今在臺已有近16年的濫觴。筆者有幸自2001年起在北市文山社大，以及自2003年起在北市士林社大，開授天文觀測科普推廣課程，迄今已有將近13年的教學相長經驗與學員回饋。社區大學中的天文推廣教育不僅能把艱深的天文知識從學術象牙塔中解放出來，成為社區中一般民眾皆可理解的生活常識，而且能讓浩瀚穹蒼成為心靈改造的場所，體會無垠宇宙帶來的心靈感動與觸發無窮的人文之美。本文將透過文山及士林兩所社大所開設的「天文觀測－星空之美」與「天文與人文」為例，分析成人天文類推廣教育修課學員的成員背景、興趣焦點，以及多年以來的衍生成果與學習反應，並探討所採用的互動教學方法與成果。台灣近年來發展出來的社區大學天文推廣教育體系的嫩芽仍不斷地在發展茁壯，雖仍有許多挑戰，卻值得持續灌溉與耕耘。謹在此分享我們如何從小型的類社團天文課程，進階到中型的非正規教育課程認證天文課程，其間的發展與心路歷程。

關鍵字: 社區大學、非正規教育課程認證、班級經營、天文觀測

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