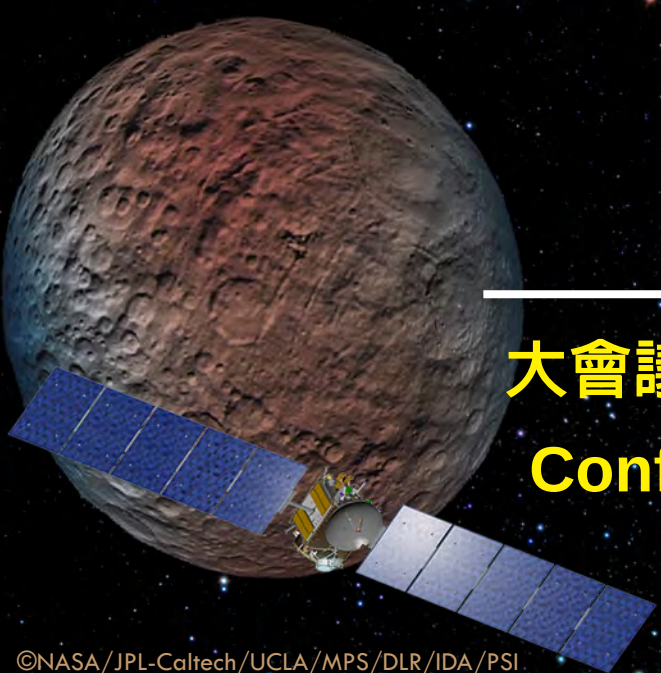
2017 Annual Meeting of

ASROC

中華民國天文學會2017年會員大會暨研究成果發表會



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大會議程與論文摘要

Conference Book

May 19~21, 2017

國立聯合大學

主辦單位：中華民國天文學會
協辦單位：國立聯合大學、中央研究院 天文及天文物理研究所
贊助單位：科技部自然司物理研究推動中心

背景圖片©ESO/M.-R. Cioni/VISTA Magellanic Cloud survey.

General Information

會議資訊

1. 年會會場 / Meeting Venue

a. 國立聯合大學八甲校區國際會議廳

National United University (NUU), International Conference Hall

國立聯合大學位於苗栗市南苗區，距國道一號高速公路苗栗交流道約6分鐘車程，國道三號高速公路後龍交流道約10分鐘車程，從苗栗火車站至本校約12分鐘(公)車程；從高鐵至本校亦僅需25分鐘車程。

二坪山與八甲兩校區相距約2.6公里，車程約5分鐘。

◎主會場（Session S1-S5）：國際會議廳(International Conference Hall)

[資訊處2F (2nd Floor of the Office of Information Technology)]

◎天文教育及業餘天文活動報告（Session E1）：

第一會議室(1st Conference Room) [國鼎圖書館1F (1F of the Library)]

◎午餐區（Lunch Area）: L1-110 教室 (L1-110 Class Room)[國鼎圖書館1F (1F of the Library)]

◎海報展及參展廠商 (Poster Sessions & Vendor Exhibits):

第四、第五會議室 (4th & 5th Conference Room)

[資訊處1F (1F of the Office of Information Technology)]

5/19接駁車位置圖及發車時間

高鐵接駁地點：
一樓1號出口往接駁巴士區
發車時間: 9:20am
現場詢問電話: 0978-807980

台鐵接駁地點：
後站英才路對面，高鐵接駁車站牌。
發車時間: 9:30am
現場詢問電話: 0982-529007

5/20 & 21
接駁車位置圖及發車時間

★接駁地點:
苗栗火車站前站右前方
新竹客運公車站牌
發車時間 8:30am
現場詢問電話:
0982-529007

5/19 Location and Departure Time

ASROC Shuttle Stop near THSR Miaoli Station:

★

Exit 1 on 1st Floor toward the Shuttle Bus Area
Departure Time: 9:20am
For assistance, call 0978-807980

ASROC Shuttle Stop near Miaoli Railway Station:

★

The Stop of THSR Shuttle, at the Back Site of Miaoli Station, facing the Yingcai Rd.
Departure Time: 9:30am
For assistance, call 0982-529007

5/20 & 21

ASROC Shuttle Location and Departure Time

★ Shuttle Bus Stop :
新竹客運 HsinChu Bus Stop in the front right of the Front Site of Miaoli Railways Station
Departure Time: 8:30am
For assistance, call:
0982-529007

校內路線與位置圖


N
觀星：
藝術中
心露臺
會場：資訊
中心1、2樓
往第一
校區
餐廳
台
13
聯大路
北大門
南大門
E3
E2
E1
D2
D1
G3
G2
G1
Q1
A1b
A1a
A1c
A2b
A2c
A2a
B4
B2
B3
B1
R1
L1
N1
M3

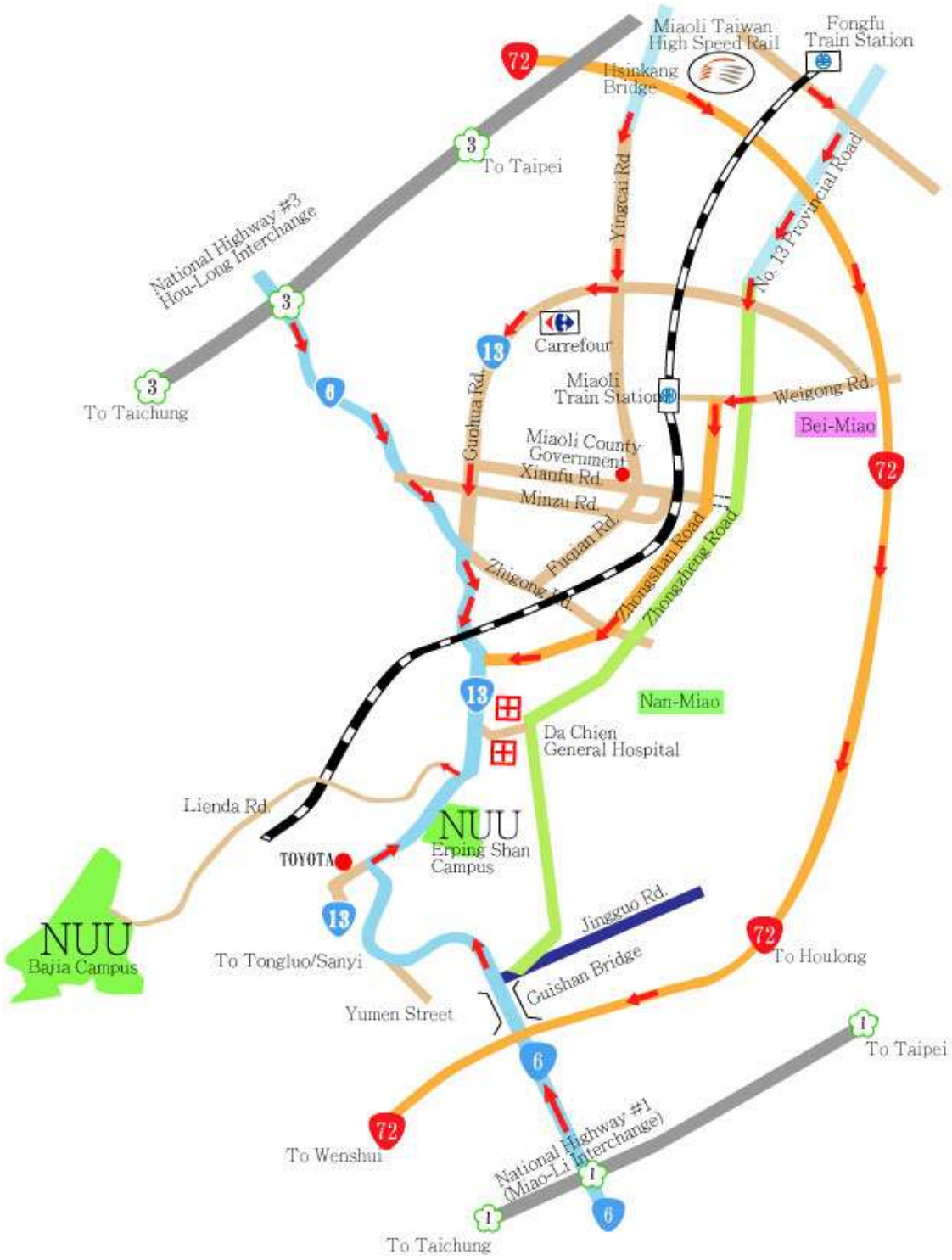

八甲校區
苗栗市南勢里聯大2號
| 教學行政 |
理工學院一館(A1a-c)
理工學院二館(A2a-c)
電機資訊學院(B1-B4)
客家學院(D1-D2)
人文社會學院(E1-E3)
共同教育委員會(G1-G3)
汙水處理場
工廠論壇
機電中心
藝文教學中心
圖書館
資訊處
國際會議中心
| 宿舍 |
第五男生宿舍
| 停車場 |
機踏車停 車場
汽車停車場(小客車)
汽車停車場(大客車)
| 活動場地 |
北大門
景觀生態大學池
中門
司令台
風雨球場
田徑運動場
南大門
保育區(生態池)
戶外音樂廣場
客家文物館
客家文化廣場
壘球場
湖畔扇形階梯廣場
景觀餐廳
木棧板休憩平台
陽光草坪
游泳池
圓廳
A1a：健康中心(3F)、機械工程學系辦公室(5F)
A1b：土木與防災工程學系辦公室(4F)
A1c：能源工程學系辦公室(3F)、理工學院辦公室(4F)
A2a：材料科學工程學系辦公室(2F)
A2b：環境與安全衛生工程學系辦公室(2F)、環境保護暨安全衛生中心辦公室(4F)
A2c：化學工程學系辦公室(3F)
B1：電機工程學系辦公室(3F)
B2：電子工程學系辦公室(3F)
B3：光電工程學系辦公室(3F)
B4：電機與資訊學院辦公室(2F)、資訊工程學系辦公室(5F)
D1：客家研究學院辦公室(2F)、文化觀光產業學系辦公室(2F)
D2：資訊與社會研究所辦公室(2F)、客家語言與傳播研究所辦公室(3F)
E2：華語文中心辦公室(1F)、人文與社會學院辦公室(3F)、
臺灣語文與傳播學系辦公室(3F)
E3：華語文學系辦公室(1F)
G1：共同教室
G2：體育室(1F)、體適能中心(1F)、器材室(1F)教官室,校安中心,生活輔導組(2F)、
全家便利超商(2F)、輕食區(2F)、學務長室(3F)、生涯發展與產商輔導室(3F)、
圖印教室(3F)、共同教育委員會辦公室(4F)、通識教育中心(4F)
G3：課外活動指導組(1樓)、教務長室(2F)、教學發展中心(2F)、註冊組(2F)、
課務組(2F)
I1：收發室(1樓)、文書組(1F)、國際會議中心(2F)、總務長室(4F)、出納組(4F)、
採購保管組(4F)、事務營繕組(4F)、資訊長室(5F)、校務資訊組(5F)、
網路服務組(5F)、教學推廣組(5F)、
L1：系統管理組(2F)、圖書服務組(3F)、採編組(4F)、圖書館館長室(5F)、
行政中心(7F)-校長室、副校長室、研究發展處、秘書室、人事室、主計室、
校友總會
已啟用
興建中
規劃中
不可開發區
自動提款機
汽車停車場
游泳池
保健中心
機車停車場
郵局自動提款機
餐廳
公車站牌
網球場
便利商店
登山步道


Bajia Campus
2, Lienda, Miaoli 36063, Taiwan, R.O.C
Center for Administration
Hakka Museum (Ground Floor) / General Education Committee
(Second Floor and Above)
College of Humanities and Social Sciences
College of Hakka Studies
College of Engineering and Science Building 1
College of Engineering and Science Building 2
College of Electrical Engineering and Computer Science
Kwoh Tius Library
Office Of Information Technology
Sewage Treatment Plant
Arts Center
Bussiness Skyscrapers
Mechanics Center
International Conference Hall
Dorms
Student Dormitory
Parking Lots
Motorcycle and Bicycle Parking Area
Parking Lot
Parking Lot (Buses Only)
School Gate
Lake for Ecological Reserve
Round Canteen
Covered Field
Athlete Field
Conservation Area (Lake for Ecological Reserve)
Music Square
Bell Tower
Hakka Culture Square
Stack Stadium
Fan-shaped Square
View Restaurant
Wooden Platform Rest Area
Grassy Lawn
Swimming Pool
Stage
Northern School Gate
Lienda Road
Southern School Gate
Construction Completed
Under Construction
Under Planning
Non-development zone

b. 國立聯合大學八甲校區位置 Location of the NUU

36063苗栗市南勢里聯大2號

2, Lienda, Miaoli 36063, Taiwan, R.O.C.


Miaoli Taiwan High Speed Rail
Fongfu Train Station
Hsinkang Bridge
72
3
To Taipei
National Highway #3 Hou-Long Interchange
3
To Taichung
Yingcai Rd.
No. 13 Provincial Road
13
Carrefour
6
Guohua Rd.
Miaoli Train Station
Weigong Rd.
Bei-Miao
Miaoli County Government
Xianfu Rd.
Minzu Rd.
Fuqian Rd.
Zhongshan Road
Zhongzheng Road
Nan-Miao
Da Chien General Hospital
Lienda Rd.
NUU
Erping Shan Campus
TOYOTA
NUU
Bajia Campus
To Tongluo/Sanyi
Jingguo Rd.
Guishan Bridge
To Houlong
Yumen Street
1
To Taipei
To Wenshui
National Highway #1 (Miao-Li Interchange)
To Taichung

2. Transportation

http://www.nuu.edu.tw/UIPWeb/wSite/ct?xItem=23761&ctNode=23375&mp=2

http://www.nuu.edu.tw/UIPWeb/wSite/ct?xItem=25779&ctNode=11160&mp=50

(English version)

(一) 自行開車（國道路線）

國道一號：苗栗交流道 (132KM) 下匝道→往苗栗方向 (台六線)→經過龜山橋直走→二坪山校區 (距離約 3.5 公里)→二坪山校區正前方路口處往左轉聯大路直行→八甲校區(總距離約 6.3 公里)。
國道三號：後龍交流道 (129KM) 下匝道→往苗栗方向 (台六線) →沿台六線直走→二坪山校區 (距離約 7 公里) →二坪山校區正前方路口處往右轉聯大路直行→八甲校區(總距離約 9.8 公里)。
二坪山校區 GPS 座標：經度 120.812354/緯度 24.545744
八甲校區 GPS 座標：經度 120.790435/緯度 24.539734
網路地圖 URMAP GoogleMap

(二) 搭乘公車

搭乘新竹客運聯營車或國光客運、統聯客運在南苗站下車，步行上坡約 10 分鐘可至本校二坪山校區。
新竹客運：由苗栗火車站或南苗站搭乘往「三義、銅鑼、新雞隆」等線公車，均可在本校二坪山校區門口之站牌下車。
苗栗客運：由高鐵苗栗站、苗栗火車站或南苗站搭乘往彎瓦(經五湖)之 5815 號公車，即可直達本校二坪山與八甲校區。
相關客運連結：苗栗客運 新竹客運 統聯客運

(三) 搭乘火車

計程車：從苗栗火車站搭乘計程車至本校二坪山校區 (距離約 3.4 公里；費用約 120 至 150 元之間)。
新竹客運：從苗栗火車站前方新竹客運苗栗站搭乘往「三義、銅鑼、新雞隆」等線公車，均可在本校二坪山校區門口前站牌下車（票價 23 元）。
苗栗客運：從苗栗火車站前方搭乘苗栗客運往彎瓦(經五湖)之 5815 號公車，即可直達本校二坪山與八甲校區（票價 23 元）。
相關連結：台灣鐵路局

(四) 搭乘高鐵

計程車：從高鐵苗栗站搭乘計程車至本校二坪山校區 (距離約 10 公里；費用約 220 至 250 元之間)。
高鐵快捷公車：從高鐵苗栗站前方搭乘往雪霸國家公園之 101B 高鐵快捷公車，可在本校二坪山校區門口前站牌下車。
苗栗客運：從高鐵苗栗站前方搭乘苗栗客運往彎瓦(經五湖)之 5815 號公車，即可直達本校二坪山與八甲校區（票價 23 元）。
相關連結：台灣高鐵

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

帳號 username： 2017ASROC## (會議現場確認)

密碼 password： MiaoLi

4. 會員大會及頒獎典禮 / General Assembly & Awards Presentation Ceremony

a) 天問獎及譚天獎頒獎

得獎人 (Recipient) :

天問獎 — 葉永烜 (Wing-Huen Ip)

譚天獎 — 親子觀星會 (Familystar)

b) 會員大會：理事長會務報告、理監事改選及修改章程

c) 年會最佳壁報論文獎頒獎 (Best Poster Awards)

d) 最佳壁報論文獎獲獎人三分鐘報告 (3-minute presentation from each awardee)

5. 大會午宴及團體參訪內容與地理位置 / Location of Off-Site Events

a) 大會午宴 Lunch Banquet

春田窯 地址：36741苗栗縣三義鄉雙潭村大坪7號 電話：(037) 877-820

Chun Tian Yao Add: No. 7 DaPin, XuanoTan Village, SunYi Township.

b) 團體參訪 Group Tour

龍騰斷橋、勝興火車站、三義木雕博物館之旅。

Long Sheng Broken Bridge, Shengsing Train Station,

Sanyi Wood Sculpture Museum.

6. 器材與書籍展示 / Exhibition of Books and Instruments

a) 永光儀器有限公司 NICK ENTERPRISE, CO. LTD

台北市羅斯福路二段198號, 電話：(02) 2365-5790

b) 鴻宇光學科技 電話：(02) 2733-2345

台北市復興南路二段329號2樓, 電話：(02) 2579-1234

c) 上宸光學國際有限公司 MICROTECH INSTRUMENT Co., Ltd.

台北市信義路二段17巷13號1樓, 電話：(02) 2392-2606

d) 信達光學 SYNTA OPTICAL Technology Corp.

竹北市新溪街219號, 電話：(03) 6561038

台北市漢口街一段71號2F, 電話：(02) 2370-8000

e) 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

7. 住宿旅館/ Hotels

栗華大飯店 地址：360苗栗市中華路85號
訂房專線：(037) 270456。

王府大飯店 地址：360苗栗市為公路三東巷3號
訂房專線：(037) 273055

除了以上兩家已同意提供優惠的飯店外，苗栗市區另有新興大旅社、 綠庭商務旅館、三統大飯店等多家住宿旅社，可自行接洽。

Program
會議議程

Day 1 (May 19, Friday) 第一天 (5月19日, 星期五) Venue /地點：NUU International Conference Center/國立聯合大學國際會議中心			
09:00 - 10:30	**Registration 註冊報到**		
10:30 - 10:40	**Opening remarks 大會開幕致詞** **Chair: You-Hua Chu** Welcome remark by Tung-Hu Tsai (NUU)		
10:40 - 12:10	**Scientific oral session S1 科學論文宣讀 S1** **Chair: Vivien Chen** **Star Formation**		
S1.1 **10:40 - 10:55**	ALMA Observations of Spiral Accretion Flows Towards Extremely Young Protostars	Pou-Ieng Choeng	NTHU
S1.2 **10:55 - 11:10**	Planet induced spirals in the circumstellar disk AB Aurigae?	Ya-Wen Tang	ASIAA
S1.3 **11:10 - 11:25**	The asymmetric structures in dust rings	Bo-Ting Shen	NTU
S1.4 **11:25 - 11:40**	Measuring the Magnetic Field from Filaments to Collapsing Cores in the Star-Formation Process	Patrick Koch	ASIAA
S1.5 **11:40 - 11:55**	The Evolutionary Status of the Prestellar Core: L1498	Ren-Shiang Sung	NTHU
S1.6 **11:55 - 12:10**	Impact of High-mass Stars on the Star-formation Properties of the Interstellar Filaments - A Case Study on the G182.4+00.3 Filamentary Cloud	Manash Samal	NCU
12:10 - 13:30	**Lunch and poster session P1 午餐及壁報欣賞 P1**		
13:30 - 14:30	**Plenary talk (I) 大會講演(I)** **Chair: Yi-Jehng Kuan** *"The Dawn Mission to Vesta and Ceres: A Voyage in Space and Time"* Prof. Christopher Russell (University of California Los Angeles)		
14:30 - 15:00	**Scientific oral session S2 科學論文宣讀 S2** **Chair: Sheng-Yuang Liu** **Stars**		
S2.1 **14:30 - 14:45**	Peculiar dwarfs in the HSC survey	Poshih Chiang	NCU
S2.2 **14:45 - 15:00**	Physical Properties of the G-type Eclipsing Binaries from the Kepler Observations	Li-Ching Huang	NCU
15:00 - 15:30	**Coffee break and poster session P2 茶敘及壁報欣賞 P2**		
15:30 - 18:00	**Scientific oral session S3 科學論文宣讀 S3** **Chair: Daisuke Kinoshita** **Solar System and Extragalactic Astronomy**		
S3.1 **15:30 - 15:45**	Surficial mineralogy of dwarf planet Ceres	Eleonora Ammannito	ISA
S3.2 **15:45 - 16:00**	The Chemical Composition in the Exosphere of Ceres	Wei-Ling Tseng	NTNU
S3.3 **16:00 - 16:15**	Surface Heterogeneity and Color Measurement of the Asteroid in Cometary Orbits	Yu-Chi Cheng	NCU
S3.4 **16:15 - 16:30**	The Large Super-Fast Rotator: (144977) 2005 EC127	Chan-Kao Chang	NCU
S3.5 **16:30 - 16:45**	Searching for Moving Objects in HSC-SSP: Pipeline and Preliminary Results	Ying-Tung Chen	ASIAA
S3.6 **16:45 - 17:00**	A Quasar Discovered at Redshift 6.6 from Pan-STARRS1	Ji-Jia Tang	ASIAA
S3.7 **17:00 - 17:15**	The 4th Most Important Parameter of the Fundamental Metallicity Relation of Star-forming Galaxies	Tetsuya Hashimoto	NTHU
S3.8 **17:15 - 17:30**	Effects of Dust Evolution on the H_2 and CO Abundances in Galaxies	Hiroyuki Hirashita	ASIAA
S3.9 **17:30 - 17:45**	Star-Formation Properties of Red Spiral Galaxies	Jen-Chao Huang	NCU
S3.10 **17:45 - 18:00**	Cosmic rays in starburst protogalaxies	Ellis Owen	UCL
18:00 - 20:30	**Welcome reception and poster session P3 歡迎茶會及壁報欣賞 P3**		

Day 2 (May 20, Saturday) 第二天 (5月20日, 星期六) Venue /地點：NUU International Conference Center/國立聯合大學國際會議中心			
09:00 - 10:00	**Plenary talk (II) 大會講演(II) Chair: Hsiang-Kuang Chang** *"3D Observations of Molecular Gas in Galaxies: From Global Dynamics to Supermassive Black Holes"* Prof. Martin Bureau (University of Oxford)		
10:00 - 10:30	**Coffee break, group photo and poster session P4** **茶敘、與會來賓團體照及壁報欣賞 P4**		
11:00 - 12:00	**Scientific oral session S4 科學論文宣讀 S4 Chair: Lihwai Lin** **Extragalactic Astronomy**		
S4.1 **11:00 - 11:15**	SCUBA2 Lensing survey	Tomo Goto	NTHU
S4.2 **11:15 - 11:30**	AGN selection by SED fitting in AKARI NEP deep field	Ting-Chi Huang	NTHU
S4.3 **11:30 - 11:45**	Maximum Halo Acceleration in Galaxies	Yong Tian	NCU
S4.4 **11:45 - 12:00**	Dark Matter in Galaxies and Galaxy Clusters	Chorng-Yuan Hwang	NCU
12:00 - 14:30	**Banquet 大會午宴**		
14:30 - 18:30	Group discussions 分組討論/自由參訪		
20:00 - 21:30	Stargazing 觀星活動 **Venue/地點：NUU Art Center Performance Exhibition Hall/國立聯合大學藝術中心展演廳露台**		

Day 3 (May 21, Sunday) 第三天 (5月21日, 星期日) Venue /地點：NUU International Conference Center/國立聯合大學國際會議中心			
09:00 - 10:40	**ASROC General Assembly & Awards Presentation Ceremony 會員大會及頒獎典禮** **Chair: You-Hua Chu**		
09:00 - 09:10	Presentation of the 4th ***Heaven Quest Award*** and ***Heaven Talk Award*** **頒發天文學會第四屆「天問獎」及「譚天獎」**		
09:10 - 09:25	***Heaven Quest Award*** acceptance speech**「天問獎」得獎致辭** **Academician Wing Ip (NCU) 葉永烜院士 (國立中央大學)**		
09:25 - 09:40	***Heaven Talk Award*** acceptance speech**「譚天獎」得獎致辭** **Familystar 親子觀星會**		
09:40 - 10:40	General Assembly, best-poster awards & presentations **會員大會、頒發最佳壁報論文獎及得獎論文口頭報告**		
10:40 - 11:10	**Coffee break and poster session P5 茶敘及壁報欣賞 P5**		
11:10 - 12:10	**Scientific oral session S5** **科學論文宣讀 S5**	**Education & Public Outreach session E1** **天文教育及業餘天文活動報告 E1**	
Scientific oral session S5 科學論文宣讀 S5 Chair: Chorng-Yuan Hwang **Cosmology and High Energy Astrophysics**			
S5.1 **11:10 - 11:25**	Rapid Oscillation of Gravitational Constant in the Scalar-Tensor Theory of Gravity: the early-time constraints on its induced energy density from cosmology	Po-Wen Chang	NTU
S5.2 **11:25 - 11:40**	Cosmological Simulation with Dust Evolution	Kuan-Chou Hou	ASIAA/ NTU
S5.3 **11:40 - 11:55**	CO Luminosity-Linewidth Correlation and Its Possible Utilization in Cosmology	Yi-han Wu	NTHU
S5.4 **11:55 - 12:10**	Using mHz QPOs to Put Constraints on Neutron Star Size and Equation of State	Holger Stiele	NTHU

Education & Public Outreach session E1 天文教育及業餘天文活動報告 E1 Chair: Shih-Ping Lai 第一會議室(圖書館1F)			
E1.1 **11:10 - 11:25**	民國初年的通俗天文學：以《婦女雜誌》及其他期刊為例	Hsiang-Fu Huang	AS IoMH
E1.2 **11:25 - 11:40**	社區大學創齡學習者天文教學的適性探討 - 以 3D 與 VR 天文教學為例	Ching-Chuan Hung	TAM
E1.3 **11:40 - 11:55**	「民眾天文科學態度、學習態度與學習動機」研究初探 -以參觀臺北天文科學教育館民眾為例	王志明	TAM
E1.4 **11:55 - 12:10**	From offline to online: Science Edu-Communication in Taipei Astronomical Museum	胡佳伶	TAM
12:10 - 13:30	**Lunch break 午餐**		
13:30 ~	**Departure 賦歸**		

Poster Presentation

壁報論文目錄

A. Stars

PS01	**Finding new Cepheids in the open clusters with their location in the color-magnitude diagram -- tests with existing data and known Cepheids** *Shih-Chang Luo (NCU), Chow-Choong Ngeow (NCU)*
PS02	**Flare morphology of M dwarfs from Kepler short cadence data** *Han-Yuan Chang (NCU), Wei-Jie Hou (NCU), Chia-Lung Lin (NCU), Li-Ching Huang (NCU), Wing-Huen Ip (NCU)*
PS03	**Multi-wavelength Characterization of Type Ia Supernova Remnants** *Po-Sheng Ou (ASIAA), You-Hua Chu (ASIAA), Chuan-Jui Li (ASIAA)*
PS04	**The Link Between the Polarization and Blueing Effect of the UXOR Type Young Star GM Cephei** *POCHIEH HUANG (NCU), CHANG-YAO CHEN (NCU), Chia-Ling Hu (TAM), Shuhrat Ehgamberdiev (UBAI, Uzbekistan), Otabek Burkhonov (UBAI, Uzbekistan), Jinzhong Liu (XAO, China), Erika Pakstiene (Vilnius U, Lithuania), Jan Kåre Trandem Qvam (Horten Secondary-school, Norway), Wen-Ping Chen (NCU)*
PS05	**Searching for Be Stars in 104 Open Clusters** *Chang-Hsien Yu (NCU), Chan-Kao Chang (NCU), Chien-Cheng Lin (SHAO, China), Chien-De Lee (NCU), Chih-Hao Hsia (MUST, Macao), Chow-Choong Ngeow (NCU), Po-Chieh Yu (NCU), Wing-Huen Ip (NCU)*
PS06	**H-BAND TIME-SERIES OBSERVATIONS OF CLASSICAL CEPHEIDS IN M33** *Chien-De Lee (NCU), Chow-Choong Ngeow (NCU)*
PS07	**Testing and observing the SSP-4 NIR-photometer on Cepheids at Lulin and NCU observatories** *Shiuan-Wen Luo (NCU), Chow Choong Ngeow (NCU), Chien De Lee (NCU), Hung-Chin Lin (NCU)*
PS08	**Boundedness of binary systems in time varying potential** *Sih-Sian Fong (NCU), Chung-Ming Ko (NCU)*
PS09	**Refining period of a Mira in M33 with multi-band analysis** *Jia-Yu Ou (NCU), Chow-Choong Ngeow (NCU)*
PS10	**Superflares relationship with rotational phase of G-type stars** *Wei-Jie Hou (NCU), Han-Yuan Chang (NCU), Chia-Lung Lin (NCU), Wing-Huen Ip (NCU)*
PS11	**Coaxial rings and H2 knots in Young Planetary Nebula Hubble 12** *Chih-Hao Hsia (MUST, Macau), Yong Zhang (UHK, Hong Kong), Wing-Huen Ip (MUST, Macau)*

B. Extragalactic Studies

PS12	**Properties of spectrally-defined red QSOs at z=0.3-1.2** *An-Li Tsai (NCU), Chorng-Yuan Hwang (NCU)*
PS13	**The Properties of Barred Spiral Galaxies** *Ying-Fang Wang (NCU), Chorng-Yuan Hwang (NCU)*
PS14	**The Relation of Mid Infrared and Radio Emission in Narrow-Line Seyfert 1 Galaxies** *Meng Che Hsieh (NCU), Chorng Yuan Hwang (NCU)*
PS15	**Color Variabilities of QSOs at z < 1.2** *Young-Tzee Loke (NCU), Chorng-Yuan Hwang (NCU)*
PS16	**Alignments of elliptical galaxies in different environments** *Jhen-Yu Chen (NCU), Chorng-Yuan Hwang (NCU)*
PS17	**Populating H_2 and CO in Galaxy Simulation with Dust Evolution** *Li-Hsin Chen (ASIAA), Hiroyuki Hirashita (ASIAA), Kuan-Chou Hou (ASIAA), Shohei*

	Aoyama (Osaka U, Japan), Ikkoh Shimizu (Osaka U, Japan), Kentaro Nagamine (Osaka U, Japan)
PS18	**Strong gravitational lensing by elliptical galaxies in modified Newtonian dynamics** *Shi-Pu Yang (NCU), Chung-Ming Ko (NCU)*
PS19	**Gauss's Law of Gravity with Anisotropic Columnar Flux Distribution to Interpret Flat Rotation Curve and Baryonic Tully-Fisher Relation of Disk Galaxies** *Te Chun Wang (私立中山工商)*
PS20	**Mock Catalogs for Testing Cluster Detection Algorithms** *Sheng-Chieh Lin (ASIAA), Yen-Ting Lin (ASIAA), Masamune Oguri (RESCEU), Bau-Ching Hsieh (ASIAA)*

地點：資訊處一樓第四會議室　　Venue: Fourth Conference Room

C. Solar System and Planetary Science

PS21	**Lightcurve analysis of 9 asteroids** *Hanjie Tan (CCU), Bin Li (PMO.China), Xing Gao (Urumqi No.1 Senior High School)*
PS22	**A Study of the Seasonal Variation of the Sublimation Rate of the Sputnik Planum Ice Sheet on Pluto** *Hua-Shan Shi (NCU), Wing-Huen Ip (NCU)*
PS23	**Synchronous Surveillances of Meteor Events using the Taiwan Meteor Detection System** *Jun-You Liu (NDHU), Bo-Hao Wang (NDHU), Yi-Ting Lin (NDHU), Jim Lee (TAM), Zhong-Yi Lin (NCU), Hsin-Chang Chi (NDHU)*
PS24	**A model study of the vertical distributions and escape fluxes of the major and minor species in Titan's thermosphere under different conditions** *Jen-Kai Hsu (NCU), Mao-Chang Liang (ASIAA), Wing-Huen Ip (NCU)*
PS25	**ALMA Study of Atmospheric Compositions of Jovian Moons Io and Callisto** *Ming-Chi Chung (NTNU), Yi-Jehng Kuan (NTNU), Yo-Ling Chuang (NTNU), Yo-Ling Chuang (NTNU), Yu-Fu Yeh (NTNU)*
PS26	**In search of the methane gas torus of Titan** *Chin-Min Yang (NCU), Wing-Huen Ip (NCU)*
PS27	**A Pilot Study of the Asteroidal Rotation Period Distribution based on High-Cadence Observations of the CNEOST Telescope at Xu-Yi** *Ting-Shuo Yeh (NCU), Chan-Kao Chang (NCU), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU), Bin Li (PMO, China), Hai-Bin Zhao (PMO, China)*
PS28	**Search for extremely recent break-up events of small solar system bodies** *Daisuke Kinoshita (NCU)*
PS29	**Intercomparison of the Size – Rotation Period Relations of Different Taxonomic Types of Asteroids** *Zhi-Xuan Zhu (NCU), Chan-Kao Chang (NCU), Yu-Chi Cheng (NCU), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU)*
PS30	**Lulin Photometric Survey for Taxonomic Classifications of Near-Earth Asteroids** *Chung-Chien Cheng (NDHU), Yi-Chuan Lin (NDHU), Jing-Ting Shi (NDHU), Meng-Yi Sie (NDHU), Zhong-Yi Lin (NCU), Hsin-Chang Chi (NDHU)*
PS31	**Characterization of (138846) 2000 VJ61 on its close approach to Earth during 2016-2017** *Jing-Ting Shi (NDHU), Meng-Yi Sie (NDHU), Chung-Chien Cheng (NDHU), Yi-Chuan Lin (NDHU), Zhong-Yi Lin (NCU), Hsin-Chang Chi (NDHU)*
PS32	**On the long-term time evolution of highly-inclined Trans-neptunian Objects** *Po-Yen Liu (NCU), Wing-Huen Ip (NCU), Yu-Chi Cheng (NCU), Hsing-Wen Lin (NCU)*

D. Star Formation

PS33	**A Study of Stellar Gyrochronology by Using the PTF and K2 Data** *Chia-Lung Lin (NCU)*
PS34	**A Bipolar Molecular jet in NGC2023 MM1** *Li-Wen Liao (NTHU), Vivien Chen (NTHU)*
PS35	**Study of Embedded X-ray Brown Dwarfs in the Young Star Cluster IC 348** *Bhavana Lalchand (NCU), Po-Shih Chiang (NCU), Wen-Ping Chen (NCU)*
PS36	**Verifying a new method using velocity gradients to probe magnetic fields in turbulent disks** *Cheng-Han Hsieh (NTHU), Shih-Ping Lai (NTHU)*
PS37	**Dating a prestellar core: L1512** *Sheng-Jun Lin (NTHU), Shih-Ping Lai (NTHU), Laurent Pagani (Observatoire de Paris, France)*
PS38	**Searching the First Hydrostatic Cores in the Perseus Molecular Cloud** *Hao-Yuan Duan (NTHU), Shih-Ping Lai (NTHU)*
PS39	**Spectral imaging of trans- and cis-HCOOH emission with ALMA** *Ya-Wen Yo (NTNU), Yi-Jehng Kuan (NTNU), Yo-Ling Chuang (NTNU), Ming-Chi Chung (NTNU)*
PS40	**Filamentary Accretion Flows in the IRDC M17 SWex** *Vivien Chen (NTHU)*

E. High Energy

PS41	**JVLA and Chandra Observations of SNR G16.7+0.1** *CHIEN-YING (NTHU), C.S. Feng (NTHU), H.K. Chang (NTHU), W.W. Tian (NAOC, China)*
PS42	**X-ray Spectral Analysis of 2015 outburst of V404 Cygni with the TCAF Solution** *Jie-Rou Shang (NTHU), D. Debnath (ICSP, India), Hsiang-Kuang Chang (NTHU)*
PS43	**An X-Ray Study of NGC 7331** Ruolan Jin (NTHU), Albert Kong (NTHU)
PS44	**MHD simulations on outflows from the Galactic centre** *Tanayveer Singh Bhatia (NCU), Bilal Ramzan (NCU), Han Cheng (NCU), Chung-Ming Ko (NCU)*
PS45	**Tracking X-ray Spectral Modulations of A 6-Hz Type-B Quasi-periodic Oscillation in GX 339-4 using Hilbert-Huang Transform** *Yi-Hao Su (NCU), Christopher Reynolds (U. Maryland, USA), Yi Chou (NCU)*
PS46	**Observation of the Crab in the Compton Spectrometer and Imager (COSI) 2016 flight** *Chao-Hsiung Tseng (NTHU), Hsiang-Kuang Chang (NTHU)*
PS47	**Fermi Large Area Telescope Observations of the Kes 73/1E 1841-045 Region: An Attempted Search for Gamma-ray Excess from a Magnetar** *Paul K. H. Yeung (NTHU), Albert K. H. Kong (NTHU)*

F. Instrumentation

PS48	**The Polarimetric Performance of the Compton Spectrometer and Imager** *CHIEN-YING YANG (NTHU), STEVEN BOGGS (UC Berkeley, USA), HSIANG-KUANG CHANG (NTHU), COSI collaboration*
PS49	**COSI effective area study** *C.-Y. Chu (NTHU), C.-Y. Yang (NTHU), C.-H. Tseng (NTHU), S.-F. Chung (NTHU), S. Boggs (UC Berkeley, USA), H.-K. Chang (NTHU), P. Jean (IRAP, France)*

G. Outreach and Education

PS50	**參與 2017IPS 數據轉球幕星象節目工作坊與第七屆科學映像祭 IFSV DOME FEST 新知分享** *Jim Ching-Chuan Hung (TAM)*

Heaven Quest and Heaven Talk Awardee

「天問獎」與「譚天獎」得獎者介紹

2017 Heaven Quest Awardee: Academician Wing-Huen Ip

Prof. Wing-Huen Ip is a National Chair Professor at the National Central University (NCU) and an Academician of Academia Sinica. He is a world-renowned planetary scientist and has won numerous awards for his outstanding research publications and academic achievements.

Prof. Ip has made great contributions to universities, society, and nation, especially for the astronomy field in Taiwan. He has been a Dean of College of Sciences at NCU and a Vice President of the United University of Taiwan. During his tenure as an administrator, he devoted his tireless efforts and innovative thoughts to the development and synergy of the departments and institutes in the universities, while still having spare energy for his beloved research and education in space sciences and astronomy.

Prof. Ip has served as the President of the Astronomical Society of the Republic of China (ASROC). He used the Ministry of Education's programs to pursue excellent and the Ministry of Science and Technology's large-scale programs to develop NCU's Lulin Observatory located in the Jade Mountain National Park, which has become the most important on-island astronomical observing facility for research, education, and public outreach. Prof. Ip is supportive of large international collaborative projects initiated by the Institute of Astronomy and Astrophysics of Academia Sinica, encouraging university members to actively participate. Prof. Ip's efforts have contributed significantly to the international stature of astronomy research in Taiwan.

Prof. Ip constantly thinks about ways to improve everything. As a senior distinguished professor, he stimulates discussions on research collaboration or instrument development among junior colleagues, broadening their mind and viewpoint in order to make wider and deeper explorations. Despite his nearing retirement age, he is still one of the most active members in the astronomical community, frequently inviting international scholars to visit and having established the NCU-Delta Young Astronomer Lectureship Award. He is artistic and rich in humanity culture, has a wide worldview, is deeply affectionate to the people and society in Taiwan. Prof. Ip is the recipient of the 2017 Heaven Quest Award because of his outstanding academic achievements, contributions to the society, and scholarly role-model characteristics.

In 2017, the Astronomical Society of the Republic of China presents the 4th Heaven Quest Award to Academician Wing-Huen Ip for his outstanding academic achievements, contributions to the society, and scholarly role-model characteristics.

第四屆「天問獎」得獎人中央大學教授暨中央研究院院士葉永烜簡介

葉永烜教授目前在國立中央大學天文所任職，是國際著名行星科學家，中央研究院院士，是國家講座，也獲得國內外多項獎項，研究著作等身，學術成就卓越。

葉院士對於學校、社會、國家，尤其台灣天文學界有重大貢獻。他曾經是中央大學理學院院長，及台灣聯大總副校長，期間除了所專長的太空科學與天文學，葉院士以其充沛之行動力與創意思考，時刻關注各校、系、所發展，並促進彼此整合，具備跨領域之學養與關懷。他曾擔任中華民國天文學會理事長，後來主持教育部追求卓越，以及後續五年五百億、科技部探高等大型計畫，主導中央大學天文所建置於玉山國家公園的鹿林天文台，成為國內研究、教學，或社會教育的重要科學基地。對於中央研究院天文所參與的大型國際計畫，葉教授即使沒有親身參與規劃，也都提供關鍵意見並帶領大學團隊積極參與。我國天文研究獲得國際重視，葉院士絕對功不可沒。

葉院士總思索如何把事情做到更好。身為資深教授，依然帶頭積極課題合作或儀器研發的討論，不斷鞭策晚輩師生放開眼界，探尋更深、更廣的問題。即使已近退休之齡，他仍是本學會裡最活躍的成員之一，頻繁邀訪國外學者來訪，成立台達電年經天文學者講座。具備驚人的體力與活動力。葉院士有豐富的人文藝術濡養，豁達的國際視野，且關懷國內族群以及本土議題。

由於葉永烜教授的學術成就、他對國家社會的貢獻，以及學養風範，本會於 2017 年將第四屆「天問獎」頒贈予葉永烜院士，以表彰他對天文研究之卓越貢獻。

第四屆「譚天獎」得獎人親子觀星會簡介

親子觀星會是由一群熱愛天文的同好所共同成立的團體，由一開始的幾個會員，拓展到現今的百餘位會員，且不分老少、職業族群，散佈在全台各地。除定期在台北、新竹、台中、高雄等地舉辦「街頭天文」外，亦不定期到偏鄉地區舉辦公益性質的觀測服務，將天文的氣息傳送到遠方。

在許多天文相關的活動上，例如南十字星空吶喊或合歡山星空饗宴，都可以看到該會志工的身影。2015 年也曾經在台北主辦「星空嘉年華」，用寓教於樂的方式，讓大家了解即使在光害及空氣污染嚴重的都市，也能進行天文觀測，並透過活動使民眾更加親近星空。親子觀星會志工還設計出許多可以親子同樂的天文遊戲，讓大小朋友都可以透過簡單的遊戲來學習天文知識，認識浩瀚的星空。

親子觀星會的宗旨是「散播天文種子，分享觀星樂趣；倡導光害防制，保護美麗星空」。志工們秉持著這樣的信念，藉由天文教育進一步推廣環境保護，期使下一代能繼續保有美麗的星空可以欣賞。

本會於 2017 年將第四屆「譚天獎」頒贈予親子觀星會，以表彰他們多年來對天文教育推廣與天文知識普及的卓越貢獻。

2017 Heaven Talk Awardee: Familystar

Familystar is an organization coordinated by amateur astronomers. The goal of Familystar is to spread astronomical seeds, share stargazing fun, advocate light pollution prevention tips, and protect the beautiful starry sky.

In 2017, the Astronomical Society of the Republic of China presents the 4th Heaven Talk Award to Familystar for their outstanding achievements in education and popularization of astronomy.

Invited Speakers
大會邀請演講講者

Prof. Christopher Russell

Prof. Russell is a member of the faculties of both the Institute of Geophysics and Planetary Physics (IGPP) and the Department of Earth and Space Sciences at the UCLA. He is the acting System-wide Director of IGPP, the head of the Space Physics Center in IGPP, and the Director of the UCLA Branch of the California Space Grant Consortium. He is the principal investigator (PI) on the POLAR mission and a co-investigator on the magnetometer team on the Cassini mission to Saturn, the ROMAP investigation on the Rosetta mission to comet Churyumov-Gerasimenko, the IMPACT investigation on the STEREO mission to study solar and solar wind disturbances; the THEMIS mission to study substorms, and the magnetometer investigation on the Venus Express mission to study the solar wind interaction with Venus. He is the PI of the Dawn mission to the asteroids Vesta and Ceres, the ninth Discovery mission of NASA.

The principal focus of Prof. Russell's Space Physics Group is the energy flow from the sun through the solar wind and into the terrestrial and planetary magnetospheres, both intrinsic and induced, and how this energy is dissipated within these magnetospheres. His other research interests include the generation of the intrinsic magnetic fields of the Earth and planets and the nature and strength of planetary lightning. In pursuit of these objectives the Space Physics Group has an engineering team that builds space flight instrumentation, a data processing team that processes the data returned from these missions, and a scientific analysis team of students, researchers and faculty.

Prof. Russell is outstanding in Planetary Physics and Space Science. He is a Fellow of the American Geophysical Union and has won numerous honors and awards, including the Fleming Medal of the American Geophysical Union. Asteroid 21459 Chrisrussell was named after him by the IAU in 2008.

Prof. Martin Bureau

Martin Bureau is Professor of Astrophysics in the Department of Physics of the University of Oxford, as well as Lindemann Fellow and Tutor in Physics at Wadham College.

Martin's research centres on the formation and evolution of galaxies, primarily through detailed studies of (samples of) nearby objects, this across the whole electromagnetic spectrum. He primarily exploits integral-field spectrographs and synthesis imaging, yielding three-dimensional observations of galaxies. Current projects include weighing the supermassive black holes lurking in galaxy centres, and characterising the nature of galaxies when our universe was half its current age. Secular evolution along the Hubble sequence, primarily bar-driven, is also a constant fascination.

Within the Physics Department, Martin was until recently in charge of all physics exams, and he supervises PhD students in Oxford and abroad. At Wadham College, in addition to recently acting as college Dean, Martin mainly tutors the first year physics curriculum (Mechanics, Circuit Theory, Special Relativity, Electromagnetism, Optics) as well as the second year Statistical Mechanics.

Before Oxford, Martin was a NASA Hubble Fellow at Columbia University and a postdoctoral fellow at Leiden University. He obtained his PhD at Mount Stromlo and Siding Spring Observatories (now the Research School of Astronomy and Astrophysics), part of The Australian National University. He obtained his BSc from the University of Montreal, where he is originally from.

Abstracts
論文摘要

Plenary Talk I : The Dawn Mission to Vesta and Ceres: A Voyage in Space and Time

Prof. Christopher Russell (University of California Los Angeles)

In September 2007 the Dawn mission began its journey to Vesta and Ceres arriving at Vesta, the second most massive body in the asteroid belt, in July 2011. It descended into Vesta's gravitational well and examined its gravitational field, topography, mineralogy, and elemental composition in a series of near circular orbits and then climbed out of the gravitational potential well and headed for Ceres in September 2012. In March 2015 Dawn entered orbit around Ceres, the most massive body in the asteroid belt and an object much different than Vesta. Ceres remains active and continues to evolve today. This remarkable journey was enabled by solar electric propulsion. The lecture provides an overview of the scientific achievements of the Dawn mission in the course of this voyage in both space and time.

Plenary Talk II : 3D Observations of Molecular Gas in Galaxies: From Global Dynamics to Supermassive Black Holes

Prof. Martin Bureau (University of Oxford)

I will first briefly review the molecular gas content of early-type galaxies. I will show not only that they unexpectedly harbour much cold gas, but also that it is the best tracer of the circular velocity, thus allowing accurate spatially-resolved dynamical mass measurements in galaxies across the Hubble sequence. Second, I will explore the use of molecular gas for studies of the Tully-Fisher (luminosity-rotational velocity) relation of galaxies to high redshifts. I will highlight the work done to establish local (z=0) benchmarks and will discuss the challenges posed by systematic effects when comparing nearby and distant galaxies. Third, I will demonstrate that CO can be used to easily and accurately measure the mass of the supermassive black holes lurking at galaxy centres. I will discuss substantial ongoing efforts to do this and present many spectacular new ALMA measurements, that open the way to literally hundreds of measurements across the Hubble sequence with a unique method. I will also hint at how the same data allow to study the spatially-resolved properties of giant molecular cloud populations in non-local galaxies for the first time, providing a new tool to understand and contrast the star formation efficiency of galaxies on cloud scale.

S1.1: ALMA Observations of Spiral Accretion Flows Towards Extremely Young Protostars

Pou-Ieng Choeng (NTHU), Shih-Ping Lai (NTHU), Sheng-Jun Lin (NTHU), Tao-Chung (NAOC), Nadia Murillo (Leiden Observatory)

Studying the accretion flows toward extremely young protostars is an important step for understanding how the protostars and the protoplanetary disks are assembled in the early stage of star formation. The accretion flows are commonly seen in the MHD numerical simulations; however, it is rarely observed toward young protostars. Here we present our ALMA observations of the accretion flows around the extremely young protostar VLA1623A with a Keplerian disk likely just formed (Murillo, Lai, et al. 2013). ”Dendrogram” algorithm (Goodman et al. 2009) are used to identify the accretion flows, and we find the three brightest ”branches” and their associated ”leaves” likely correspond to the spiral structure flowing toward the central young cluster. We further compare the three accretion flows in the position-position-velocity cube to the CMU model (Ulrich 1976; Cassen & Moosman 1981) which describe the velocity structure of the gas accreting to the central protostar with constant angular momentum. We find that our identified branch structures well match with the CMU model.

S1.2: Planet induced spirals in the circumstellar disk AB Aurigae?

Ya-Wen Tang (ASIAA)

We report the results of ALMA observations of a protoplanetary disk surrounding the Herbig Ae star AB Aurigae. We obtained high-resolution ($0.''1$; 14 au) images in ^{12}CO (J=2-1) emission and in dust continuum at the wavelength of 1.3 mm. The continuum emission is detected at the center and at the ring with a radius of $\sim$ 120 au. The CO emission is dominated by two prominent spirals within the dust ring. These spirals are trailing and appear to be about 4 times brighter than their surrounding medium. Their kinematics is consistent with Keplerian rotation at an inclination of 23°. The apparent two-arm-spiral pattern is best explained by tidal disturbances created by an unseen companion located at 60–80 au, with dust confined in the pressure bumps created outside this companion orbit. An additional companion at r of 30 au, coinciding with the peak CO brightness and a large pitch angle of the spiral, would help to explain the overall emptiness of the cavity. Alternative mechanisms to excite the spirals are discussed. The origin of the large pitch angle detected here remain puzzling.

S1.3: The asymmetric structures in dust rings

Bo-Ting Shen (NTU), Ya-Wen Tang (ASIAA)

Unprecedented sensitivity and resolution achieved by ALMA has allowed us to probe deeply into compact structures, such as cavities, asymmetries and spiral patterns in protoplanetary systems. Currently, different hydrodynamical models of planet-disk interaction have proposed that vortices excited by planets might be a good explanation for these interesting structures within transitional disks. We obtained ALMA data from a selected list of transitional disks where the archival data are public. Among them, we found MWC758 particularly interesting, where a spiral-like arc in 0.87mm continuum is detected along with a circumstellar ring. We analyze the spiral-like arc feature with an empirical logarithmic spiral function and also with the analytical expression of the spiral pattern induced by an embedded planet. I will present the best-fit results and discuss the possible implications of these results.

S1.4: Measuring the Magnetic Field from Filaments to Collapsing Cores in the Star-Formation Process

Patrick Koch (ASIAA)

We present dust polarization observations from large filamentary infrared dark clouds down to high-mass star-forming cores. Starting from single-dish observations the magnetic field structures are resolved with increasingly higher resolutions down to individual cores. ALMA observations in Band 6 with a resolution of 0.25" reveal a wealth of substructures with satellite cores, locally pinched magnetic field morphologies in individual cores and a field morphology in between cores that indicates a global drag towards the overall center of mass. On larger scales we outline a scenario where the magnetic field is guiding and possibly dictating the fragmentation process towards the next smaller scale.

S1.5: The Evolutionary Status of the Prestellar Core: L1498

Ren-Shiang Sung (NTHU), Shih-Ping Lai (NTHU), Laurent Pagani (Observatoire de Paris)

The processes of forming a protostar from diffuse gas are still not fully understood. There are several important steps, such as the condensation and cooling of the diffuse medium subsequently turns to molecules, the formation of cores that slowly contract to form prestellar cores, and the collapse of prestellar cores to form protostars. In addition, the main mechanism driving above phenomena is also under debate. Two generally accepted theories, turbulence fast decay and slow ambipolar diffusion, predict very different timescales in forming the prestellar cores, even up to a factor of 10. Thus, constraining the ages of the prestellar cores gives an opportunity to answer above questions. Pagani et al. (2013) showed that the deuteration profiles of key species behave differently for the two type of theories, and their measurements on L183 constrain its age to be less than 4 Myr which is more consistent with the turbulence fast decay model. However, these results should be verified with other prestellar cores which are different at evolutionary stages and physical conditions. L1498 is a widely studied and isolated starless core located in Taurus, and found to have strong depletion at the center and possibly magnetic supported. Therefore, L1498 provides a great opportunity to examine whether slow ambipolar diffusion exist at the early stage of star formation. Here, we have obtained the H_2D^+ from JCMT, N_2H^+ and N_2D^+ from IRAM 30m, and DCO^+ from GBT. We will present our results and discuss the evolutionary status of L1498.

S1.6: Impact of high-mass stars on the star-formation properties of the interstellar filaments - A case study on the G182.4+00.3 filamentary cloud

Manash Samal (NCU), W. P. Chen (NCU), Yan Sun (Purple Mountain Observatory and Key Laboratory of Radio Ast ronomy, Chinese Academy of Sciences, Nanjin), Jessy Jose (The Kavli Institute for Astronomy and Astrophysics, Peking University, China), PoShish Chiang (NCU)

Recent Herschel observations have shown that most of the star formation occurs in filaments, yet how the fragmentation operates and how the nearby massive stars affect the star-formation properties of a filament is far from being clear. We present observations towards the G182.4+00.3 molecular cloud in the transition of ^{12}CO, ^{13}CO, and C^{18}O using the PMO 13.7 m telescope. These maps are at an angular resolution of 45" and velocity resolution of 0.45 kms^{-1}. Though the emission from three molecular lines show different emission areas with their own distinct structures, the ^{13}CO integrated intensity map clearly reveals a filamentary cloud of length 1 degree (36 pc) with column density greater than 1e+10^{22} cm^{-2}. The distribution of excitation temperature shows two phases: cold gas of 10K across the large area filament; relatively warm gas in the range 15-25 K at the edge of the filament facing an HII region S242. Using multiwavelength data, we find that, part of the filament is indeed heated and compressed by the stellar winds and radiation from the massive stars

of S242. Our C18O data reveals nine massive clumps across the filament. We compare the gas properties of the clumps with the distribution of young stellar objects obtained with CFHT and *Spitzer* to investigate the relationship between gas properties of the clumps, their locations with respect to the HII region and star formation activity their in. Based on our multiwavelength results, in this presentation, we will discuss the star formation properties of the clumps, and the large-scale kinematics of the gas and the role of HII region's feedback on the star-formation process of the filament.

S2.1: Peculiar dwarfs in the HSC survey

Poshih Chiang (NCU), Chien-Hsiu Lee (Subaru Observatory), Wen-Ping Chen (NCU), Yoshiki Matsuoka (Ehime University)

We present the design of our projects on searching for brown dwarfs and ultracool white dwarfs in the HSC-SSP survey. The HSC-SSP survey is the deepest imaging survey in the north sky, carried out by the Subaru telescope with its' wide-field HSC camera. Taking the advantages of the HSC survey on the sensitivity and the large area, faint objects such as brown dwarfs and white dwarfs could be detected. Using the current S16A internal released data, we have identified ∼ 500 BD candidates and 27 ultracool (∼3000 K) white dwarf candidates.

S2.2: Physical Properties of the G-type Eclipsing Binaries from the Kepler Observations

Li-Ching Huang (NCU), Wing-Huen Ip (NCU), Han-Yuan Chang (NCU), Ali Luo (中國科學院國家天文台), Yihan Song (中國科學院國家天文台)

The Kepler space telescope has observed more than 2000 eclipsing binary (EB) systems during its primary mission between 2009 and 2013. According to the effective temperatures measured by Huber et al. (2014), we have selected about 100 systems with G-type primary stars characterized by Teff ∼ 5000K-6000K for statistical study. These classifications are compared to the spectral measurements of LAMOST. Many of the binaries are characterized by the EA (Algol)-type light curves of detached systems. To calculate their spectral types, mass ratio, radius, system incline angles, and orbital distance between the two components in individual EBs, we measured their primary and secondary eclipsing transit depths and effective temperature ratios according to the Kepler data. In some test cases, we can find a best fit of two spectral components from LAMOST spectra. A fraction of the EBs in this sample displayed flare activities. There is an indication that the flare frequency of the G-type EBs tend to be higher than that of the single solar-type stars while the corresponding flare energetics tends to be at lower level. At the same time, some flare effects could have been generated by the M- or K-type companion stars as demonstrated by our statistical study.

S3.1: Surficial mineralogy of dwarf planet Ceres

E.Ammannito (Italian Space Agency, Rome, Italy) on behalf of the Dawn/VIR Science Team

The Dawn spacecraft has been acquiring data on dwarf planet Ceres since January 2015 (1). The VIR spectrometer (0.25-5.0 μm) acquired data at different altitudes providing information on the composition of the surface of Ceres at resolutions ranging from few kilometers to about one hundred meters (2).

The average spectrum of Ceres acquired by VIR is well represented by a mixture of dark minerals, Mg- phyllosilicates, ammoniated clays, and Mg- carbonates (3). This result confirms and extends previous studies based on ground based spectra. Mg- phyllosilicates have been associated with the 2.72μm absorption band precluded from telescopic measurements owing to the atmospheric absorptions. The ammoniated clays have been identified through the presence of an absorption feature centered at 3.06μm as already suggested by (4) while the 3.9 μm absorption feature is indicative of the presence

of carbonates as previously concluded by (5). Maps of the surface at about 1 km/px show that the components identified in the average spectrum are present all across the surface with variations in their relative abundance (6). Some localized areas however have peculiar spectral characteristics. One example is the spectrum of the bright faculae within Occator crater that is most consistent with a large amount of Na-carbonates and possibly ammonium salts (7). In addition, water ice has been detected on the surface (8) and organic rich regions have been identified in some localized areas across the surface (9). The retrieved composition indicates a pervasive aqueous alteration and at least localized hydrothermal activity of the surface of Ceres. In addition, the co-existence of ammonia-bearing hydrated minerals, water ice, carbonates, and organic material indicates a complex chemical environment that could allow the formation of prebiotic molecules making Ceres a primary target for exobiological studies.

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S3.2: The Chemical Composition in the Exosphere of Ceres

Wei-Ling Tseng (NTNU), Wing-Huen Ip (NCU), Yi-Jehng Kuan (NTNU), Nien-Fang Hung (NCU)

The Dawn spacecraft has orbited around Ceres for more than two years, which is the largest object among the main-belt asteroids. Many unexpected discoveries have been made. In addition to the surface water ice seen in the permanently shadowed region (Platz et al., 2016), Prettyman et al. (2016) used the Gamma Ray and Neutron Detector (GRaND) instrument finding that Ceres' uppermost surface is rich in hydrogen (in the form of water ice), with higher concentrations in the mid/high latitude regions. Organic material is also discovered near Ernutet crater on Ceres, which makes its composition (i.e., rich in water and organics) similar to carbonaceous chondrites (Di Sanctis et al., 2017). Nathues et al. (2015) showed that a haze layer above the Occator crater has a diurnal change of brightness, indicating a comet-like sublimation activity. In addition, subsurface outgassing (e.g., impact-triggered upwelling and/or the plume activity similar to that found in Enceladus) is another possible source mechanism, which is not fully understood yet. Kuppers et al. (2014) reported a direct detection of water vapor by Herschel that $> 10^{26}$ molecules s^{-1} was produced from localized sources on Ceres' surface. Following the Ceres' exospheric model of Tu et al. (2014), we will re-investigate the source mechanisms producing vapors and compute their source rates. In addition to the primary products of radiolytic and photolytic decomposition of water ice (i.e., O_2, O_3 and CO_2 produced from the impurities), the vapors from salts and organic material will be considered as well. Their interaction with the solar photons and solar wind plasma will be taken into account in the modeling the chemical composition of Ceres' exosphere. Then we will compare with the available data and seek for any evidence in the ground-based millimeter/submillimeter observations.

S3.3: Surface Heterogeneity and Color Measurement of the Asteroid in Cometary Orbits (ACOs)

Yu-Chi Cheng (NCU), Wing-Huen Ip (NCU)

The asteroid in cometary orbits (ACOs) is a unique asteroid group which occupied the comet-like high eccentric orbit in our inner solar system. They are sharing the same orbital space with the Jupiter Family Comet (JFC) but without any detectable cometary activity. An earlier study suggests a dormant comet scenario that ACOs may origin from extinct cometary nuclei according to the dynamical simulation. In this study, we will present a series of ground-based observation to measure the surface color on ACOs using Lulin One-meter Telescope (LOT). The spin period and rotationally resolved surface color are also well-determined on some ACOs with higher observing cadences.

S3.4: The Large Super-Fast Rotator: (144977) 2005 EC127

Chan-Kao Chang (NCU), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU), Zhong-Yi Lin (NCU), Thomas Kupfer (Caltech), Thomas Prince (Caltech), Quan-Zhi Ye (Caltech), Hee-Jae Lee (KASI), Hong-Kyu Moon (KASI)

(144977) 2005 EC_{127} is a S-type inner-main belt asteroid with a diameter of 0.8 ± 0.1 km. Asteroids of this size are believed to have rubble-pile structure and therefore cannot have a rotation period shorter than 2 hours. However, 2005 EC_{127} completes one rotation in 1.65 ± 0.01 hours with a peak-to-peak light-curve variation of ~ 0.5 mag. Therefore, it is identified as a large super-fast rotator. Either a rubble-pile asteroid with a bulk density of $\rho \sim 6$ g cm$^{-}3$ or an asteroid with an internal cohesion of $95 \pm 30\ Pa$ can explain 2005 EC_{127}. However, the scenario of high bulk density is very unlikely to happen to asteroids. To date, only six large super-fast rotators, including 2005 EC_{127}, have been reported, and this number seems to be rare when compare with other large, fast rotators. Moreover, none of the known super-fast rotators are of C-type asteroid. Therefore, any discovery of large C-type super-fast rotator is important to understand the formation of large super-fast rotators.

S3.5: Searching for Moving Objects in HSC-SSP: Pipeline and Preliminary Results

Ying-Tung Chen (ASIAA), Hsing-Wen Lin (NCU), Shiang-Yu Wang (ASIAA), Mike Alexandersen (ASIAA), Matthew J. Lehner (ASIAA), J.-H. Wang (ASIAA), Fumi Yoshida (Planetary Exploration Research Center, Chiba Institute of Technology, Japan), Satoshi Miyazaki (NAOJ), Yutaka Komiyama (NAOJ)

The Hyper Suprime-Cam Subaru Strategic Program (HSC-SSP) is currently the deepest wide-field survey in progress. The 8-m aperture of Subaru telescope is very powerful in detecting faint/small moving objects, including near-Earth objects, asteroids, centaurs and Tran-Neptunian objects (TNOs). However, the cadence and dithering pattern of the HSC-SSP are not designed for detecting moving objects, making it difficult to do so systematically. In this paper, we introduce a new pipeline for detecting moving objects (specifically TNOs) in a non-dedicated survey. The HSC-SSP catalogs are re-arranged into the HEALPix architecture. Then, the stationary detections and false positive are removed with a machine learning algorithm to produce a list of moving object candidates. An orbit linking algorithm and visual inspections are executed to generate the final list of detected TNOs. The preliminary results of a search for TNOs using this new pipeline on data from the first HSC-SSP data release (Mar 2014 to Nov 2015) are also presented.

S3.6: A Quasar Discovered at redshift 6.6 from Pan-STARRS1

Ji-Jia Tang (ASIAA), Tomotsugu Goto (NTHU), Youichi Ohyama (ASIAA), Wen-Ping Chen (NCU), Fabian Walter (Max-Plank Institute for Astronomy), Bram Venemans (Max-Plank Institute for Astronomy), Kenneth C. Chambers (Institute for Astronomy University of Hawaii at Manoa), Eduardo Bañados (Carnegie Observatories), Roberto Decarli (Max-Plank Institute for Astronomy), Xiaohui Fan (Steward Observatory University of Arizona), Emanuele Farina (Max-Plank Institute for Astronomy), Chiara Mazzucchelli (Max-Plank Institute for Astronomy), Nick Kaiser (Institute for Astronomy University of Hawaii at Manoa), Eugene A. Magnier (Institute for Astronomy University of Hawaii at Manoa)

Luminous high-redshift quasars can be used to probe of the intergalactic medium in the early universe because their UV light is absorbed by the neutral hydrogen along the line of sight. They help us to measure the neutral hydrogen fraction of the high-z universe, shedding light on the end of the reionization epoch. In this paper, we present a discovery of a new quasar (PSO J006.1240+39.2219) at redshift z = 6.61 ± 0.02 from Panoramic Survey Telescope & Rapid Response System 1. Including this quasar, there are nine quasars above z > 6.5 up to date. The estimated continuum brightness is M1450 =

−25.96 ± 0.08. PSO J006.1240+39.2219 has a strong Ly α emission compared with typical low-redshift quasars, but the measured near-zone region size is RNZ = 3.2 ± 1.1 proper megaparsecs, which is consistent with other quasars at z $\sim$ 6.

S3.7: The 4th most important parameter of the fundamental metallicity relation of star-forming galaxies

Tetsuya Hashimoto (NTHU), Tomotsugu Goto (NTHU)

A tight relation has been observationally known among star formation rate, metallicity, and stellar mass of star-forming galaxies. The relation is among three of the most fundamental physical properties of galaxies. Thus it has been called as 'fundamental metallicity relation' (FMR), and had profound implications to galaxy formation and evolution models. However, there still remained considerable amount of dispersion around the FMR. Here we show, the 4th parameter, surface density of stellar mass, reduces the dispersion around the FMR. Out of a principal component analysis of 29 physical parameters of 41,338 star-forming galaxies from the Sloan Digital Sky Survey (0.04 < z < 0.1, 8.3< log M_* < 11.3, -1 < log SFR < 1.5), the surface density of stellar mass is found to be the 4th most important parameter. The new fundamental metallicity relation including the surface density forms a tighter hypersurface in the 4D parameter space, reducing the metallicity dispersion to 40%. Based on the results, we suggest the surface density of stellar mass as the 4th most important property governing the physics of star-forming galaxies. A benefit of the surface density is that it can be easily measured from imaging data, and thus is widely available. One possible physical explanation of the dependence on the surface density of massive galaxies is the higher star-formation efficiency in more concentrated ones, while physical time scales related to inflow of metal-poor gas may play important role in less-massive galaxies.

S3.8: Effects of dust evolution on the H2 and CO abundances in galaxies

Hiroyuki Hirashita (ASIAA), Nanase Harada (ASIAA), Li-Hsin Chen (ASIAA), Kuan-Chou Hou (ASIAA)

Stars form in molecular clouds. Therefore, tracing molecular gas in galaxies is important in revealing how galaxies convert gas to stars. Molecular gas is usually observed by CO emission in extragalactic objects. The CO-to-H_2 conversion factor ($X_{\rm CO}$) is known to correlate with the metallicity (Z). The dust abundance, which is related to the metallicity, is responsible for this correlation through dust shielding of dissociating photons and H_2 formation on dust surfaces. Thus, we investigate how the relation between dust-to-gas ratio and metallicity (D–Z relation) affects the H_2 and CO abundances (and $X_{\rm CO}$) of a 'molecular' cloud. For the D–Z relation, we adopt a dust evolution model developed in our previous work, which treats the evolution of not only dust abundance but also grain sizes in a galaxy. Shielding of dissociating photons and H_2 formation on dust are solved consistently with the dust abundance and grain sizes. As a consequence, our models predict consistent metallicity dependence of $X_{\rm CO}$ with observational data of nearby galaxies. Among various processes driving dust evolution, grain growth by accretion has the largest impact on the $X_{\rm CO}$–Z relation. We also find that dust condensation in stellar ejecta has a dramatic impact on the H_2 abundance at low metallicities (< 0.1 solar metallicity), relevant for damped Lyman α systems and nearby dwarf galaxies, and that the grain size dependence of H_2 formation rate is also important. Furthermore, we implement the above framework into hydrodynamical simulation of a galaxy; thereby, we have clarified how the star formation law (relation between the surface densities of molecular gas and star formation rate) changes as a function of galaxy age and metallicity.

S3.9: Star-Formation Properties of Red Spiral Galaxies

Jen-Chao Huang (NCU)

We investigated the spectroscopic properties and environments of red spiral galaxies selected from the Galaxy Zoo 2 project. The star-formation activities and stellar ages of these red spirals are between those of normal spiral galaxies and elliptical galaxies. We found that the red spirals tend to be in high density regions and have similar bar-fraction to normal spirals. We also discussed the possible process to form the red spirals and the roles of these red spirals in galaxy evolution.

S3.10: Cosmic rays in starburst protogalaxies

Ellis Owen (University College London)

Star-forming galaxies are complex multi-phase, multi-component systems, where cold dense molecular clouds and clumps, hot tenuous Lyman-alpha emitting gas and energetic thermal and non-thermal charged particles are found to co-exist. Recent observations have indicated that many star-forming galaxies, nearby and far away, are enveloped by a Lyman-alpha halo. These Lyman-alpha halos could be produced by interactions between ambient gases and energetic non-photonic particles, i.e. cosmic rays, or by shock heating generated by ongoing star-forming activities in the galaxies. This talk will address the interplay of interactions between high-energy cosmic-rays, X-rays, ionised and partially ionised gases and the dense media in starbursting protogalactic environments. We calculate the energy deposition by cosmic-rays, X-rays and stellar radiation when they propagate through the galaxy of their origin to the host environment. We show how energy transport is regulated by the evolution of the galaxy and we demonstrate how the energy deposition affects the thermal conditions of the host galaxy and the region where it resides. We argue that combining the information obtained from high-energy (e.g. gamma rays via Fermi and IACTs, X-rays via XMM-Newton/Chandra), medium-energy (e.g. optical/IR via large ground-based telescopes) and low-energy (e.g. molecular lines via ALMA and other millimeter interferometers) studies will allow the evolution of complex interactions between the different phases of media in galaxies to be tracked over cosmic time.

S4.1: SCUBA2 Lensing survey

Tomo Goto (NTHU)

Strong gravitational lensing is a powerful tool to investigate faint, distant galaxies. With a large magnification factor (μ; e.g., $\times$100), one can observe very faint galaxies, that cannot be observed unless gravitationally magnified. A factor of 100 magnification corresponds to having a factor of 100 larger telescope in diameter. However, such strongly-lensed sources need specific geometric configuration with a massive lens object. Therefore, they are rare, and difficult to be found. Sub-millimeter (submm) observation is a powerful tool to find strongly-lensed sources. Due to the negative k-correction of the Rayleigh-Jeans tail of the dust component spectral energy distribution (SED), submm flux stays bright even at the distant Universe. To find new gravitational lens, we have been performing a SCUBA2 survey of massive clusters with M $> 6 \times 10^{14} M_{\odot}$. So far, we have observed 136 of such clusters with SCUBA2. We successfully found 12 lens candidates, for several of which we have taken submm spectra with IRAM 30m telescope. Here, we report our results obtained so far, andthe progress of the project.

S4.2: AGN selection by SED fitting in AKARI NEP deep field

Ting-Chi Huang (NTHU), Tomotsugu Goto (NTHU)

Understanding cosmic black hole (AGN) accretion history is one of the major goals of astronomy. However, AGNs are often obscured by gas and dust and those obscured AGNs tend to be missed in optical, UV and X-ray observations. Mid-IR light can help us recover them in an obscuration free way due to their thermal emission. On the other hand, SFG (Star-Forming Galaxy) also has strong PAH emission lines in mid-IR. Hence, establishing an accurate method to separate populations of AGN and SFG is important. However, in previous mid- IR surveys, only 3 or 4 filters were available, and thus the selection was limited. We have developed an efficient AGN (Active Galactic Nucleus) selection method using SED (Spectral Energy Distribution) fitting in mid-IR (mid-infrared). We combined AKARI' s continuous 9 bands with WISE and Spitzer space telescope data, to create 18 mid-IR bands SED for AGN selection. Our result has been tested by investigating stack median flux, and by comparing with X-ray data from Chandra and WISE' s color box selection. Our method successfully recovered those obscured AGN missed in previous studies.

S4.3: Maximum Halo Acceleration in Galaxies

Yong Tian (NCU), Chung-Ming Ko (NCU)

Halo acceleration of galaxies can be considered as the difference between the observational and baryonic acceleration. We confirmed the existence of maximum halo acceleration (MHA) in 153 disk galaxies (McGaugh et al. 2016) and 493 elliptical galaxies (Dabringhausen & Fellhauer 2016), which occurs around 10^{-10} ms^{-2}. The result is sensitive to the specific form of radial acceleration relation. Thus, MHA provides a proper test of different theoretical models. Moreover, both dark matter model and modified Newtonian dynamics can explain the MHA.

S4.4: Dark Matter in Galaxies and Galaxy Clusters

Chorng-Yuan Hwang (NCU)

We study constraints imposed on dark matter distributions from observations of a few galaxies and galaxy clusters. We investigated the central mass distributions for a few galaxies using CO observations of the Atacama Large Millimeter and sub-millimeter Array (ALMA). We found that there is a huge amount of invisible dynamical mass in the central regions of these galaxies. We note that this invisible mass is difficult to explain with the conventional Modified Newtonian Dynamics (MOND) model, which is only applicable at low acceleration regime. We also used the detection upper limit on diffuse radio emission in a sample of galaxy clusters to put constraints on the properties of neutralino dark matter. We examined the constraints on the parameter space of Minimal Supersymmetric Standard Model (MSSM) and the minimal Supergravity (mSUGRA) scenarios by using the Darksusy package.

S5.1: Rapid Oscillation of Gravitational Constant in the Scalar-Tensor Theory of Gravity: the early-time constraints on its induced energy density from cosmology

Po-Wen Chang (NTU), Je-An Gu (Leung Center for Cosmology and Particle Astrophysics)

In the scalar-tensor theory of gravity, the concept of gravitational constant G can be replaced with a scalar field non-minimally coupled to gravity. It turns out to be an additional degree of freedom compared to general relativity and is possible to induce periodic oscillations in G by a homogeneous and isotropic massive scalar field ϕ. In this research, we

show that the equation of motion of ϕ can be cast into a fairly graceful formula and the dissipation rate of its effective energy density could behave differently during the cosmic evolution, which depends on the strength of non-minimal coupling, mass of ϕ and the cosmic expansion rate. Realizing the dynamics of ϕ, we find that we could obtain a loose upper bound of the effective energy density from cosmology by assuming specific properties of the G oscillation at present. We then give phenomenological constraints on the effective energy density in a broad parameter space. The constraints could be served as a potential guide to construct the models with non-minimal coupling.

S5.2: Cosmological simulation with dust evolution

Kuan-Chou Hou (ASIAA/NTU), Shohei Aoyama (Osaka University/ASIAA), Hiroyuki Hirashita (ASIAA), Ikko Shimizu (Osaka University), Kentaro Nagamine (Osaka University)

Dust enrichment is one of the most important aspects in galaxy evolution. The evolution of dust is tightly coupled with the nonlinear evolution of the ISM including star formation and stellar feedback, which drive the chemical enrichment in a galaxy. Numerical hydrodynamical simulation provides a powerful approach to studies of such nonlinear processes. In this work, we present a cosmological simulation using smoothed particle hydrodynamics (SPH) with dust evolution. We consider dust production in stellar ejecta, destruction in supernova shocks, dust growth by accretion and coagulation, and dust disruption by shattering for the processes driving the dust evolution. We also treat the evolution of grain sizes distribution by representing the entire grain radius range by small (< 0.03 μm) and large (> 0.03 μm) grains. We show that our cosmological simulation allows us to examine the dust mass function and to analyze the dust abundance and dust properties in galaxies statistically. Besides, we also examine the redshift evolution of dust content in galaxies. In particular, we show how the relation between dust abundance and galaxy properties (such as stellar mass and star formation activity) evolves as a function of redshift. The above predictions could be tested by ALMA up to high redshifts.

S5.3: CO Luminosity-Linewidth Correlation and Its Possible Utilization in Cosmology

Yi-han Wu (NTHU), Tomotsugu Goto (NTHU)

The evolution of dark energy has been an important topic in cosmology. Distance measurements of luminous objects at high z can provide a clue on its evolution and dynamical properties. Galaxies in CO survey can be a reliable tool since the observation can reach high z (z 6). The empirical relation between CO luminosity (L‘CO) and the linewidth (FWHM) has been proposed in the literature. The goal of this study is to investigate (i) the existence of L‘CO-FWHM correlation and (ii) if L‘CO-FWHM correlation evolves with respect to z. We compiled published CO data in 1-0 transition from the literature, both at low ($0 < z < 0.07$) and high ($z > 1$) redshifts, to avoid the uncertainty caused by different CO transitions. Lambda CDM model was adopted in our analysis. After the considerations of the line width correction and the mu (magnificent factor) correction, we separately established L‘CO-linewidth correlations with the low and high z samples for comparison. We found that both correlations are quite significant and consistent with power-laws. Furthermore, the two correlations seem to be compatible, implying no significant evolution of the relation. Finally, we try to use the relation to estimate the distances to galaxies, and to create a Hubble Diagram. The comparison with the cosmological models demonstrates a potential use of CO galaxies as a cosmological tool.

S5.4: Using mHz QPOs to put constraints on neutron star size and equation of state

Holger Stiele (NTHU), Wenfei Yu (SHAO), Albert Kong (NTHU)

We performed a variability study of archival XMM-Newton data of 4U 1636-536, a neutron star (NS) low mass X-ray binary, and investigated the energy dependence of its low frequency variability. Here we present the results of our waveform analysis and phase resolved spectral investigations of the mHz quasi-periodic oscillations (QPOs). Our study showed that the oscillations are not caused by variations in the blackbody temperature of the NS, but revealed a correlation between the change of the count rate during the mHz QPO pulse and the spatial extent of a region emitting blackbody emission. The maximum size of the emission area allowed us to obtain a lower limit on the size of the NS that rules out equations of state that prefer small NS radii.

E1.1: 民國初年的通俗天文學：以《婦女雜誌》及其他期刊為例

Hsiang-Fu Huang (Institute of Modern History, Academia Sinica)

《婦女雜誌》是上海商務印書館於 1915 年至 1931 年間發行，標榜以女性為訴求讀者的綜合性雜誌。無論就發行時間、規模及全國影響力而言，《婦女雜誌》皆是當代婦女期刊中的佼佼者，也成為探討近代中國婦女論述、女權運動及社會文化變遷的絕佳史料。過去對《婦女雜誌》的研究，鮮少分析其啟蒙讀者自然科學知識的角色。事實上，《婦女雜誌》內容有許多譯介或原創的通俗科學文章，涵蓋理化、生物、天文、算學等學科，及各種與家政相關的實用知識。天文學在其中佔的比例雖然不高，但也偶有佳作，例如「淺識薄技號」(1929) 中的大篇幅介紹。這些通俗文章的作者背景廣泛，包括編輯、翻譯、教員，甚至在學中的學生，但大多不是受過科學專業訓練的專家。這種文化啟蒙現象普遍呈現在《婦女雜誌》及當代其他期刊。它們所引介、詮釋的科學知識，不但反映當代知識分子改良女子及家庭教育的期望，也顯示「科普」在民國初年複雜多元的樣貌。Popular astronomy in early Republican China: the cases of The Ladies' Journal (Funü zazhi) and other periodicals The Ladies' Journal (Funü zazhi), published by the Commercial Press in Shanghai from 1915 to 1931, was the most pre-eminent women's magazine in early twentieth-century China. In addition to discussing women's issues, the journal also aimed to promote "useful" scientific knowledge to female readers. It contained a wide spectrum of popular science coverage ranging from chemistry to horticulture. Although astronomy was not a frequent subject featuring in the journal, there were occasionally well-written astronomical articles. Most of the authors or translators were non-elite popularizers rather than specialists who received formal scientific training. This cultural enlightenment phenomenon was common in many other contemporary magazines. The development of the science coverage in The Ladies' Journal reflects the complexity of popular science in early Republican Chinese society and culture.

E1.2: 社區大學創齡學習者天文教學的適性探討 - 以 3D 與 VR 天文教學為例

Jim Ching-Chuan Hung (TAM)

高齡化社會已來臨，高齡者參與終身學習是樂齡、創齡的必要過程。高齡者因生理、心理及社會等因素，在學習的內容及教學課程設計與實施上，都有其特殊性，有別於一般成人教育或學校教育，故在安排高齡者教學環境的條件時須多方配合。本研究主旨在探討創齡學習者的學習問題，以台北市兩所現有開設天文觀測課程的社區大學之創齡學習者為對象，發展並檢討其適性化的教學目標。高齡者接受教育或訓練的主要目的在於鍛鍊身心健康，延緩老化，節省國家醫療資源，愉悅地過晚年生活，有能力的老人擔當台北天文館志工繼續貢獻社會或從事有酬工作，而經濟能力佳的高齡者可以天文觀星休閒娛樂為生涯規劃主軸。提供符合需求之天文學習課程為吸引老人參與天文學習的基本條件之一，但設計符合需求的課程內容並不能等於有效增進學習者的參與性。高齡者參與學習知識的原因，有“解決發展任務需求”、“提高生活品質”、“發展智慧結晶”等各種面向。

為正視高齡者的學習問題，高齡者教育與學習之內容應包含多元面向的範圍，例如一般天文學知識性內涵：天文觀測技能、天文攝影知識、天文與人文性靈修養、寒冷低壓環境養生常識、現代網路數位科技生活適應等較專業深入之知識。規劃設計高齡者學習課程內容，學習需求因素只是設計課程時部份參考的依據。終身學習社會已來臨，老人學習是社會進化的指標，老人參與適性學習課程，以具彈性化的學習課程教材，彈性化教學互動，必能使老人學習更有趣，能使教學活動更能符合預期教學效果，適性化的教材及教學，例如將 3D 與 VR 融入天文觀測教學，的確能有效提升學習效果。

關鍵字：創齡者學習、社區大學、適性化教學、發展任務、3D 與 VR 融入天文教學、臺北市立天文科學教育館

E1.3:「民眾天文科學態度、學習態度與學習動機」研究初探 -以參觀臺北天文科學教育館民眾為例

王志明 *(TAM)*, 林琦峰 *(TAM)*

「民眾天文科學態度、學習態度與學習動機」研究初探-以參觀臺北天文科學教育館民眾為例王志明研究助理、林琦峰副研究員 *、洪景川研究助理、王心怡解說員 chifeng@tam.gov.tw 摘要臺北市立天文科學教育館（以下稱天文館）完成自編問卷「民眾對天文科學態度、學習態度與學習動機問卷調查表」，本問卷問題包含天文科學態度層面 6 題、學習態度層面 5 題、學習動機層面 8 題，合計 19 題，問卷的整體 α 值達 0.8214。透過本問卷以參觀天文館民眾為對象，進行抽樣問卷調查，合計回收有效問卷 1058 份。問卷結果顯示，天文科學態度向度結果，以「我認為天文科學對人類而言，是有幫助的」平均數 4.36 達最高；學習態度向度結果，以「我認為學習天文科學過程中，最重要的是學到解決問題的方法」之平均數 3.95 達最高；學習動機向度結果，以「我認為學習天文科學主要能擴展我的知識」平均數 4.29 達最高。另外，發現男性的科學學習動機高於女性統計結果顯示男性的科學學習動機高於女性，且達顯著差異，故往後科學教育活動建議可設計較能吸引女性參加的誘因，在活動舉辦時能適時鼓勵女性參與。研究也發現「趣味」是引起民眾參與的主要動機，未來在相關活動的設計上，可以朝「趣味」和「應用在生活中」發展，除了可以引起民眾的學習興趣之外，更可以運用在日常生活中，讓生活學習化、學習生活化，落實學以致用。

關鍵字：臺北市立天文科學教育館、天文科學態度、學習態度與學習動機

E1.4: From offline to online: Science Edu-Communication in Taipei Astronomical Museum

胡佳伶 *(TAM)*

博物館教育一直是非制式科學教育中相當重要的一環，更不能自科學傳播的新浪潮中缺席。在這兩個領域之中，不僅是科學教育的學習理論逐漸自獲得/轉移模型轉換為參與/建構模型，科學傳播也自缺失模型走向對話模型。新興的博物館學研究更是認為博物館正面臨極大的觀念革新，由傳統詮釋展品資訊的單向傳遞，轉換為互動性的敘事溝通。我們不難看見，「參與」是這三項轉變的共同關鍵性元素。我們希望以臺北天文科學教育館做為實踐的場所，探討博物館如何利用新形態的科學教育傳播途徑，從線下到線上，達成教育、娛樂和參與的重要目標。

A. Stars

PS01: Finding new Cepheids in the open clusters with their location in the color-magnitude diagram – tests with existing data and known Cepheids

Shih-Chang Luo (NCU), Chow-Choong Ngeow (NCU)

Cepheids in open clusters can be used to calibrate the period-luminosity relation. Currently there are 30 Cepheids found in the open clusters, in comparison there are more than 1000 open clusters in our Galaxy. The goal of our project is to find new Cepheids in the open clusters, by using their location in the color-magnitude diagram (CMD). To test our method, we first construct the CMD for the 14 open clusters that host Cepheids by using the cluster data from WEBDA and 2MASS. Then we find 10 candidate clusters that probably have Cepheids and attempt to analyze their BVRI data of SLT in Lulin Observatory. In this Poster, we will present our preliminary test results, as this is an on-going work.

PS02: Flare morphology of M dwarfs from Kepler short cadence data

Han-Yuan Chang (NCU), Wei-Jie Hou (NCU), Chia-Lung Lin (NCU), Li-Ching Huang (NCU), Wing-Huen Ip (NCU)

M dwarfs are known to be magnetically active displaying impulsive energy release effects in terms of stellar flares. According to our previous study (Chang et al 2016.), flare occurrences are highly related with the stellar spin period. Fast rotators (spin period < 20 days) are often found with super-flares or even hyper-flares (> 100% stellar luminosity). To further investigate the hyper-flare phenomena, we extend our sample by selecting 4000 M dwarfs with Teff between 2500 to 3900 and Log(g) larger than 4. We using the short cadence data (1 minute for 1 data point) from Kepler to investigate the detail morphology of each flare events. And we found there are some events happened at the same time to form the multiple flare. The detail will be present in the conference.

PS03: Multi-wavelength Characterization of Type Ia Supernova Remnants

Po-Sheng Ou (ASIAA), You-Hua Chu (ASIAA), Chuan-Jui Li (ASIAA)

Few Type Ia supernova remnants (SNRs) in the Milky Way are known; however, more than 10 Type Ia SNRs have been identified in the Large Magellanic Cloud (LMC). Due to the small distance to the LMC, 50 kpc, physical properties and stellar environments of SNRs can be well resolved and studied. We use the LMC sample of SNRs to characterize and compare the properties and environments of Type Ia and core-collapse SNRs. More specifically, we examine their optical morphology, nebular spectra (whether Balmer-line dominated or not), X-ray luminosity, and stellar environment. In this poster, we characterize the physical properties of Type Ia SNRs in the LMC so that these properties can be used to identify Type Ia SNRs in nearby but more distant galaxies. A complete sample of Type Ia SNRs in a galaxy will allow us to determine Type Ia supernova rate, while the youngest (Balmer-dominated) SNRs can be used to search for surviving companions of their supernova progenitors.

PS04: The Link Between the Polarization and Blueing Effect of the UXOR Type Young Star GM Cephei

POCHIEH HUANG (NCU), CHANG-YAO CHEN (NCU), Chia-Ling Hu (TAM), Shuhrat Ehgamberdiev (Ulugh Beg Astronomical Institute, Uzbekistan), Otabek Burkhonov (Ulugh Beg Astronomical Institute, Uzbekistan), Jinzhong Liu (XingJiang Astronomical Observatory, CAS, China), Erika Pakstiene (Institute of Theoretical Physics and Astronomy, Vilnius University, Lithuania), Jan Kåre Trandem Qvam (Horten Secondary-school, Norway), Wen-Ping Chen (NCU)

UX Orionis stars, or UXORs, are a sub-type of Herbig Ae/be or T Tauri stars exhibiting sporadic extinction of stellar light due to circumstellar dust obscuration. GM Cep is such a UXOR in the young (4 Myr) open cluster Trumpler 37 at 900 pc, showing prominent infrared access, H-alpha emission, and flare activity. Our multi-color photometric monitoring from 2009 to 2017 showed (i) sporadic brightening on a time scale of days due to young stellar accretion, (ii) cyclic, but not strictly periodical, occultation events, each lasting for a couple months, with a probable recurrence time about two years, (iii) normal dust reddening as the star became redder when dimmer, with unusual color behavior near the brightness minima when the star appeared bluer when dimmer (the "blueing" phenomenon), (iv) moderate polarization from 4% to 9% in g, r, and i bands, with the level of polarization anti-correlated with the brightness in the bright state. The occultation events may be caused by an orbiting dust clump, or a string of dust clumps along one of the spiral arms in the protoplanetary disk. In either case, the clumpy disk of GM Cep signifies the density inhomogeneity in a young stellar disk from grain coagulation to planetesimal formation. We will present the follow-up photometry and polarization results of GM Cep, together with the discussion of the polarization behavior in the wavelength dependence and variation during the different phase of the star.

PS05: Searching for Be Stars in 104 Open Clusters

Chang-Hsien Yu (NCU), Chan-Kao Chang (NCU), Chien-Cheng Lin (Shanghai Astronomical Observatory), Chien-De Lee (NCU), Chih-Hao Hsia (Macau University of Science and Technology), Chow-Choong Ngeow (NCU), Po-Chieh Yu (NCU), Wing-Huen Ip (NCU)

The comprehensive survey of Be stars in star clusters of different ages is crucial to understand the formation and evolution of Be stars. We used H-alpha photometry of the Palomar Transient Factory (PTF) to search for Be stars in 104 open clusters. The procedure is as follow: Firstly, H-alpha emitters are selected by using the PTF on-line (Ha656) and off-line (Ha663) photometry. Secondly, the radial density profile, the near-infrared color-magnitude diagram, and the proper motions (PMs) are adopted to identify their memberships. Thirdly, the J-H and H-Ks colors are used to determine Be candidates. In total, we identified 96 Be candidates in 32 of 104 open clusters. Our preliminary results are summarized below: (1) The Be fraction of most clusters with Be stars is below 10%; (2) The clusters with age between $10^{7.5}$ - $10^{8.5}$ years have high probability to form Be stars; (3) No mass segregation effect can be found with different ages; (4) Most Be candidates have Mid-infrared color excess, which is similar to known Be stars. We have used SED-machine, BAO 2.16m, BOAO 1.8m, NHAO 2m, YNAO 2.4m and Lulin One-meter telescopes to confirm Be candidates spectroscopically.

PS06: H-BAND TIME-SERIES OBSERVATIONS OF CLASSICAL CEPHEIDS IN M33

Chien-De Lee (NCU), Chow-Choong Ngeow (NCU)

Cepheid variables are crucial standard candles for distance estimation from intragalactic to intergalactic scale. A precise and accurate measurement of distance beyond our Milky Way narrows down the error budget of Hubble constant determination and better constraining the properties of dark energy. M33 is the second nearest major galaxy harboring

at least several hundreds Cepheids with plentiful data in optical wavelengths. Therefore, M33 deserves to be on the list of the primary anchoring galaxies. However, the near-infrared observation is very sparse, despite it provides advantages including less effect of extinction and small-amplitude light curve making mean magnitude estimation easier. Here, we present a preliminary result of the long period Cepheids in M33 and their mean magnitude in H-band WIRcam on the CFHT.

PS07: Testing and observing the SSP-4 NIR-photometer on Cepheids at Lulin and NCU observatories

Shiuan-Wen Luo (NCU), Chow Choong Ngeow (NCU), Chien De Lee (NCU), Hung-Chin Lin (NCU)

It has been demonstrated in previous research that the classical and Type II Cepheids can be distinguished from their optical light curves. Our research is about exploring the possibility to separate these two groups of variable stars in near-infrared bands. I use the SSP-4 photometer to observe a number of bright Galactic and Type II Cepheids in JH-band. This photometer will output the counts of standard stars and variable stars. Because the output counts is linearly proportion to the flux, we can calibrate the apparent magnitude by the method of linear regression. We had done several tests on the SSP-4, and we found that this instrument can be influenced by environmental temperature (for example, the observer can affect the output counts by just standing near the instrument). In order to fit the light curve of our targets, we need to get about 20 data points per light curves. We choose the two sites for our observations on Cepheids: one is at Lulin Observatory with LOT (Lulin One-meter Telescope), the other one is NCUO (National Central University Observatory) with the 24-inch telescope. Because the weather condition is very different on these two sites, we can compare the data of observations between them. On the other hand, the data from NCUO can be use to complement the data taken with LOT. In our Poster, we present our preliminary result on the J-band light curve for a Galactic classical Cepheid, RT Aur, based on our SSP-4 observations at Lulin Observatory and NCUO. Keywords: Cepheids, Light curve, Near-Infrared, Photometer, Lulin Observatory

PS08: Boundedness of binary systems in time varying potential

Sih-Sian Fong (NCU), Chung-Ming Ko (NCU)

We study binary systems of two point masses in time varying potential. We explore the conditions under which the binary system becomes unbound. We consider two cases. In the first case, the binary system is “isolated”, while mass loss occurs in one or both masses. In the second case, the binary system is located inside a potential well which becomes shallower and shallower with time. The first case represents a rudimentary model of the fate of a binary system when one of the stars (or both) entering its late or final stage with massive mass loss rate. The second case is an extremely primitive representation of an embedded star cluster inside a dispersing cloud.

PS09: Refining period of a Mira in M33 with multi-band analysis.

Jia-Yu Ou (NCU), Chow-Choong Ngeow (NCU)

[HBS 2006] 40671 is a confirmed long period Mira found in M33. Using observed light curves from Hartmann et al (2006) data, Barsukova et al. (2011) found a period of 665 day for this Mira. In addition to Hartmann’s data (2005 2006), we also collected PTF (Palomar Transient Factory) data taken from 2009 to 2016. Combining these two datasets that spanned 10 years we can refine the period of this Mira. The preliminary results show that the period of [HBS 2006] 40671 could be 503 days. In addition to Hartmann’s data and PTF data in R band, several nights of LOT data were

collected in R band and I band. We combined these datasets spanned in different bands and refine the period further using the multi-band Lomb-Scargle method and the method proposed in He et al. (2016). We also collected a number of confirmed Miras in I band with periods similar to our target in LMC and SMC from OGLE database to compare to our target. According the Mira of OGLE database we found majority of Miras are multi-periodic, hence we also tried to find out the additional periods with our method. In this poster, we present our lasted investigation on the period refinement of this Mira.

PS10: Superflares relationship with rotational phase of G-type stars

Wei-Jie Hou (NCU), Han-Yuan Chang (NCU), Chia-Lung Lin (NCU), Wing-Huen Ip (NCU)

Solar flare was suggested to be related to the sun-spots based on previous observation of our sun. Superflares(flares with energy > 10^{33}erg) was also observed in extrasolar system (Hiroyuki et al. 2012). To investigate the relation between superflares and the rotation phase, we selected 77 G-type stars from Kepler measurements with well-defined light curve periodicities from previous study (Wu et al. 2015). We use the rotation period to transform the light curve into the phase to check which phases were the flares occurred. However, no relation can be found. The flares occur in any phase on the stellar rotation.

PS11: Coaxial rings and H2 knots in Young Planetary Nebula Hubble 12

Chih-Hao Hsia (1. Space Science Institute, Macau University of Science and Technology, Macau), Yong Zhang (2. Laboratory for Space Research, Faculty of Science, The University of Hong Kong, Hong Kong), Wing-Huen Ip (1. Space Science Institute, Macau University of Science and Technology, Macau)

Hubble 12 (Hb 12) is a member of the rare group of planetary nebulae (PNs) exhibiting nested shells. We present new near-infrared narrow-band imaging observations of Hb 12 using Canada-France- Hawaii Telescope (CFHT). Combining Hubble Space Telescope optical imaging and CFHT observations, co-axial rings aligned with the bipolar lobes and two pairs of H_2 knots with different orientations are found. These rings are thought to be the manifestation of a time-variable, collimated fast wind of bipolar lobes interacting with surrounding asymptotic giant branch circumstellar medium. The existence of H_2 knots with different orientations suggests that this PN hosts a bipolar, rotating, episodic jet (BRET). We also constructed this object by a three-dimensional (3D) model, and find that this PN might have intrinsic structures similar to the other multipolar PNs, Hen 2-320 and M 2-9.

B. Extragalactic Studies

PS12: Properties of spectrally-defined red QSOs at z=0.3-1.2

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

We investigated the properties of a sample of red QSOs using optical, radio, and infrared data. These QSOs were selected from the SDSS DR7 quasar catalog. We only selected sources with sky coverage of the VLA FIRST survey, and searched for sources with the WISE counterparts. We defined the spectral color of the QSOs based on the flux ratio of the rest frame 4000A to 3000A continuum emission. In accordance with this criterion, only QSOs with redshifts between 0.3 and 1.2 could be selected. We found that the red QSOs (especially for radio-loud QSOs) exhibited stronger infrared emissions than the typical QSOs did. However, the red QSOs at high redshifts had a low population than the red QSOs at

low redshifts had, yet the typical QSOs showed inverse population distribution along the redshifts. Furthermore, at high redshifts, the luminosity distribution of the typical QSOs and the red QSOs seemed to exhibit similar patterns. However, at low redshifts, the red QSOs showed a different luminosity distribution than that of the typical QSOs. These findings suggest that there might have been at least two types of red QSOs in our samples.

PS13: The Properties of Barred Spiral Galaxies

Ying-Fang Wang (NCU), Chorng-Yuan Hwang (NCU)

We studied the properties of barred spiral galaxies and non-barred spiral galaxies in the field. We selected 351154 galaxies in the field from the Sloan Digital Sky Survey Data Release 12 (DR12) with redshifts between 0.001 and 0.1. We considered a galaxy as a barred spiral galaxy if the source has a barred spiral vote fraction greater than 0.5 in the Galaxy Zoo 2; we considered a galaxy to be in the field if the galaxy has less than 100 neighbors galaxies within 1 Mpc. Our results show that there is a positive correlation between the ratios of barred spirals to non-barred spiral galaxies and the numbers of their neighbor galaxies independent of their redshifts. Our results also show that there are higher fractions of AGN-host galaxies in the bar- spiral galaxies than in the non-barred ones independent of their companions. These results indicate that bars might play a important role in triggering AGNs. On the other hand, the fractions of AGN-host galaxies in non-barred spiral galaxies highly depend on their companions, suggesting that the AGNs in the non-barred spirals might be triggered by galaxy interactions.

PS14: The Relation of Mid Infrared and Radio Emission in Narrow-Line Seyfert 1 Galaxies

Meng Che Hsieh (NCU), Chorng Yuan Hwang (NCU)

We investigated the relation of mid-infrared (MIR) and radio emission in narrow-line Seyfert 1 (NLSy1) galaxies, using the data from the Sloan Digital Sky Survey (SDSS), the Wide-Field Infrared Survey Explorer (WISE), and the Faint Images of the Radio Sky at Twenty cm (FIRST). We found that there is a positive correlation between the 22μm MIR (W4) and the 1.4GHz radio (FIRST) emission. Also, the correlation exists between the 22μm MIR (W4) and the [O III] emission. Next, we used GALFIT to decompose the NLSy1 galaxies into three components, and we found that the radio emission for the NLSy1 with disk components might be related to star formation activity. Nevertheless, the MIR and the [O III] emission are related to the AGN. Our results suggest that most of the MIR emission is from the central AGNs.

PS15: Color Variabilities of QSOs at z < 1.2

Young-Tzee Loke (NCU), Chorng-Yuan Hwang (NCU)

The QSOs phenomenon is thought to be a relatively brief stage of galaxy evolution (Martini & Weinberg 2001; Kelly et al. 2010). They are believed to be an active galactic nucleus (AGN), it can be explained by the unification model (Urry & Padovani 1995). An AGN is described as a central supermassive black hole surrounded by an accretion disk. We further study the color variabilities of QSOs at $z < 1.2$ in the poster.

PS16: Alignments of elliptical galaxies in different environments

Jhen-Yu Chen (NCU), Chorng-Yuan Hwang (NCU)

We studied alignments of elliptical galaxies in different environments. Our data were from the Twelfth Data Release of the Sloan Digital Sky Survey (SDSS DR12). We analyzed the galaxy alignments in the filaments, and compared with the alignments of field galaxies. The preliminary results show that when there are fewer elliptical galaxies in the filaments then they have higher probability to align with the filament direction. The alignment was broken when the galaxy density is high. We discuss the implication of this result in galaxy evolution.

PS17: Populating H_2 and CO in Galaxy Simulation with Dust Evolution

Li-Hsin Chen (ASIAA), Hiroyuki Hirashita (ASIAA), Kuan-Chou Hou (ASIAA), Shohei Aoyama (Osaka University, Japan.), Ikkoh Shimizu (Osaka University, Japan.), Kentaro Nagamine (Osaka University, Japan.)

For the interpretation of observational star formation laws, that is, observed relations between the surface densities of molecular gas and star formation rate on a galaxy scale, there are two major theoretical issues which needs further understanding: (i) At low metallicity, it is not obvious that star-forming places are rich in H_2 because H_2 formation efficiency depends on the dust abundance; and (ii) whether or not CO really traces H_2 is uncertain, especially at low metallicity. To clarify the effect of metal and dust enrichment on the observed star formation law on a galaxy scale, we use a hydrodynamic simulation of an isolated spiral galaxy whose spatial resolution is a few tens pc. In this simulation, we solve the evolution of dust abundance consistently with metal enrichment and physical state of the interstellar medium. We also treat the grain size distribution by separately treating small and large grains. Based on the simulation result, we calculate the H_2 abundance by post-processing assuming the equilibrium between the formation on dust surfaces and destruction by stellar ultraviolet radiation. We also calculate the CO abundance using a subgrid model, utilizing a result of smaller-scale simulations. We find that, at young ages (< 1 Gyr), when the metallicity is mostly $\lesssim 0.4\,Z_\odot$, H_2-rich regions are limited to dense compact regions, while they extend to wider areas as the galaxy evolves. Therefore, the star formation law traced by H_2 is not well established at the low-metallicity stage, which means that H_2 may not be a good tracer of star formation rate in the early epoch of galaxy evolution. At $Z \gtrsim 0.8\,Z_\odot$, a tight star formation law is established both for H_2 and CO. We also find that the grain size distribution is important for both H_2 and CO abundances at early stages, while it is important only for CO at later ($\gtrsim 5$ Gyr) stages. Therefore, as long as we trace the molecular gas with CO, adopting an appropriate grain size distribution is crucial to correctly understand the CO abundnace. For CO, resolving small-scale structures is essential for further improvement while the H_2 abundance is not sensitive to subgrid structures at $Z \gtrsim 0.4\,Z_\odot$.

PS18: Strong gravitational lensing by elliptical galaxies in modified Newtonian dynamics

Shi-Pu Yang (NCU), Chung-Ming Ko (NCU)

Modified Newtonian Dynamics (MOND) is a viable alternative to dark matter paradigm for the missing mass problem in systems of galaxy scale. Recent development in MOND on slightly deformed spherical systems enable us to tackle problems related to elliptical galaxies. We study strong gravitational lensing by elliptical galaxies using relativistic MOND. In this contribution, results of some specific examples in the framework of MOND and GR will be compared.

PS19: Gauss's Law of Gravity with Anisotropic Columnar Flux Distribution to Interpret Flat Rotation Curve and Baryonic Tully-Fisher Relation of Disk Galaxies

Te Chun Wang (私立中山工商)

This report shows that the Gauss's law of gravity with an anisotropic flux distribution on a Gaussian surface of columnar symmetry may well describe the flat rotation curves of disk galaxies. It is pointed out that this columnar Gaussian surface description converts the inverse square radius dependence of the Newtonian gravity into a direct inverse radius dependence, together with an inverse column height dependence. The flat rotation curve condition corresponds to that the gravitational field fluxes flow toward the mass source perpendicularly through the side wall alone and thus strengthen the field and speed up the rotation, compared to the Keplerian motion, within the extended plane of disk galaxies. The disk thickness related properties are examined. Possible consequences and applications of the field strengthening by this anisotropic flux distribution scheme are discussed. The Baryonic Tully-Fisher relation, namely, the baryonic mass is proportional to highest roation velocity to the power of roughly 4, is shown to be satisfied during the gravitational flux distribution switching from the spherical symmetry with a critical radius to the columnar symmetry with a critical thickness, as the field strength drops to a critical value.

PS20: Mock Catalogs for Testing Cluster Detection Algorithms

Sheng-Chieh Lin (ASIAA), Yen-Ting Lin (ASIAA), Masamune Oguri (RESCEU), Bau-Ching Hsieh (ASIAA)

The science of galaxy clusters has been flourishing in modern times due to the successful wide field surveys, such as the Sloan Digital Sky Survey (SDSS), the Hyper Suprime-Cam Subaru Strategic Program (HSC) and the Dark Energy Survey (DES). To study physical properties of these massive galactic systems statistically, mock catalogs are an useful tool for evaluating statistical uncertainties in measurements and quantifying the observational selection bias. We present a set of mock galaxy catalogs designed for the HSC survey. The catalogs are generated using real galaxies identified in the S16A release of HSC and a halo catalog from N-body simulation. Our mock clusters span the redshift from 0.3 to 1.2 with the mass range $10^{13}M_{\odot} < M_{200} < 2 \times 10^{14}M_{\odot}$. To mimic realistic observation conditions, we make use of the HSC galaxy catalog in the COSMOS field as the field population and combine it with our mock cluster galaxies adopting mask regions where no galaxies are in it. We run the CAMIRA algorithm on 90 realizations of mock galaxy catalog and cross-match the result with mock halo catalogs. We investigate the purity and completeness of CAMIRA detected mock clusters, and find that the purity of the CAMIRA catalog on mocks is greater than 0.95, which indicates that most of the clusters detected by CAMIRA are true clusters in mocks. For the completeness, we find that it is correlated to halo masses and halo redshift. The completeness is high at high mass end and starts to drop once halo masses are lower than $1.4 \times 10^{14}M_{\odot}$. Given a halo mass, the completeness is higher at lower redshift and becomes lower at higher redshift.

C. Solar System and Planetary Science

PS21: Lightcurve analysis of 9 asteroids

Hanjie Tan (Chinese Culture University), Bin Li (Purple Mountain Observatory), Xing Gao (Urumqi No.1 Senior High School)

The lightcurves of 963, 1025, 1117, 2019, 17814, NEA 459872, NEA 2017 AG5, NEA 2017 CP1 and NEA 2017 BS32 determined using the images taken at Xingming Observatory (Code C42) from 2016 March through 2017 March. These 9

asteroids in the range of absolute magnitudes H = 11.6-27.3 (diameters approximately 16m-21km). The lightcurves show that the synodic rotation periods for these nine asteroids are ranging from 0.1h to 10h.

PS22: A Study of the Seasonal Variation of the Sublimation Rate of the Sputnik Planum Ice Sheet on Pluto

Hua-Shan Shi (NCU), Wing-Huen Ip (NCU)

The Sputnik Planum (SP) of Pluto is one of the most important discoveries of the New Horizons spacecraft during its flyby observations of the Pluto-Charon system in July 2015. SP is located at the northern mid-latitude hemisphere in the antipodal position to Charon on the opposite side. It contains a large quantity of the nitrogen ice on Pluto, and the content of Pluto's atmosphere is likely controlled by the variable sublimation rate of the SP ice. In this work, we use a coupled treatment of the Clausius-Clapeyron equation and the surface energy balance equation to compute the variation surface temperature and the sublimation rate of SP in the different orbital phase of Pluto. Moreover, we also calculated the total amount of nitrogen gas emitted from the SP during the whole orbital period. This set of model calculations will allow us to explore the range of Pluto's atmospheric content and the corresponding escape dynamics.

PS23: Synchronous Surveillances of Meteor Events using the Taiwan Meteor Detection System

Jun-You Liu (NDHU), Bo-Hao Wang (NDHU), Yi-Ting Lin (NDHU), Jim Lee (TAM), Zhong-Yi Lin (NCU), Hsin-Chang Chi (NDHU)

Taiwan Meteor Detection System (TMDS) is a developing system under a collaboration among National Dong-Hwa University (NDHU), National Central University (NCU) and Taipei Astronomical Museum (TAM). This system aims at capturing meteor instances in the sky surrounding Taiwan. At present, we have established two sites to perform synchronous observations of meteors in the NE direction: One is located at the Lulin observatory of NCU. The other is at Hutian Elementary school inside Yang Ming Shan National park. To summarize, over the period from Aug. to Oct. in 2016, Lulin stations detected 783 meteor events while Hutian marked 197 events. It is noteworthy that 7 simultaneous events recording a common meteor are justified. We apply the triangulation method to calculate the positions and velocities of simultaneously detected meteors. In consequence, orbits of these meteors are determined using the commercial codes UFO Capture and Orbit. With diffraction gratings implemented, the current TMDS framework is capable of achieving meteor illumination spectra. As a matter of facts, around 2% of detected meteor events are concurrently associated with illumination spectra. A forthcoming attempt is to analyze the line profiles of the observed spectra to unearth the compositions of the detected meteors. We are planning to compare the analyzed results including orbits and optical spectrum with the NEAs (Near-Earth Asteroids) observations to unravel the correlations interplayed between the meteor events and the NEAs information. In this report, we will present the radiant as well as orbit information of meteors evidenced from the undergoing TDMS image acquisitions.

PS24: A model study of the vertical distributions and escape fluxes of the major and minor species in Titan's thermosphere under different conditions

Jen-Kai Hsu (NCU), Mao-Chang Liang (ASIAA), Wing-Huen Ip (NCU)

From the measurements of the Ion Neutral Mass Spectrometer (INMS) on the Cassini spacecraft at different close encounters with Titan, it is know that the vertical temperature profile and density distributions of N2, CH4, H2 and other

species could have large variations which might be driven by environmental effects such as solar radiation and magnetospheric interaction. For example, the atmospheric temperature as determined from the N2 density profiles can vary between 120 K and 175 K. Following the treatment of Li et al. (PSS, 104 (2014) 48-58) by applying a non-monotonic eddy diffusivity profile, we compute the vertical distributions of different species between Titan's surface to 2000 km altitude, for a range of atmospheric temperatures. Intercomparison between the model results and observations leads to better understanding of the production mechanisms of the minor species like C2H2, C2H4, C2H6 and others, all important to the hydrocarbon budgets of Titan's atmosphere and surface, respectively. Furthermore, such detailed photochemical calculations will also yield accurate estimates of the escape fluxes of H, H2 and CH4 into the circum-planetary region.

PS25: ALMA Study of Atmospheric Compositions of Jovian Moons Io and Callisto

Ming-Chi Chung (NTNU), Yi-Jehng Kuan (NTNU), Yo-Ling Chuang (NTNU), Yo-Ling Chuang (NTNU), Yu-Fu Yeh (NTNU)

According to the Grand Tack (GT) model, Jupiter is believed to have migrated very close to the Sun. Hence atmospheres of the four Galilean moons were largely destroyed during the GT due to non-thermal XUV-driven atmospheric escape. However, scarce atmospheres remain existent on Galilean moons today. It is thus important to study the chemical compositions of these atmospheres in order to understand their origins. In particular, by probing atmospheric trace components evaporated from the surface, we may infer the likely chemical compositions of the subsurface oceans suspected to exist on the outer three Galilean moons Europa, Ganymede and Callisto. Thanks to the high sensitivity and spatial resolution of the ALMA array, we are now able to resolve the discs of Galilean moons directly. As first steps, we use the archival ALMA data to study the atmospheric compositions of Io and Callisto, respectively, the innermost and outermost Galilean moons orbiting around Jupiter. Because of its closeness to Jupiter, Io is the most geologically active body in the solar system. Io's surface appears mainly in yellow, black, white and orange colors due to sulfide compounds ejected from volcanic eruptions. Sulfide compounds from volcanic plumes are also present in Io's atmosphere. On the other hand, Callisto is about 1,880,000 km away from Jupiter, hence it is least affected by Jupiter tidally among four Galilean moons. Unlike Io, Callisto's atmosphere is thought to be formed mainly due to sublimation of icy volatiles on its surface. Preliminary results obtained from our high spectral resolution ALMA study indicate the existence of sulfide compounds (SO, SO_2 and $^{34}SO_2$) and potassium chloride (KCl) in Io's atmosphere. A hint of likely existence of ethanol in Callisto's atmosphere is seen but it requires observations of more C_2H_5OH transitions for confirmation.

PS26: In search of the methane gas torus of Titan

Chin-Min Yang (NCU), Wing-Huen Ip (NCU)

Titan which is the largest moon of Saturn has a very thick nitrogen atmosphere containing a small amount of methane (CH_4) gas. The CH_4 escape flux via either Jeans escape or non-thermal process is still under debate. To shed light on this problem we have developed a neutral gas cloud model coupled with photolytic effects of the methane-group molecules (i.e., CH_4, CH_3, CH_2 and CH ....) with a view to estimate the number densities of these neutral molecules and the production rates of the corresponding ions. Our results would be useful for intercomparison with the magnetospheric ion measurements by instruments onboard the Cassini orbter.

PS27: A Pilot Study of the Asteroidal Rotation Period Distribution based on High-Cadence Observations of the CNEOST Telescope at Xu-Yi

Ting-Shuo Yeh (NCU), Chan-Kao Chang (NCU), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU), Bin Li (Pruple Mountain Observatory, NanJing, China.), Hai-Bin Zhao (Pruple Mountain Observatory, NanJing, China.)

The size dependence of the asteroidal rotation period distributions can yield very important information on the interior properties and dynamical evolution of these primitive solar system bodies. This is the major focus of our cross-strait bilateral cooperation with the Purple Mountain Observatory, CAS, which main optical facility is the CNEOST (Chinese Near-Earth Object Survey Telescope) at Xu-Yi. The CNEOST is a 1.2 m wide-field (FOV=9 sq. deg.) telescope equipped with a 4K x 4K CCD with asteroid observations as its main task. Within the framework of this cooperative project, CNEOST carried out high-cadence (8 min) photometric measurements over a field of 40 sq. deg. between Feb. 27 and March 2, 2017. Preliminary data process showed that about 1000 light curves of good quality were obtained in this pilot project. Quantitative analysis of the rotation periods is still ongoing and the statistical results will be reported. It is our plan to perform such high-cadence observations in a routine fashion in the next few years to improve significantly our understanding of the relationship between the rotational dynamics and the physical properties of the asteroids.

PS28: Search for extremely recent break-up events of small solar system bodies

Daisuke Kinoshita (NCU)

Break-up events of small solar system bodies are common and frequent phenomena in solar system. The power-law index of the size-frequency distribution of these bodies are found to be ~ 3.5 which is indicative of steady-state collisional cascade. Tidal break-up at close encounter to a planet and YORP spin-up are also considered as mechanisms for split of bodies. Although small solar system bodies are thought to be remnants of planetesimals, their surface is altered by irradiation of ultraviolet radiation and energetic particles. Thermal metamorphism is also attributed for surface alteration. Break-up events may expose unaltered sub-surface of precursor objects, and these freshly exposed area of fragmented bodies are suitable target to study primordial material of solar system. In this point of view, it is scientifically meaningful to search for extremely recent break-up events and identify very young surface on small solar system bodies. Recent cyclical sky surveys, such as Pan-STARRS, is dramatically increasing number of known objects. A trial of search for recent break-up events by backward orbital integrations of known objects is reported. Candidates of fragments are characterized by photometric measurements by Palomar Transient Factory, and photometric phase curves are also presented for some objects.

PS29: Intercomparison of the Size –Rotation Period Relations of Different Taxonomic Types of Asteroids

Zhi-Xuan Zhu (NCU), Chan-Kao Chang (NCU), Yu-Chi Cheng (NCU), Hsing-Wen Lin (NCU), Wing-Huen Ip (NCU)

The size-rotation period relation of asteroids plays a key role in probing the internal properties of these primitive bodies. The existence of a spin-cutoff at about 2.2 hours has been interpreted to be the physical consequence of gravitationally bounded rubble-pile structures of the asteroids. Because different types of asteroids should have somewhat different bulk densities and albedos, their corresponding size-dependence of the rotation period distributions could be different. Following the work of Chang et al. (ApJ Supp. Ser., 219:27, 2015), we include the X-type asteroids into this consideration by comparing the light curve data of PTF and the albedo measurements of the NEOWISE mission. We are particularly interested in the M-type objects of nickel-iron composition from this point of view.

PS30: Lulin Photometric Survey for Taxonomic Classifications of Near-Earth Asteroids

Chung-Chien Cheng (NDHU), Yi-Chuan Lin (NDHU), Jing-Ting Shi (NDHU), Meng-Yi Sie (NDHU), Zhong-Yi Lin (NCU), Hsin-Chang Chi (NDHU)

The near Earth asteroids (NEAs) have close relation with the Earth and human being. At the later stage of the Earth formation, the surface of Earth was heavily affected by very large collisions of NEAs. Nowadays, hitting events by NEAs are still happening but only about 10 percent of NEAs have been investigated in detail. A systematic observations programs for physical studies of asteroids therefore is necessary. Since 2013, Lulin observatory started its ambitious work to produce a comprehensive database of NEAs. In this work, we will present the results of NEAs' multicolor photometric measurements, that can be used for classifying the spectral class for each NEA and contribute a significant fraction of NEA taxonomy.

PS31: Characterization of (138846) 2000 VJ61 on its close approach to Earth during 2016-2017

Jing-Ting Shi (NDHU), Meng-Yi Sie (NDHU), Chung-Chien Cheng (NDHU), Yi-Chuan Lin (NDHU), Zhong-Yi Lin (NCU), Hsin-Chang Chi (NDHU)

The apollo asteroid (138846) 2000 VJ61 grazed Earth on May 24, 2017 at a distance of about 29 million km. This favorable geometry and a wide range of solar phase angles (from 5 degrees to 70 degrees) allowed observing it to derive its physical and dynamical parameters. We observed (138846) 2000 VJ61 from the ground with a broadband photometry acquired by both Lulin one-meter and 40cm telescopes at Lulin observatory. With multi-color photometric observations, we classify (138846) 2000 VJ61 as S-type asteroid. In addition, the rotation period is 4.19 by using the light curves obtained 6 nights in late-December 2016 and mid-February 2017.

PS32: On the long-term time evolution of highly-inclined Trans-neptunian Objects

Po-Yen Liu (NCU), Wing-Huen Ip (NCU), Yu-Chi Cheng (NCU), Hsing-Wen Lin (NCU)

It is known that the capture efficiency of long-period comets originated from the distant Oort cloud into short-period comets is very low. This is particularly so for those originally in high-inclination or retrograde orbits. Such paradigm has been the basis for identifying the population of small objects outside Neptune's orbit (e.g., TNOs) in low-inclination orbits to be the source of the short-period comets. The recent discovery of a "disk" of TNOs in high-inclination or retrograde orbits (cf. Chen et al., 2016; The Astrophysical Journal Letters, 827:L24) raises interesting questions on their origin, namely, at what time and under what circumstance were they injected into the current orbital configurations? Also, what are their evolutionary histories? Along the same line, we would like to attack another related problem; that is, what are the dynamical lifetimes of objects with different orbital inclinations after first injection into the trans-neptunian region. Could there still be a small population of highly- inclined/retrograde objects dated back to the phase of Oort cloud formation? To explore this issue, we examine the associated dynamical evolution by long-term orbital integration. The statistical results from this numerical exercise will be presented here.

D. Star Formation

PS33: A Study of Stellar Gyrochronology by Using the PTF and K2 Data

Chia-Lung Lin (NCU)

Chang H.Y. et al. (ApJ, 2016) showed that flare activities of the M dwarfs correlates with their corresponding chromospheric Hα emission by analyzing the LAMOST and Kepler K1 data. Stars with rotation periods shorter than 20 hours usually exhibit enhanced Hα emission and frequent occurrence of large flare events. This is consistent with the gyrochronological relation describing the age effect of stellar magnetic activity. To further the flare phenomenon of the M dwarfs might be important to the development of biospheres of Earth-like exoplanets in the habitable zones, we have initiated a project to estimate the Hα emission strength of M dwarfs using the Palomar Transient Factory (PTF) data archive and cross-correlating with LAMOST spectra. We have found a considerable amount of M dwarfs which are all included in the PTF Hα data archive and K2 catalog in just one Campaign of K2. We examine that if the PTF Hα photometric measurements can yield similar results as obtained in medium resolution spectral observations. In the future, we plan to apply this method to M dwarfs in open clusters from which age dependence of the gyrochronological relation can be better understood. Keywords: Stellar Gyrochronology, H-alpha, M dwarfs, Kepler K2, PTF, Exoplanets, Habitable zones, LAMOST

PS34: A Bipolar Molecular jet in NGC2023 MM1

Li-Wen Liao (NTHU), Vivien Chen (NTHU)

We have observed a bipolar molecular jet in NGC 2023 MM1 with the Submillimeter Array (SMA). NGC 2023 MM1, a class 0 protostar in Orion (d $\sim$ 460 pc) with luminosity L $\sim$ 7 Lsun, is driving a large-scale CO bipolar outflow previously observed with JCMT. With an angular resolution of 4″ and a spectral resolution of 2 km/s, our observations show a highly collimated bipolar jet close to the source in both CO (2-1) and SiO (5-4) emissions. In the CO redshifted component, the jet is further resolved into two compact knots.

PS35: Study of Embedded X-ray Brown Dwarfs in the Young Star Cluster IC 348

Bhavana Lalchand (NCU), Po-Shih Chiang (NCU), Wen-Ping Chen (NCU)

Brown dwarfs have masses (15-80 MJup) below that required to maintain core hydrogen fusion. A reliable substellar population in star-forming regions is the critical first step to understand their formation mechanism (do they form like stars, or like planets?). The sample also serves to bridge the knowledge of free-floating planets versus exoplanets. We are part of a consortium to identify brown dwarf candidates via imaging detection of possible water absorption, one of the characteristics of cool atmospheres, in nearby star-forming regions or young star clusters. Here we report the results in the young (3-Myr) star cluster IC 348. Some of these molecule-bearing objects are matched with X-ray sources, and with JCMT 850-micron emissions, thus are magnetically active brown dwarfs in their infancy. These embedded X-ray brown dwarfs have Lx/Lbol $\geq 10^{-5}$-10^{-4}, to be compared with other young stellar populations such as,Lx/Lbol $\approx 10^{-4}$ for typical T Tauri stars, i.e., sun-like pre-main sequence objects, where x-ray emission arises from magnetically heated and confined coronal structures possibly with a (small) contribution from accretion. For Herbig Ae/Be stars, the intermediate-mass pre-main sequence object, Lx/Lbol $\approx 10^{-6}$-10^{-5}, with typical extremely soft emission, similar to that of classical T Tauri stars. Instabilities in the wind could give rise to shocks that heat the plasma to X-ray emitting temperatures, analogs to OB stars for which Lx/Lbol $\approx 10^{-7}$. M dwarfs are expected to be fully convective; some, e.g., dMe stars are known X-ray

emitters, and so do late-M brown dwarfs. Whether even cooler L and T type brown dwarfs and planet-mass objects, with largely neutral atmospheres, hence unlikely to activate magnetic dynamos, can emit X-ray remain to be investigated. The brown dwarf sample reported in this work is the most comprehensive in any young star cluster, and we present how X-ray and sub millimeter properties correlate with young brown dwarf spectral typing. Keywords: brown dwarfs, open clusters and associations: individual (IC 348), X-rays.

PS36: Verifying a new method using velocity gradients to probe magnetic fields in turbulent disks

Cheng-Han Hsieh (NTHU), Shih-Ping Lai (NTHU)

Magnetic fields are critical for the formation of protoplanetary disks since angular momentum of the disks are regulated by the magnetic braking and bipolar outflows. However, measurements of magnetic fields often involved with measuring polarized emission which is extremely difficult. A new method to trace magnetic field direction by using gradients of velocity channel map intensities is proposed by A. Lazarian and Ka Ho Yuen recently. By using a turbulent 3D MHD model, they concluded that when the channel map velocity width is thin with respect to turbulent velocity, magnetic field would be aligned to velocity field. This is due to the effects of Alfven modes and slow modes. This research aims to test the conclusions of whether or not magnetic field is aligned with velocity field in the disk morphology. A high resolution spherical ZeusTW code is used in this study. By verifying the relationship between magnetic field direction and velocity field, it will provide a practical and innovative way to probe magnetic field in turbulent disks.

PS37: Dating a prestellar core: L1512

Sheng-Jun Lin (NTHU), Shih-Ping Lai (NTHU), Laurent Pagani (LERMA, UMR 8112 du CNRS, Observatoire de Paris, 61 Av. de l' Observatoire, 75014 Paris, France)

We estimate the age of a prestellar core, L1512, in the Taurus molecular cloud with H_2D^+ (1_{10}-1_{11}) and multiple transitions of N_2H^+, N_2D^+ and DCO^+ using GBT, JCMT, and IRAM 30 m telescope. L1512 is chosen because it is globular-shaped and relatively isolated in the Taurus molecular cloud, providing an ideal environment for studying the target properties. Prestellar cores are the sites for future star and planet formation. Although we know the gravitational collapse plays a main role during the star formation, it is not yet well understood how the detailed formation process depends on the physical and chemical properties. One key factor hindering our understanding is that it is quite difficult to determine the age of the prestellar cores. In order to estimate the age of the prestellar cores, we have developed two techniques: either measure the deuteration ratio profile of a H-carrier (best species is N_2H^+) or measure the depletion profile of CO, both across the core. With the help of chemico-dynamical models, we can compare the observations to an evolutionary model for both methods and constrain the age of the cores.

PS38: Searching the First Hydrostatic Cores in the Perseus Molecular Cloud

Hao-Yuan Duan (NTHU), Shih-Ping Lai (NTHU)

First Hydrostatic Cores (FHCs) are the transient phase between prestellar cores and Class 0 protostars. Therefore, FHCs are best targets for understanding the earliest stage of star formation. Several FHCs candidates were suggested, but none of them have been confirmed. Recently, some potential candidates of FHCs have been suggested based on the low temperature from the SED fitting ($\sim$ 10–30K); however, theoretical models predicted that FHCs can be heated over 100K. The low temperature of FHCs derived from observation may be due to the mixing of the unresolved FHCs and the cold

envelope. In this project, we produce synthesis images using CASA based on a simple self-similar collapse density model. We match the simulated images of First Core candidates in Perseus Molecular Cloud to the SMA and VLA observational results. Our simulations show that with both VLA and ALMA observations, we can decouple the FHC component from envelope with reasonable observing time. The identification of FHCs will make great strides in our understanding of star formation.

PS39: Spectral imaging of trans- and cis-HCOOH emission with ALMA

Ya-Wen Yo (NTNU), Yi-Jehng Kuan (NTNU), Yo-Ling Chuang (NTNU), Ming-Chi Chung (NTNU)

The //trans//-conformer of formic acid has long been observed in interstellar space. However, the //cis//-HCOOH, a wobbly conformer of formic acid, was not expected to exist in the interstellar medium due to its very high //trans//-to-//cis// conversion energy barrier. Recently //cis//-HCOOH was detected in the Orion Bar PDR with the IRAM 30m and a FUV photoswitching mechanism for //trans//-to-//cis// isomerization was proposed, nevertheless, no //cis//-HCOOH was detected toward Orion KL (Cuadrado et al. 2016). Thanks to the mighty ALMA with her very high angular resolution and superb sensitivity, we are able to detect an isolated, clean line of //cis//-HCOOH in Orion KL unambiguously the first time; additionally we also detect four //trans//-HCOOH lines in Orion KL. The spectral emission of both conformers of formic acid is located in a region near the continuum sources SMA 1, HKKH 8 and HKKH 9, with the //cis//-HCOOH concentrated mainly on HKKH 9, and the //trans//-HCOOH, on SMA 1. Weaker, diffuse emission of //trans//-HCOOH encircling the region between the Compact Ridge and Southern Peak is also apparent which is consistent with previous BIMA and SMA lower angular-resolution results. Our ALMA finding of the existence of //cis//-HCOOH in the optically thick Orion KL hot molecular core presents an immediate challenge to the FUV photoswitching scenario thus may require a new //trans//-to-//cis// conversion mechanism.

PS40: Filamentary Accretion Flows in the IRDC M17 SWex

Vivien Chen (NTHU)

Although filamentary structures are ubiquitous in molecular clouds, basic observational constraints are needed to clarify the role of filaments in the mass assembly process. Using ALMA Band 3, we have observed the N2H+ (1-0) and HNC (1-0) emission in the filamentary accretion flows in the remarkable IRDC complexes, M17 SWex, where a delayed onset of massive star formation was reported in the two hubs at the convergence of multiple filaments of parsec length. We derived gas kinematics with the N2H+ emission and found the line widths are smaller than those of ammonia, suggesting a transonic nature of dense gas in the filaments. Slow infall motions towards the hubs are detected along the filaments. Multiple velocity-coherent substructures are present in both hubs, likely not yet reaching virial equilibrium.

E. High Energy

PS41: JVLA and Chandra Observations of SNR G16.7+0.1

CHIEN-YING (NTHU), C.S. Feng (NTHU), H.K. Chang (NTHU), W.W. Tian (National Astronomical Observatories，Chinese Academy of Sciences)

We report on the analysis of JVLA and Chandra data of shell-type supernova remnant (SNR) G16.7+0.1 and Pulsar Wind Nebula (PWN) G16.73+0.08. X-ray observation allows us analyze the feature of the PWN and its possible central

point source and obtain their physical parameters (e.g. absorption column density (NH)). HI continuum and HI- line observations bring reliable HI absorption spectrum to the SNR. OH observation to G16.7+0.1 confirms detecting a 1720 MHz maser of $v = \approx$20 km^{-1} at its southern shell which supports exiting an interaction between SNR shock and surrounding molecular cloud. ^{13}CO observation towards SNR G16.7+0.1 reveals a broadened CO cloud at about 25 km^{-1} which validates above claim of an SNR-cloud interaction. The HI absorption spectrum, the 1720 MHz OH maser and the broadened CO feature all together solid the remnant' s distance of d˜ about 13.5 kpc, i.e. the far side distance of 20 km^{-1}. The NH/ d ratio constrains the NH-Av relation along the line of sight towards G16.7+0.1

PS42: X-ray Spectral Analysis of 2015 outburst of V404 Cygni with the TCAF Solution

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V404 Cygni (GS 2023+338) is a Galactic X-ray binary containing a black hole candidate. It is an X-ray transient, which exhibited 3 outbursts in 1980' s. After a long period of quiescence, V404 Cygni showed X-ray outburst in 2015 June. Meanwhile, multi-wavelength observations of this outburst from radio to gamma-rays were conducted. The X-ray spectra of V404 Cygni show high variability during its outburst and indicate violent changes inside the system. We do the spectroscopy analysis of data taken by Swift/XRT and BAT in 15-28 June 2015 with the Two-Component Advective Flow (TCAF) model to understand its physical accretion flow properties during the outburst. The TCAF model, developed by Chakrabarti and his collaborators in mid 90s, considers the disc accretion rate (Keplerian, high angular momentum) and the halo accretion rate (sub-Keplerian, low angular momentum) to explain both soft and hard components of the observed energy spectrum. Relevant model parameters can also describe QPO phenomena produced by the Compton cloud around the central black hole. We will introduce the TCAF model and report the effort of spectroscopy results of V404 Cygni 2015 outburst based on the TCAF resolutions.

PS43: An X-Ray Study of NGC 7331

Ruolan Jin (NTHU), Albert Kong (NTHU)

We report on Chandra X-ray Observatory ACIS-S observations of the spiral galaxy NGC 7331. There are 50 X-ray point sources, including SN2014C, identified by combining five observations taken between 2001 and 2015 within the optical D25 region of NGC 7331 with a signal to noise ratio (S/N) larger than 3. The detection limit of our sample is 1.3×10^{38} ergs s^{-1} in the $0.5-7.0$ keV energy band. Fifteen of them are variable with variability larger than 3σ. The cumulative luminosity function of point sources can be fitted with a broken power-law with a luminosity break at 3.6×10^{38} ergs s^{-1} while the slope is 0.6 and 2.04 before and after the break, respectively. This may indicate a mixture of bright and young sources on the spiral arms, and older disk populations as studied in other late type galaxies. For the five sources with net counts larger than 120, the spectral model fittings are carried out with absorbed power-law, Raymond-Smith and blackbody models. By adopting the classification method proposed by Prestwich et al. (2003) according to the X-ray color-color diagram of the sources with S/N larger than 4, we find 9 sources that are likely to be low-mass X-ray binaries. We plan to use the observations taken with the Hubble Space Telescope (HST) Wide Field and Planetary Camera2 (WFPC2) and Wide Field Camera 3 (WFC3) to identify optical counterparts lying in the error ellipses of X-ray sources in the future.

PS44: MHD simulations on outflows from the Galactic centre

Tanayveer Singh Bhatia (NCU), Bilal Ramzan (NCU), Han Cheng (NCU), Chung-Ming Ko (NCU)

Star captures by the supermassive black hole at the Galactic centre would release a large amount of energy (a.k.a. an outburst) and drive an outflow perpendicular to the Galactic plane. This is a possible scenario for the Fermi bubbles discovered by NASA's gamma-ray satellite Fermi. We study these outflows by the MHD code FLASH. We compare the structure of the outflows with and without magnetic field, and also structures from single outburst and multiple outbursts.

PS45: Tracking X-ray Spectral Modulations of A 6-Hz Type-B Quasi-periodic Oscillation in GX 339-4 using Hilbert-Huang Transform

Yi-Hao Su (NCU), Christopher Reynolds (Department of Astronomy, University of Maryland, USA), Yi Chou (NCU)

We present the phase-resolved spectroscopy results based on the Hilbert-Huang transform (HHT) for a 6-Hz type-B quasi-periodic oscillation (QPO) in the black hole X-ray binary GX 339-4. It had been shown that type-B QPO frequencies have strong correlation with the hard X-ray flux, but the detail variations of hard X-ray spectral components during the oscillation is still not clear. To track modulations of spectral parameters, we utilized the HHT to characterize the HHT-based timing properties, extract the QPO instantaneous phases, and then construct its phase-resolved spectra. We found that the QPO is composed of a series of intermittent oscillations with a 1 s coherence time. Furthermore, the phase-resolved spectra illustrate significant modulations of Comptonization parameters with unignorable modulations of thermal disk components. Finally, we discuss differences of the HHT-based timing property between this type-B QPO and a 4-Hz type-C from XTE J1550-564 and give possible interpretations of the spectral modulations.

PS46: Observation of the Crab in the Compton Spectrometer and Imager (COSI) 2016 flight

Chao-Hsiung Tseng (NTHU), Hsiang-Kuang Chang (NTHU)

The Compton Spectrometer and Imager (COSI) is a balloon-borne soft gamma-ray telescope designed to study astrophysical sources in the MeV energy range and, if with good enough statistics, also the polarization of their emissions. COSI had a few balloon flights in the past. The most recent one was an ultra-long duration balloon flight with a super-pressure balloon launched from Wanaka, New Zealand, in May 2016, which lasted for 47 days. Although it was in the southern hemisphere, there was still considerable exposure on the Crab. Here we report results of Crab observation in the COSI 2016 flight.

PS47: Fermi Large Area Telescope Observations of the Kes 73/1E 1841-045 Region: An Attempted Search for Gamma-ray Excess from a Magnetar

Paul K. H. Yeung (NTHU), Albert K. H. Kong (NTHU)

The supernova remnant Kes 73 and/or the magnetar 1E 1841-045 at its center can deposit a large amount of energy to the surroundings and is potentially responsible for particle acceleration. Using the data taken with the *Fermi* Large Area Telescope (LAT), we confirmed the presence of an extended source whose centroid position is highly consistent with this magnetar/supernova-remnant pair. Its emission is intense from 100 MeV to $>$100 GeV. Its LAT spectrum can be decoupled into two components which are respectively governed by two different mechanisms. According to the young age of this system, the magnetar is seemingly a necessary and sufficient source for the downward-curved spectrum below 10 GeV,

as the observed $<$10 GeV flux is too high for the supernova remnant to account for. On the other hand, the supernova remnant is reasonably responsible for the hard spectrum above 10 GeV. Further studies of this region in the TeV regime is required, so that we can perform physically meaningful comparisons of the $>$10 GeV spectrum and the TeV spectrum.

F. Instrumentation

PS48: The Polarimetric Performance of the Compton Spectrometer and Imager

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The Compton Spectrometer and Imager (COSI) project is an effort to develop the next generation Compton telescope of higher sensitivity. COSI is currently a balloon-borne telescope project. The heart of COSI is an array of cross-strip germanium detectors, each with 15mm x 80mm x 80mm dimension and full 3D position resolution of less than 2 mm^3. COSI performs Compton spectroscopic imaging in the 0.2-10 MeV gamma-ray band with a field of view about 50 degrees across and capability of polarization measurement. It is also well suitable for monitoring transient events. Several COSI balloon flights were conducted in the past. The most recent flight was launched from Wanaka, New Zealand, in May with a super-pressure balloon flying for 47 days. During this flight, COSI discovered GRB160530A. We will report the polarization calibration result in Wanaka in 2017 and the polarimetric performance of COSI.

PS49: COSI effective area study

C.-Y. Chu (NTHU), C.-Y. Yang (NTHU), C.-H. Tseng (NTHU), S.-F. Chung (NTHU), S. Boggs (Space Sciences Laboratory, UC Berkeley, Berkeley, USA), H.-K. Chang (NTHU), P. Jean (The Research Institute in Astrophysics and Planetology , Toulouse, France)

The COmpton Spectrometer and Imager (COSI) is a wide-field gamma ray telescope whose energy range is from 0.2 to 10 MeV. The heart of COSI is a compact array of twelve high-purity cross-strip germanium detectors. COSI performs gamma ray spectroscopy and imaging with the principle of Compton scattering between incoming gamma-ray photons and electrons in the detector volume. Currently, COSI is a ballon-borne telescope as a prototype for a future satellite mission. In this paper, we report the effective area study for COSI. The efficiency of COSI is roughly the same as INTEGRAL/SPI. We are now investigating whether the efficiency of COSI can be improved by adopting more germanium detectors in the detector array.

G. Outreach and Education

PS50: 參與 **2017IPS** 數據轉球幕星象節目工作坊與第七屆科學映像祭 **IFSV DOME FEST** 新知分享

Jim Ching-Chuan Hung (TAM)

2017 年 IPS 數據轉球幕工作坊 (Data to Dome Workshop 2017) 與第 7 屆科學映像祭影展暨研討會 (IFSV Dome Fest)，今年於日本東京接連舉行。IPS 目前共有 700 個會員機關，分別來自 35 個國家，包含各類星象館、科學中心、星象儀製造商和節目設計研發公司等。本館是 IPS 國際星象館協會會員，期望透過參與工作坊和科學影展，認識各國星象館所關注的議題，且與各會員組織互動。透過論文與星象影片發表，分享本館的研究成果，以提升本館之國際能見度。今年「IPS 數據轉穹幕工作坊」，於 2017 年 3 月 2 日至 3 月 3 日為期 2 天，在日本東京三鷹市國立天文臺舉辦，希望星象館從業員能透過工作坊的分組學習與經驗分享，提升其專業素養，並實現「天文觀測數據即節目素材」的數位化教育目標；並期望透過各館所之經驗分享，探討數位星象館為公眾提供天文科教服務的路徑與方法。另外第 7 屆科學映像祭 IFSV Dome Fest 於 3 月 5 日至 3 月 7 日為期 3 天，假東京都足立區西新井星系城劇場舉行。旨趣是希望與會者藉由觀摩精良的科普影像作品、與研討周邊相關技術等配套，讓星象館從業員皆有職涯上的長足進展。筆者此次參與研討會的主要目的為發表本館相關經驗的口頭論文與自製星象節目，以「Public outreach of TAM Planetarium - a Study of Digital programming in Prompt / Real-time Tour Guide 」及「The Sun and The Space Weather」- the Essence 與會發表。本報告就參加 IPS 數據轉穹幕工作坊及第 7 屆科學映像祭影展暨研討會提出心得與建議，提供本館及國內各星象館所及各級學校星象館參考。

關鍵字：臺北市立天文科學教育館、2017 IPS 數據轉穹幕工作坊 (Data to Dome Workshop2017)、第 7 屆科學映像祭 (IFSV 2017 Dome Fest) 會議

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