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一、 科研 Research

新闻动态 News & Events

2020 年 6 月 14 日，云南卫视《云南新闻联播》栏目头条播出了“深入实施人才强省战略，多层次灵活引才——为云南高质量发展提供智力支持”的新闻报道，重点采访了云南大学中国西南天文研究所所长刘晓为教授和云南大学副校长刘波教授。在节目中，刘晓为所长介绍了中国西南天文研究所建设情况、未来发展以及 1.6 米多通道测光巡天望远镜研制进展，对云南省人才政策予以积极评价。刘波副校长则介绍了学校为创造人才和学科发展优良环境出台的多项政策及举措。（视频链接）

On 14 June 2020, the Yunnan News Broadcast program of YNTV aired a headline story titled “Deepening the Implementation of the Strategy of Strengthening the Province through Human Resource Development, Attracting Talents with Flexibility and at Multiple Levels--Providing Intellectual Support for Yunnan's High-Quality Development”, featuring interviews with Professor Xiaowei Liu, Director of SWIFAR, and Professor Bo Liu, Vice-President of Yunnan University. In the program, Professor Xiaowei Liu talked about the current status of SWIFAR, his vision for its future as well as the development of the Mephisto Project, and gave positive comments on the talent program of Yunnan Province; while Vice-President Bo Liu gave insight into the numerous policies and initiatives introduced by Yunnan University to create an excellent environment for talent recruitment and academic development. (Video link)

范祖辉教授与访问学者 Oleg Yu Tsupko 博士提出黑洞阴影作为宇宙学标准尺

Black hole shadows as standard rulers for cosmological studies

“事件视界望远镜”合作组首次成功获得了 M87 星系中心的大质量黑洞的“照片”，并于 2019 年公布（见图 1.1），这一成果打开了探索黑洞的新窗口。展望未来观测发展，范祖辉教授和研究所访问学者 Oleg Yu Tsupko 博士提出了利用黑洞阴影作为“标准尺”测量宇宙学距离的方法。

In 2019, the Event Horizon Telescope (EHT) Collaboration released the very first image of a black hole and its shadow, the supermassive black hole at the centre of the M87 galaxy (Figure 1.1). The paradigm-shifting observations have opened a new window for probing black hole physics. Foreseeing the future developments of the field, in their 2020 paper published in Classical and Quantum Gravity, Prof. Zuhui Fan and SWIFAR visiting fellow Dr. Oleg Yu Tsupko proposed to use black hole shadows as “standard rulers” for cosmological distance measurements.

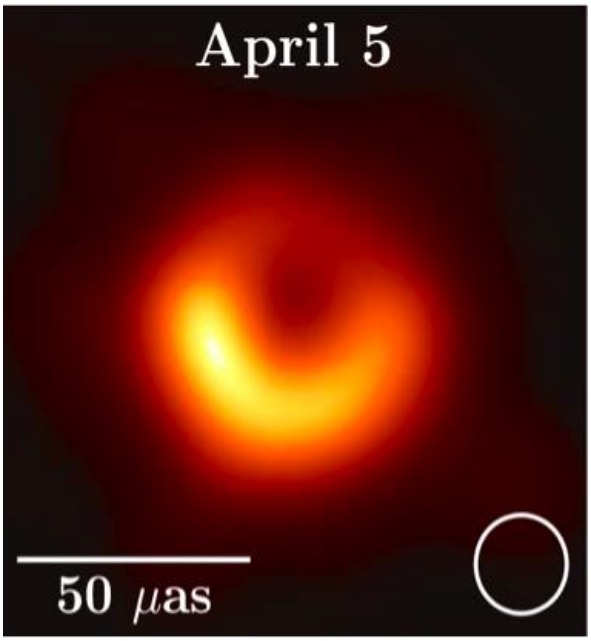

图 1.1: M87 中心黑洞阴影图像 Black hole shadow of M87 (ETH Collaboration 2019, ApJL, 875, L4)

根据广义相对论理论，阴影的物理半径主要取决于黑洞的质量。因此，如果能够准确测量黑洞质量，则黑洞阴影可以作为“标准尺”，并通过观测其角直径大小，获得宇宙学距离。图 1.2 给出了不同质量黑洞在不同红移处阴影角半径的理论计算。结果表明，如果下一代事件视界望远镜的分辨率能够达到 1 微角秒，则有望在红移小于 0.1 范围内，分辨出 10^9-10^{10} 太阳质量黑洞的阴影，进而测量其宇宙学距离。该方法独立于标准烛光测距法，有助于解决当前哈勃常数测量结果不一致的问题。如果望远镜分辨率能达到 0.1 微角秒，对大于 10^9 太阳质量的黑洞，则可以观测到红移 1 以上的黑洞阴影，测量高红移宇宙学距离，开展宇宙学研究。

According to the theory of General Relativity, the physical size of a black hole shadow is mainly determined by its mass. Therefore, if we can measure the black hole mass accurately, its shadow size is known. By observing the angular extension of the shadow, we will then be able to derive the angular diameter distance to the black hole. Figure 1.2 shows the theoretical calculations of the shallow angular size versus redshift for different black hole masses. It is seen that if the future advanced Event-Horizon Telescopes (EHTs) can achieve a resolution of 1μas, then for black holes of 10^9 to 10^{10} solar mass, their shadows can be resolved up to redshift z ~ 0.1. This, in turn, will allow us to derive their cosmological distances independent of the standard candles, providing vital clues to the Hubble constant H_0 tension problem. If the resolution can further reach 0.1μas, shadow measurements can even be done for black holes larger than 10^9 solar mass up to z ~ 1 and beyond, enabling cosmological studies.

需要指出的是，从观测上实现该测距方法，除需高分辨率黑洞阴影观测外，还需黑洞质量的准确测量及对黑洞吸积盘、喷流等结构的理解。虽然这在目前难以实现，但天文观测和理论的快速发展有望使该方法在未来成为独立的宇宙学测距手段。该研究工作已在国际专业学术期刊《经典与量子引力》（*Classical and Quantum Gravity*）发表（文章链接：https://iopscience.iop.org/article/10.1088/1361-6382/ab6f7d）。

It is noted that to realize the proposed method, we need not only high-resolution shadow observations but also accurate determinations of the black hole masses as well as a thorough understanding of the accretion disks and jet structures. It is still beyond the reach of the current observational and theoretical capacities. However, with the fast observational and theoretical developments, in the future, our proposed method can potentially provide independent distance measurements for cosmological studies. The paper has been published in *Classical and Quantum Gravity* (article link: https://iopscience.iop.org/article/10.1088/1361-6382/ab6f7d).

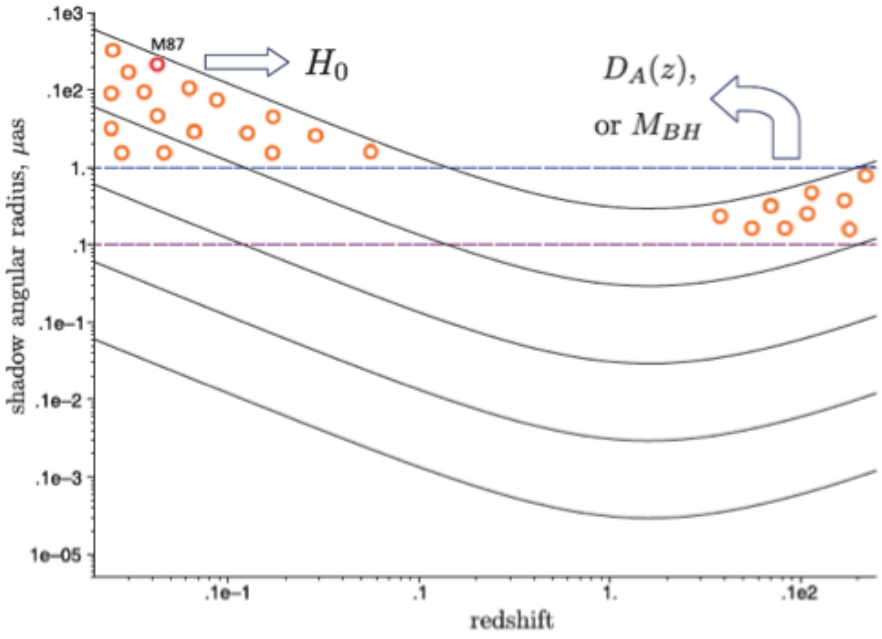

图 1.2: 阴影角半径随红移的变化，不同线给出了黑洞质量为 10^6，10^7，10^8，10^9 和 10^{10} 太阳质量的结果（从下到上） Shadow angular radius vs. redshift. Different lines, from bottom to top, are the results for black hole mass of 10^6, 10^7, 10^8, 10^9 and 10^{10} solar mass, respectively (Tsupko, Fan, & Bisnovatyi-Kogan, 2020, Class. Quantum Grav. 37, 065016)

二、 科学前沿 Science Frontiers

快速射电暴及其起源问题 Fast Radio Burst and Its Origin

快速射电暴是近十年来新发现的一类天文现象。它们的持续时间只有千分之一秒，并且绝大部分产生于银河系之外、甚至宇宙学距离上。自从 2007 年 Duncan Lorimer 教授从脉冲星巡天数据中发现第一个快速射电暴以来（如图 2.1 所示），人类已经探测到一百多个快速射电暴，它们中部分表现出重复爆发、甚至周期性活动的特征。由于快速射电暴的波长为几十厘米，也就是说与我们的手机信号相当，当它们在星际空间中传播的时候，会明显受到星际 / 星系际介质中等离子的影响，产生色散、散射、闪烁、法拉第旋转等效应。这些效应可以很好地作为探针研究宇宙中的“缺失重子”，暗物质和暗能量分布，原初磁场，以及暴周环境等重要科学问题。

Fast Radio Bursts (FRBs) are a new kind of astronomical phenomena discovered in the last decade. They last milliseconds, and are of extragalactic or even cosmological origin. Since Prof. Duncan Lorimer identified the first FRB from the survey data of pulsars in 2007, see Figure 2.1, more than 100 FRBs have been detected. Some of them even show repeating or even periodical activities. The characteristic wavelengths of FRBs are about a few tens of centimetres, similar to those of cellphone signals. FRBs are affected by the plasma in the interstellar/intergalactic medium when they propagate in the universe, and several effects occur, such as dispersion, scintillation, and Faraday rotation etc. Those effects can be used to study problems such as the “missing baryons”, the nature of dark matter and dark energy, the primordial magnetic field, the ambient medium of burst sources, etc.

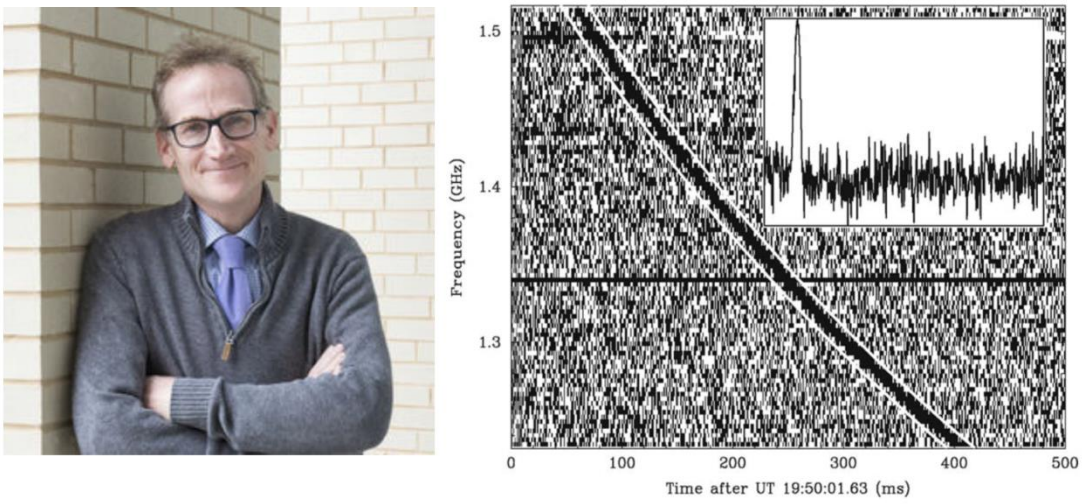

图 2.1: 左：第一个快速射电暴的发现者 Duncan Lorimer 教授；右：第一个快速射电暴 FRB 010724，也被称作 Lorimer 暴 Left: The discoverer of the first FRB, Prof. Duncan Lorimer. Right: The first discovered fast radio burst, FRB 010724, also called the “Lorimer burst”

快速射电暴早期的发现过程并非一帆风顺，主要原因是由于存在诸多的地面干扰。这就不得不提到快速射电暴发现历史上著名的 Peryton，Peryton 中文名又叫鹿鹰兽，是西方文学作品中构造出的一种类似于四不像的动物。而 Peryton 在快速射电暴领域中，就特指射电望远镜发现的一类类似于快速射电暴的奇怪信号。Peryton 的特征和快速射电暴非常像，但只被澳大利亚的 64 米射电望远镜 Parkes 探测到过，更有意思的是，这类现象密集出现在澳大利亚中午十二点前后。通过多方面排查，澳大利亚的射电天文学家最终发现，Peryton 其实是 Parkes 天文台的微波炉门打

开时释放出来的无线脉冲信号。在 Peryton 被确认为人造信号之后，真正快速射电暴的天体物理起源才最终被确认。

The searching process for FRBs is not smooth during the early stage of FRB history. The main reason is that there are many ground interferences, like “Peytons”. Peryton is a mythological hybrid animal combining the physical features of a stag and a bird, which was created and described in western literary. In the field of FRBs, Perytons referred to some radio signals similar to FRBs, but they were only detected by the Parkes Telescope. More interestingly, Perytons occurred only around lunchtime in Australia. By checking all the potential causes, the Australian astronomers eventually pinned down that Perytons were actually artificial radio signals emitted when the doors of microwave ovens at the Parkes Observatory were opened. With the identification of Perytons, the astrophysical origin of those bona fide ones was finally established.

近年来随着 CHIME、ASKAP、FAST 等射电望远镜的建成和运行，观测到的快速射电暴数目急剧增加，然而由于一直以来缺少多波段观测信息，快速射电暴的物理起源始终是个未解之谜。关于快速射电暴起源的理论非常多，包括脉冲星的超巨型脉冲、年轻磁星的磁能释放、中子星的磁层被临近天体流“梳理”、小行星碰撞中子星、双致密星并合、宇宙弦能量释放等。哈佛大学的天文系主任 Abraham Loeb 教授甚至提出过一种可能性，他认为一个发展到高技术的文明可能会发射接近光速运动的飞船，在飞船加速的过程中就会被动产生类似快速射电暴的信号。

With the construction and operation of more and more radio telescopes, such as CHIME, ASKAP and FAST, the number of detected FRBs increases dramatically. However, due to the lack of multi-wavelength information, the physical origin of FRBs remains unknown until fairly recently. Many models have been proposed, including giant pulses of pulsars, the release of magnetic energy in young magnetars, the collision between a pulsar and an asteroid, the merger of binary compact stars, etc. Prof. Abraham Loeb, Head of the Department of Astronomy at Harvard University, has suggested the possibility that a super-advanced civilization may have launched space ships of an extremely high speed close to the speed of light. During their acceleration, the ships radiate signals resembling those of FRBs.

2020 年 4 月 28 日，快速射电暴的起源问题得到了突破性的进展。从 2020 年 4 月初开始，银河系内的一颗距离地球大约三万光年的磁星，SGR J1935+2154，开始频繁活动，产生了一百多次 X 射线爆发。在 4 月 28 日这一天，天文学家发现其中一个 X 射线爆发伴随着极亮的射电爆发，其中中国的“慧眼”卫星对这次与快速射电暴成协的 X 射线爆发有着非常精细的探测（如图 2.2 所示）。当把这次射电爆发放到宇宙学距离上的时候，它的亮度几乎接近于银河系外的快速射电暴。这次事件是人类首次探测到银河系内的快速射电暴，同时证实了快速射电暴的起源来自于磁星的高能活动。有趣的是，在这次爆发半天之前，中国的 500 米口径球面射电望远镜 FAST（也被称做“天眼”，图 2.3 左图）与 Fermi GBM 进行了联合观测，这段时间磁星 SGR J1935+2154 产生了 29 次 X 射线爆发，但并没有射电信号被探测到。这就意味着大部分磁星的 X 射线爆发并不会产生快速射电暴。目前关于快速射电暴的产生机制还存在很大的争论，比如它们是产生在磁星的磁层之内，还是来自于磁星外激波的脉泽过程。不过我们相信，随着今后时域天文学的发展，以及更多重大天文设备的建成，包括云南大学 1.6 米多通道测光巡天望远镜（Mephisto，图 2.3 右图），快速射电暴的神秘面纱将有望很快会被天文学家揭开。

On April 28, 2020, there is a breakthrough in the origin study of FRBs. Since April 2020, a magnetar in the Milky Way about 30,000 light-years away from the Earth, SGR J1935+2154, becomes active. It generates more than a hundred times of X-ray bursts. On April 28, astronomers find one of the X-ray bursts is companied by an extremely bright radio burst. The Chinese HXMT satellite detects many important details of the X-ray burst, see Figure 2.2. More excitingly, were the aforementioned source

located at a cosmological distance, the brightness of its radio burst would have matched those of extragalactic FRBs. This event is the first time that we detect an FRB in the Milky Way. It confirms that at least some FRBs are generated by magnetar activities. Interestingly, half a day before this burst, the Five-hundred-meter Aperture Spherical Telescope (FAST; see the left panel of Figure 2.3) of China made a joint observation with the Fermi GBM. During the observation, Fermi GBM detected 29 X-ray bursts, but not a single dispersed pulsed emission was detected by FAST. The result suggests that FRB – X-ray burst associations are rather rare. The physical mechanism of FRBs is still poorly known. Astronomers are still arguing whether FRBs originate from the magnetosphere of a magnetar or from the shock waves in it. We believe, as the time-domain astronomy develops, and more and more astronomical facilities complets, such as the Multi-channel Photometric Survey Telescope (Mephisto; see the right panel of Figure 2.3), currently being built at YNU, the day astronomers unearth the mysteries of FRBs is approaching.

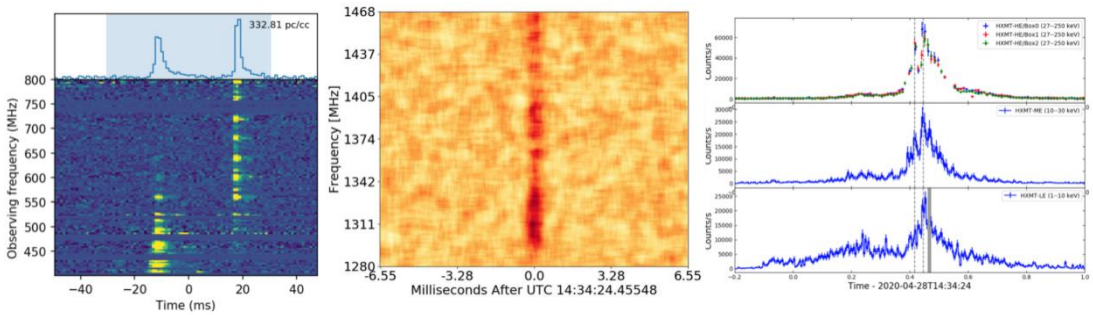

图 2.2: 左：CHIME 射电望远镜在 400－800 MHz 探测到的快速射电暴 FRB 200428；中：STARE2 射电望远镜在 1281－1468 MH 探测到的 FRB 200428，与 CHIME 不同的是，STARE2 在该频段只探测到一个暴，但流量极高；右："慧眼"卫星测到的与 FRB 200428 成协的 X 射线爆发 Left: FRB 200428 detected by CHIME at 400-800 MHz. Middle: FRB 200428 detected by STARE2 at 1281-1468 MHz. Unlike CHIME, STARE2 detected only one burst with an extremely large flux. Right: The associated X-ray bursts detected by HXMT

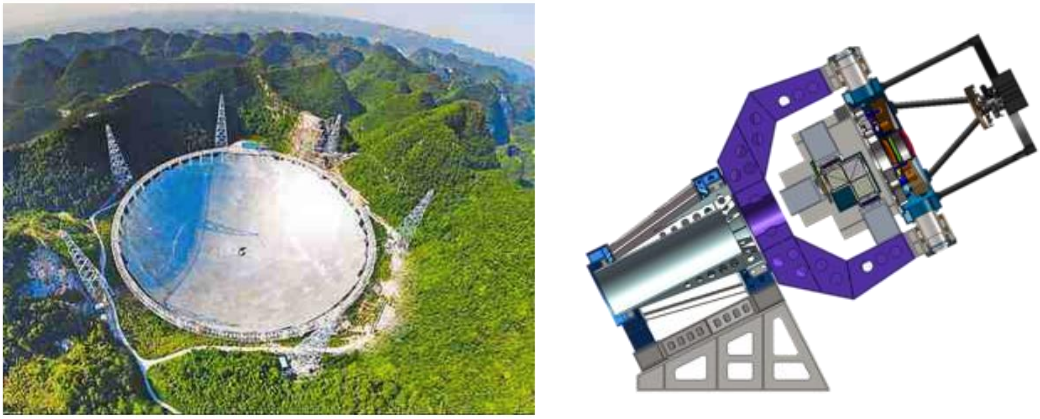

图 2.3: 左：500 米口径球面射电望远镜；右：云南大学 1.6 米多通道测光巡天望远镜 Left: Five-hundred-meter Aperture Spherical Telescope (FAST). Right: Multi-channel Photometric Survey Telescope (Mephisto) of YNU

三、 平台建设 Platform Development

云南大学 1.6 米多通道测光巡天望远镜项目 The MEPHISTO Project

- 望远镜建设 Telescope Construction

2020 年 4 月 1 日、5 月 7 日和 6 月 10 日，作为双边每月例会，研究所组织召开了 1.6 米多通道测光巡天望远镜（Mephisto）建设讨论会。南京天文光学技术研究所（天光所）项目组介绍了 3 月以来望远镜在光学系统、机械结构、电控系统等方面的进展，整体进展顺利。预计 6 月底前完成主镜和透镜改正镜组加工，8 月完成副镜加工。

On April 1, May 7 and June 10, 2020, as part of the monthly series, 3 bilateral workshops were held with the Nanjing Institute of Astronomical Optics & Technology (NIAOT) on the construction of the Multi-channel Photometric Survey Telescope (Mephisto). The NIAOT project team presented the development since last March of the telescope optical system, mechanical structure, and electronic control system. Good progress was made. It is expected that the figuring of the primary mirror and of the lens correctors will be completed before the end of June, while the processing of the secondary mirror will be finished in August.

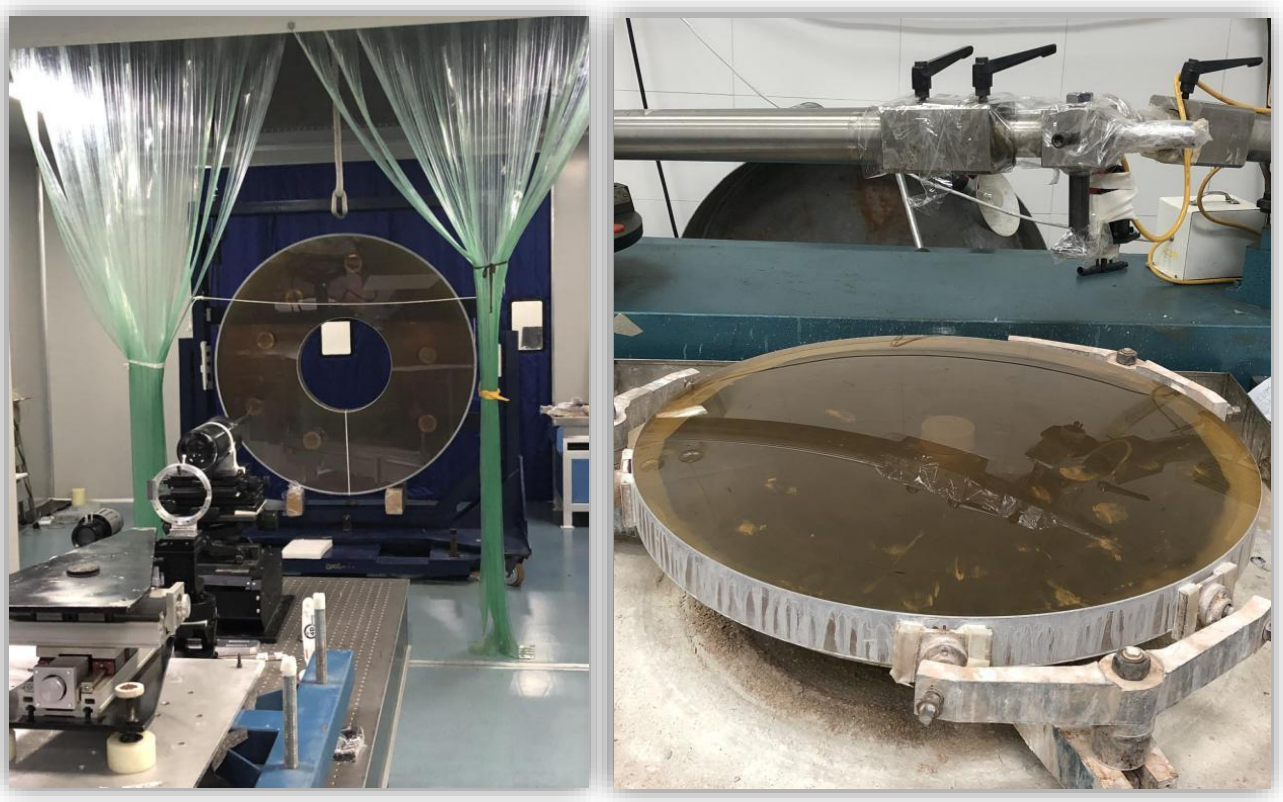

图 3.1: 左：主镜抛光检测；右：副镜加工 Left: Polishing and testing the primary mirror. Right: Optical figuring of the secondary mirror

天光所项目组和浙江大学合作团组正在对滤光片污染光大小、均匀性以及 u 波段材料吸收等问题进行评估。

The light leakage level, uniformity and material absorption in u band of Mephisto filters are being studied by the NIAOT project team in cooperation with a group from Zhejiang University.

2020 年 5 月 25 日，完成 325mm 定制快门采购合同签署。

On May 25, 2020, the procurement contract of a customized Bonn Shutter with a square aperture of 325 mm was signed.

• 台址建设 Site Development

2020 年 4 月 11 日，项目组与云南省设计院召开 1.6 米多通道测光巡天望远镜主体工程设计讨论会，会上通过了基墩设计方案。

On April 11, 2020, the Mephisto project team and Yunnan Design Institute held a meeting on the detail design of the Mephisto building. The design structure of the telescope base pier was approved.

2020 年 4 月 24 日，云南省设计院完成 1.6 米多通道测光巡天望远镜主体工程施工图设计。

On April 24, 2020, Yunnan Design Institute completed the construction drawing of the Mephisto main building.

2020 年 4 月 29 日，云南天文台与云南建投四公司相关负责人召开 1.6 米多通道测光巡天望远镜基建协调会。会上确定建投四公司为望远镜主体建设施工单位，并对具体施工事宜进行了沟通交底。

On April 29, 2020, Yunnan Observatories and YCIH No.4 Construction Co, Ltd. held a coordination meeting on the Mephisto infrastructure development. YCIH No.4 Construction Co, Ltd. was chosen as the construction unit for the Mephisto main building, and specific issues related to construction were carefully discussed.

2020 年 5 月 6 日，项目组、云南建投四公司相关负责人与云南省设计院召开 1.6 米多通道测光巡天望远镜主体工程设计交底和施工方案讨论会。会上通过了施工方案，并对施工方提出的问题进行了解释。

On May 6, 2020, the Mephisto project team, YCIH No.4 Construction Co, Ltd., and Yunnan Design Institute held a meeting on the design and construction details of the Mephisto main building. The construction plan was approved, and problems raised by the construction unit were answered.

2020 年 5 月 8 日，主体工程正式开工。基墩位置处基岩开始人工开凿。

On May 8, 2020, the Mephisto main building construction kicked off. The bedrock where the telescope base pier will locate began to be manually excavated.

2020 年 5 月 21 日，完成基墩−1.5 米以上基岩开凿和主风道钢筋混凝土施工。

On May 21, 2020, the excavation of bedrock above −1.5m of the base pier and the concreting of the main ventilation tunnel was completed.

2020 年 5 月 22 日，云南省设计院、地勘、监理、云南建投四公司、云南天文台和云南大学进行主体工程现场验槽。

图 3.2: 现场验槽 *In situ* inspection of the base pier foundation

On May 22, 2020, Yunnan Design Institute, a geological exploration company, the construction supervisor of the Project, YCIH No.4 Construction Co, Ltd., Yunnan Observatories and Yunnan University carried out an on-site examination of bedrock foundation to locate the Mephisto base pier as well as the telescope main building.

2020 年 6 月 14 日，完成主体工程基墩基槽开凿及锚杆钻孔、进场道路路基施工。

On June 14, 2020, rock excavation of the base pier trough, anchor drilling and entrance road clearing were completed.

2020 年 6 月 24 日，主体工程基墩和建筑物基础（至地平−1.5 米）完成浇筑。

On June 24, 2020, concreting the telescope base pier trough and the foundation of the telescope main building (up to −1.5m of the ground level) was completed.

图 3.3: 主风道浇筑完成
Concreting the main ventilation tunnel

图 3.4: 基墩和建筑物基础浇筑（至地平−1.5 米）
Concreting the telescope base pier trough (up to −1.5m of the ground level)

- 圆顶、数据中心及其他附属设施 Dome, Data Centre and Auxiliary Facilities

目前，南京天文仪器有限公司正在按计划生产 1.6 米多通道测光巡天望远镜穹顶，每两周提交书面进展报告，整体进展顺利。

At present, CAS Nanjing Astronomical Instrument Co., Ltd. is constructing the Mephisto dome according to the schedule, submitting a progress report every two weeks.

图 3.5: 圆顶主要部件生产 Dome main components being produced

已基本完成数据中心及其他附属设施的施工图设计。因风机房与风道衔接密切，将优先建设风机房。

Construction drawings of the Data Centre and auxiliary facilities are nearly completed. Given the tight connection between ventilation room and tunnel, priority is given to the construction of the ventilation room.

6 月 17-18 日，通过开会比选，确定防雷塔和接地网工程项目由云南云雷联创气象科技服务有限公司承接，计划 7 月 1 日开工。

On June 17-18, 2020, Yunnan YLLC Meteorological Science & Technology Service Co., Ltd. was chosen to undertake the construction of the lightning protection tower and the grounding net via a careful comparison and selection procedure. This project is planned to start on July 1, 2020.

- ## CCD 相机研制 CCD Camera Development

光本卓研科研有限公司和安道尔公司每月提交有关 e2v CCD 芯片以及 Andor iKon-XXL 科学级超大靶面 CCD 相机的书面进展报告。截至目前，情况良好，但仍有因新冠肺炎疫情影响导致货期延误的风险。

Photon Basic Research Technology Limited and Andor Technology Limited submit respectively the monthly progress reports of the production status of the e2v CCD sensors and of the Andor iKon-XXL cameras. Hitherto, the projects are in good shape. However, the eventual delivery might be delayed a bit due to the impact of the Covid-19 pandemic.

2020 年 6 月 3 日，研究所与国家天文台天文光学与红外探测器实验室签署《CCD 芯片设备租借协议》，向其租借一块 CCD 工程级芯片（5 级片）用于测试相机研制。

On June 3, 2020, SWIFAR signed a rental agreement with the Astronomical Optics and Infrared Detector Laboratory (AOIDL) of National Astronomical Observatories, CAS (NAOC), renting an e2v CCD 290-99 sensor of engineer grade for the purpose of CCD test cameras development by the AOIDL for the Mephisto project .

- ## Mephisto 软件与科学 Mephisto Software and Science

自 2020 年 4 月以来，共举办 5 次 Mephisto 软件与科学双周系列讨论会。项目科学组、时域组、巡天策略组以及数据处理组介绍了各自的进展。

Since April 2020, five of the biweekly series of Mephisto Software and Science Meetings were held. The teams on Mephisto science, time-domain astronomy, survey strategy, and data processing presented their progress.

2020 年 4 月 10 日和 5 月 15 日，研究所与国家天文台举办 1.6 米多通道测光巡天望远镜观测控制系统（OCS）月度双边例会。预计 7 月初完成小型模拟测试系统的搭建。

On April 10 and May 15, 2020, as part of the monthly series, two bilateral workshops were held with the NAOC on the Mephisto Observatory Control System (OCS). A proto system of OCS is expected to be completed by early July.

四、教学和研究生培养 Teaching & Graduate Training

教学 Teaching & Learning

- 2020 年 6 月 5 日，何紫朝同学和邓文强同学顺利通过硕士学位论文答辩，他们是中国西南天文研究所培养的首批硕士毕业生。祝两位同学未来学业进步，事业有成！

图 4.1: 何紫朝同学和邓文强同学与中国西南天文研究所教师合影留念 Mr. Zizhao He and Mr. Wenqiang Deng with the examination committee on the occasion of their M.Sc thesis defence

On June 5, 2020, Zizhao He and Wenqiang Deng passed their M.Sc thesis defence with excellent performance. They are the very first graduating M.Sc students trained in SWIFAR. Sincerely wish them a bright academic career future.

- 2020 年 5 月 26 日和 27 日，中国西南天文研究所举行了 2020 年硕士研究生录取复试。十四名考生参加了线上面试，经过严格的专业和英语测试，最终研究所确定录取十名考生。期待新同学的加入！

On May 26 and 27, 2020, SWIFAR conducted the admission interview of 2020 prospective M.Sc students. Fourteen students joined the online interview, and ten of them were finally admitted. We warmly welcome them to join SWIFAR soon!

图 4.2: 中国西南天文研究所 2020 年硕士研究生录取线上面试 SWIFAR online admission interview of the candidates for the 2020 M.Sc program

- 2020 年 5 月 19 日，中国西南天文研究所所长通过了研究生委员会制定的《研究生工作细则》。该细则旨在进一步规范研究生培养过程，提高培养质量。

  On May 19, 2020, the SWIFAR Director approved the *Postgraduate Training Code of Practice*, formulated by the Graduate Committee. The document aims to provide guidelines to both students and supervisors of SWIFAR so that we can further improve our graduate training quality.

研究生培养 Postgraduate Training

✧ 2017 级硕士毕业生何紫朝在中国西南天文研究所学习感悟：

图 4.3：何紫朝同学在西藏阿里北冕天文台

Mr. Zizhao He at Beimian Observatory, Ali, Tibet

在研究所度过的三年，对我而言，是充实、新鲜而有趣的三年。第一次讲文章、第一次讲组会、第一次在学术会议上作报告、第一次去拉萨和阿里，都发生在这短短的三年中。

第一年，我努力学习专业课，并在尔欣中老师的启发与支持下选定了研究课题。第二年，在范祖辉老师和尔欣中老师的指导下，我的科研渐有成效，开始与不同的学者交流。我第一次作学术报告是在威海，那种紧张和兴奋至今记忆犹新。第三年，我的研究遇到了一些障碍，结果不太理想，后面经过与导师们的不断讨论以及和校外学者的交流，我意识到了自己学习中存在的不足，随即尽力弥补缺陷。终于，我的文章于 2020 年春节投稿。

三年的硕士研究生生活，给我留下不少记忆深刻的片段。在格物楼的时候，记得刘项琨老师晚上还陪着我们在办公室讨论问题；记得自己找到了一个被强透镜的类星体的那种激动（虽然后面发现 2018 年的时候已经被人找到过）；记得那次中秋茶话会上与刘晓为老师、范祖辉老师开心的聊天……

最后，真的非常感谢所有老师对我的指导和协助，以及同学们对我的帮助。虽然要离开了，但在研究所选定的研究兴趣和方向没有改变。今后，每当在研究中取得进展，每当在人生遇到重大事情，我都会想到研究所，想到老师、同学们。因为一切是从这里开始的。祝 Mephisto 早日开光。

✧ Zizhao He, graduating M.Sc student of grade 2017, talks about his learning experience at SWIFAR:

The past three years in SWIFAR have been meaningful, fruitful and exciting. This is the place where I first talked about a paper, gave a talk in our cosmology group meeting, delivered a presentation in an academic meeting, and went to Lasa and Ali. All of these things happened for the first time in my life.

In the first year, I studied gradate courses. My research topic was inspired by Prof. Xinzhong Er, who also helped me a lot during the course. In the second year, I gradually had some results for my research and started to talk with different scholars. I clearly remembered how nervous yet so excited I was before delivering my very first talk to an academic meeting in Weihai. In the third year, I encountered some problems in my research — the results were not in line with my expectations. After discussing many times with Prof. Zuihui Fan and Prof. Xinzhong Er, as well as with some researchers from other institutes, I realized that there were some profound shortcomings in my work. Later, I tried to make them up. Eventually, I managed to submit my first research article to *MNRAS* for peer review during the Spring Festival of 2020.

There were many memorable moments during my time at SWIFAR. I remembered when we were still in Gewu building, Associate Prof. Xiangkun Liu often stayed late with us in the office and answered many of our questions, scientific ones and beyond. I recalled how happy I was when I discovered a lensed quasar, even though I found later it had already been reported by other groups two years ago. I also remembered our delightful chat in a Mid-autumn Festival tea party with Prof. Xiaowei Liu and Prof. Zuihui Fan.

Finally, what I want to emphasize is how I appreciate the help and guidance from all the teachers and classmates of SWIFAR. Although I am going to leave SWIFAR, the research interest that I developed here will not change. In the future, if I manage to make a significant progress in my work, I will recall SWIFAR, the teachers and classmates I met there because everything started at SWIFAR. I wish the Mephisto Project could have its first light soon.

✧ 2017 级硕士毕业生邓文强在中国西南天文研究所学习感悟：

2020 年 6 月 5 日我完成了硕士毕业论文答辩。很幸运能在中国西南天文研究所度过三年求学之路。研究所是个非常棒的学习之地，我喜欢研究所的学习环境、老师及同学，并对他们深表谢意。我相信中国西南天文研究所会越来越好，会成为世界顶级的天文研究所。

✧ Wenqiang Deng, graduating M.Sc student of grade 2017, talks about his learning experience at SWIFAR:

I completed my thesis defence on June 5, 2020. I was lucky to spend the past three years at SWIFAR. SWIFAR is a wonderful institute. I like the learning environment, teachers and classmates at SWIFAR. Many thanks to them. I believe that SWIFAR will be better and better and become one of the world's top astronomical institutes in the future.

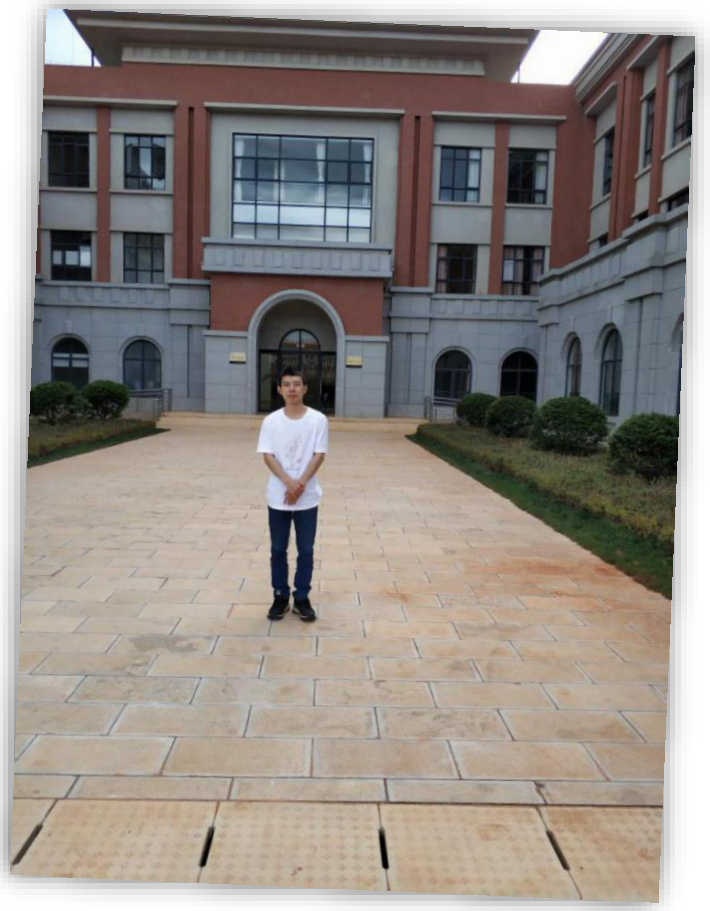

图 4.4: 邓文强同学在云南大学天文楼前

Mr. Wenqiang Deng in front of the YNU Astronomy Building

我从 2019 年 12 月加入 SWIFAR 到现在已经半年了，之前是在法国波尔多的天体物理学实验室工作。当我还在法国的时候就向 SWIFAR 提交了博士后研究人员职位的申请，然后很幸运地被录用了。作为一名研究者，我在这里看到了实现目标的绝佳机会，这样的机会在欧洲和美国许多同类研究机构或许是天方夜谭。我之所以这样说，是因为包括 SWIFAR 在内的许多中国大学和研究机构都在为初出茅庐的研究人员积累相关科研经验提供资金和制度上的支持，这对培养他们无论在科研成果的数量还是质量上都能与发达国家相抗衡的科研能力是至关重要的。

图 4.5: 瓦西姆 • 伊克巴尔博士后办公室窗外的景色

The view from the office window of Postdoctoral Fellow Wasim Iqbal

Six months have passed since I joined SWIFAR in December 2019. Before coming here, I worked in the Laboratory of Astrophysics in Bordeaux, France. While still in France, I found the luck to apply for a SWIFAR post-doctoral position, and I was fortunate enough to be recruited. Here, as a researcher, I see an excellent opportunity to achieve what, perhaps, could not have been possible at many others similar institutes in Europe or in the USA. I say this because a large number of universities and research institutes in China, including SWIFAR, are providing early career researchers with the financial as well as institutional support that allow them to gain research experience and develop research capacity, at a level that matches in both quality and quantity with those possible in any other developed countries.

从来到 SWIFAR 的第一天起，我就忘我地投入到了自己的科研项目中。在这段时间里，我作为一名研究者不仅充分感受到了自身的成长，同时也很快意识到在当前促使研究人员不停发表论文的“不发表就灭亡”的学术文化中，做一个博士后是多么的不同。展望未来，

我在 SWIFAR 看到了施展拳脚的大好机会。借着这个新的机会，我加强了与本领域其他几个研究小组的合作，这对我拓展研究领域大有帮助。现在，我期待着我所作的研究和发表的文章能够引起更多分子天体物理学同行的关注。对此，SWIFAR 提供的博士后研究职位为我创造了比单个研究项目所能提供的更为丰富的研究机会。我十分看好我的研究项目在不久的将来即将取得的成果。

Since the very first day in SWIFAR, I got the freedom to be indulged in developing my own research projects. This experience greatly helped me grow a bit as a researcher and also made me quickly realize how different it is to be an independent researcher in the current "publish-or-perish" culture that pushes researchers to publish more and more. Looking ahead, I see a great opportunity for myself in SWIFAR. I took this new opportunity to boost my collaborations with a couple of other research groups in my field. This has helped me to expand my field of research greatly. Now I expect my research and publications to attract the attention of a much larger community of researchers in molecular astrophysics. Thus, the fellowship at SWIFAR has opened the research opportunities for me that exceeds what an individual research project could offer. I am very positive about the outcomes of my research projects in the near future.

图 4.6: 瓦西姆 • 伊克巴尔博士后拍摄的云大校园内的樱花树
Photo of cherry trees in the campus of YNU, taken by Postdoctoral Fellow Wasim Iqbal

SWIFAR 的工作氛围是我目前工作过的所有地方中最好的一个。昆明市宜人的天气更是锦上添花。很多时候，当我坐在办公室时，就会看看窗外的远山。这样的景色让人心旷神怡，使我能够更深入地思考。我一直很欣赏山的壮美。云南大学呈贡校区的校园大而美丽，显然是经过一番精心设计的。傍晚时分，天气好的时候，我经常骑着电动自行车在校园里转悠。这里有池塘和花园，还有美丽的樱花树。在生机勃勃的春日里看到盛开的樱花，实在是一桩美事。

The working atmosphere at SWIFAR is one of the best of all the places I have worked so far. The pleasant weather of Kunming is only a plus. Very often, while sitting in my office, I look at mountains visible from the window. The view is so relaxing. It helps me think more deeply. I always appreciate the beauty of the mountains. The University campus is big and beautiful. It is a well thought of campus. Very often in the evening, I take my e-bike to roam around the campus when the weather is good, which is the case quite often. There are ponds and gardens and beautiful stretches of cherry trees. It was such a wonderful experience during the spring season to see the cherry trees blossom.

假期里，我有幸到昆明的一些景点游玩。昆明是一座群山环绕的美丽城市，至少有两个景点都深受我和家人的喜爱。首先是滇池附近的湿地公园，这里是放松身心、欣赏美丽滇池的最佳场所。其次是昆明动物园，这里是有小孩的一家人必去的景点，我的儿子们很喜欢它。昆明动物园非常的大，需要一整天的时间才能全部游览完。

During the holidays I got the opportunity to visit a couple of places in Kunming. Kunming is a beautiful city surrounded by mountains. Here, I would like to mention at least two places which I enjoyed with my family. First is Wet Land Park near Lake Dianchi. It is a perfect place to relax and enjoy the beautiful Lake Dianchi. Second is the Kunming Zoo. It is a must-go place for anyone with kids. My sons love it. It is a big zoo and needs all day to enjoy it fully.

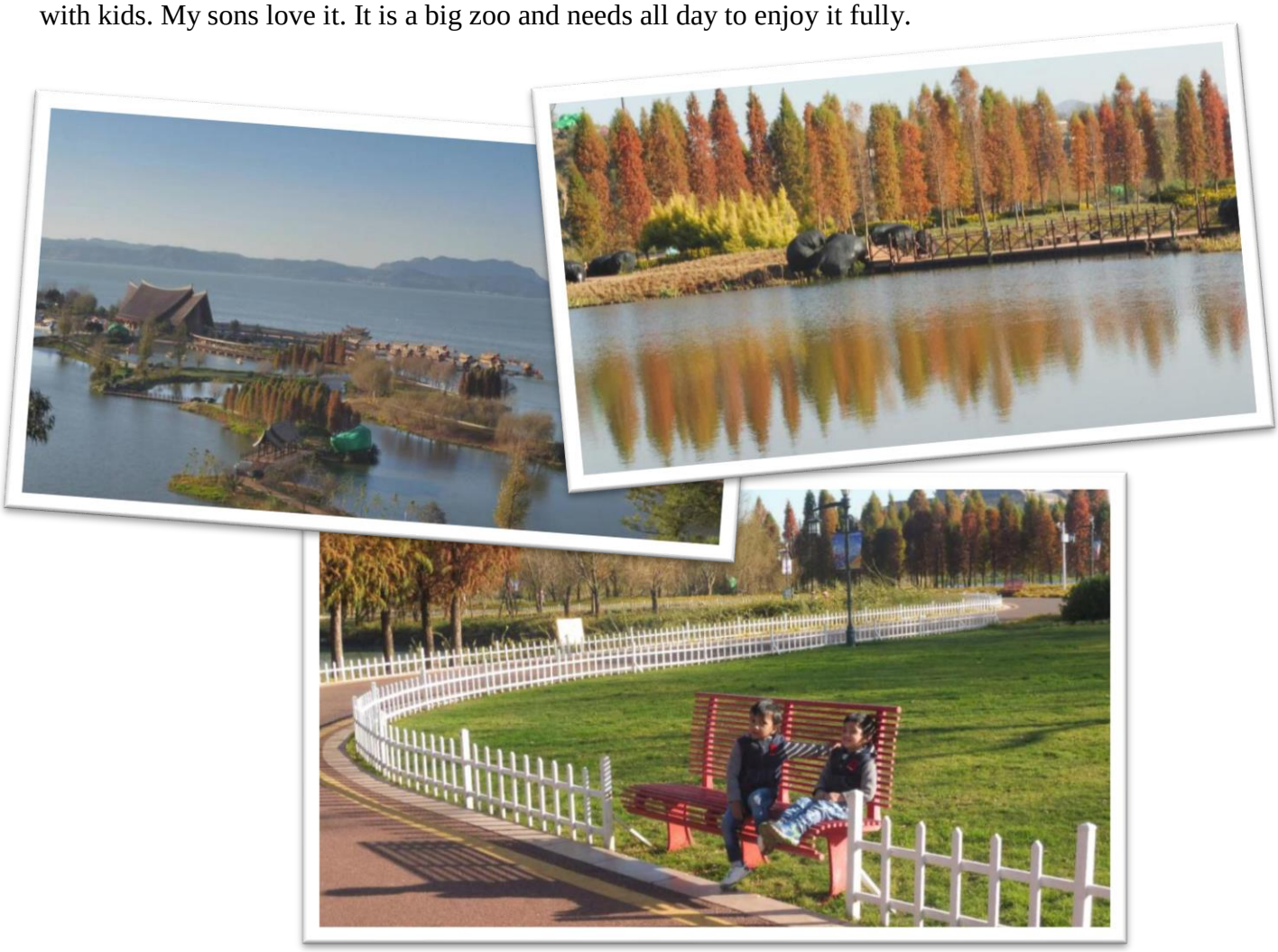

图 4.7: 瓦西姆·伊克巴尔博士后拍摄的和家人在昆明游玩的照片

Photos taken by Postdoctoral Fellow Wasim Iqbal of his family trips in Kunming

最后，我要衷心感谢 SWIFAR 的全体师生，尤其是子昭瑾、刘项琨、刘晓为所长和胡玥，是他们让我在异国他乡落脚后也能拥有现在这样安宁舒适的生活。

Finally, I would like to say thanks to SWIFAR students, staff, and faculty who made it really comfortable for me to move and settle to a new place. Especially Zhaojin Zi, Xiangkun Liu, Prof. Xiaowei Liu, and most recently Yue Hu.

——云南大学中国西南天文研究所印度籍博士后：瓦西姆·伊克巴尔

— Wasim Iqbal, postdoctoral fellow of SWIFAR, YNU

五、 教师风采 Faculty Profile

杨元培，1989 年出生于云南昆明，现为研究所助理教授，主要研究领域为快速射电暴。

Born in Kunming, Yunnan in 1989, Yuanpei Yang is an assistant professor of SWIFAR. His main research field is fast radio bursts.

能否请您简单作个自我介绍？

我叫杨元培，1989 年 4 月出生于云南昆明。由于中学的时候对天文和物理一直有着浓厚的兴趣，2007 年高考第一志愿就填报了南京大学天文学系，并被顺利录取。2007 至 2011 年，我在南大完成了本科阶段的学习，随后获得保研资格，继续在南大进行硕博连读。读研期间，我主要从事高能天体物理研究，特别是中子星相关的辐射过程，导师是南大的戴子高教授。2014 年至 2015 年，我到美国内华达大学拉斯维加斯分校进行了为期一年的访问学习，在此期间我认识了张冰教授，并开启了长期的学术合作。2016 年 6 月我从南大博士毕业，并于同年 7 月到北京大学科维理天文与天体物理研究所从事博士后研究工作。2019 年 4 月，我正式加入云南大学中国西南天文研究所，担任助理教授一职。

Could you briefly introduce yourself?

My name is Yuanpei Yang. I was born in Kunming, Yunnan, in April 1989. When I was in middle school, I was so fascinated by astronomy and physics that I applied to the Department of Astronomy of Nanjing University (NJU) as my first choice in the 2007 college entrance exam, and was successfully admitted to its undergraduate program. In 2011, I completed my undergraduate studies and continued my studies through the successive postgraduate and doctoral program at NJU. During this period, I mainly worked on high-energy astrophysics, especially the radiative processes related to neutron stars, under the supervision of Prof. Zigao Dai. From 2014 to 2015, I went to the University of Nevada, Las Vegas, USA as a visiting scholar and met Prof. Bing Zhang, with whom I started a long-term academic collaboration. I got my PhD degree from NJU in June 2016 and joined the Kavli Institute for Astronomy and Astrophysics (KIAA) at Peking University (PKU) in July for postdoctoral research. In April 2019, I became an assistant professor of SWIFAR.

您最早是从什么时候开始对天文学产生兴趣的？

上小学的时候我父亲给我买过一套《中国少年儿童百科全书》，那时很喜欢读里面各种神奇的自然现象和历史上科学家的故事。当时第一次知道卡文迪许一生都宅在家里做实验，直到去世后大量的工作才被后人整理出来。那种纯粹的研究精神震撼了我。初中的时候，霍金著名的《时间简史》在各大书店非常热销，我也买了一本。书里讲述的宇宙诞生和量子现象深深吸引着我，从那时起，我就下定了将来要学习天文和物理的决心。

When did you first become interested in astronomy?

Back in my elementary school years, I was captivated by a series of book entitled "*Chinese Children's Encyclopaedia*" that my father bought me one day. At that time, all the amazing natural phenomena and stories about famous scientists in the world history depicted in the book made me wonder. I remember when I first read the story about Cavendish, who spent all his life staying at home and experimenting, and it wasn't until after his death that a great deal of his work was put together by the later generations. His sheer spirit of scientific research impressed me profoundly. When I reached junior high school, I bought a copy of Stephen Hawking's well-known book, "*A Brief History of Time*," a bestseller of major bookstores at that time. I was fascinated by the author's theory about the birth of the universe and the quantum phenomena, and made up my mind from then on to study astronomy and physics in the future.

图 5.1: 杨元培老师镜头下的云大校园

A view of the campus of YNU, taken by Assistant Professor Yuanpei Yang

如果您现在面对的是一个像您当年那样对天文学感兴趣的初中生，您将如何向他介绍您目前研究的领域？

我目前主要的研究领域是快速射电暴，这是近十年来新发现的一类天文现象。它们的持续时间只有千分之一秒，因此要捕获它们非常困难。作为射电电磁波，快速射电暴的频率与我们每天接触到的手机信号相当，只是它们绝大部分产生于银河系之外、甚至宇宙学距离上。从 2007 年发现第一个快速射电暴，天文界至今对快速射电暴知之甚少——它从哪里来？是怎么产生的？事实上，由于快速射电暴在过去十余年一直对众人保持着神秘，它甚至被怀疑是来自于地外文明的信号。直到 2020 年 4 月 28 日，天文学家在观测银河系内一个磁星活动时探测到了来自该天体的快速射电暴，才首次了解了快速射电暴的起源。

If you were actually having a conversation with a junior high school student who was as interested in astronomy as you were back then, how would you introduce your current field of study to him?

My current field of study is fast radio bursts, a new class of astronomical phenomena discovered only in the last decade. Fast radio bursts last only a thousandth of a second, making them very difficult to capture. As electromagnetic waves in the radio band, they have frequencies comparable to the cell phone signals we are exposed to every day, except that most of them are generated beyond our Galaxy the Milky Way, or even at cosmological distances. The astronomical community had known very little about fast radio bursts since they were first discovered in 2007 - Where do they come from? What is the cause of them? In fact, fast radio bursts have remained such a mystery to the public for the past decade that they are also suspected to be signals most likely emitted by extra-terrestrial civilizations. It was not until 28 April 2020 that astronomers, while monitoring the

activities of a magnetar in the Milky Way galaxy, detected its fast radio bursts, revealing, for the first time, the origin of the latter.

您在 SWIFAR 所做的研究都有哪些进展？

我从去年 4 月加入 SWIFAR 以来，主要的研究工作都是围绕着快速射电暴展开，包括快速射电暴的辐射机制、传播效应，以及多波段观测特征。此外，我还从事过一些基于天体物理学方法对基础物理进行限制的研究。过去一年里，我已在国际天文学重要期刊上，例如《天体物理学杂志》《皇家天文学月刊》等，发表了学术文章 13 篇，其中作为第一作者或通讯作者的有 7 篇。前段时间我与南京大学天文与空间科学学院王发印教授等人提出了部分快速射电暴可能源于双中子星并合形成的大质量磁星的活动过程，该理论可以解释为什么目前一部分被定位的快速射电暴位于大质量星系的外围。此外，我最近还加入了中国的 500 米口径球面射电望远镜 FAST（也被国内的媒体形象地称为“天眼”）的快速射电暴搜寻项目，我们合作组最新的工作表明并非磁星的每次 X 射线爆发都会产生快速射电暴，其中原因可能是快速射电暴存在集束效应，或有较宽的频率分布范围。

What progress are you making in your research here at SWIFAR?

Since I joined SWIFAR in April last year, my research has been mainly focused on fast radio bursts, including their radiative mechanisms, propagation effects, and multi-wavelength observational properties. Besides, I have also worked on using the astrophysical probes to constrain the fundamental physics. In the past year alone, I have published 13 papers in major international journals of astronomy such as *ApJ* and *MNRAS*, 7 of them I am the first or corresponding author. Recently, in collaborating with Prof. Fayin Wang from the School of Astronomy and Space Science, Nanjing University, I have put forward a hypothesis that fast radio bursts may originate from activities of newly born massive neutron stars resulted from binary neutron star mergers. This could explain why a fraction of the currently localized fast radio bursts have large offsets from the centres of the host galaxies. In addition, I recently became a member of a project searching for fast radio burst with the Five-hundred-meter Aperture Spherical Telescope (FAST, also called “Tianyan”, meaning “an eye of the sky” by the Chinese press). The latest work from this project shows that not all X-ray bursts of a magnetar are accompanied by fast radio bursts. This may be due to the beaming effects or a wide range of frequency distribution of fast radio bursts.

图 5.2: 杨元培老师的办公室一角

Assistant Professor Yuanpei Yang’s office at SWIFAR

您目前参与了哪些学术活动？

从去年底到现在，我在国际天文学重要期刊上担任过四次审稿人，包括《天体物理学快报》《天体物理学杂志》和《高能天体物理

杂志》。在今年国家自然科学基金委的中长期规划中，我还担任了“快速射电暴及引力波暴”子课题的共同撰稿人。此外，在学术活动方面，我从这学期开始负责研究所的午间讨论会，该活动的宗旨为促进国内外青年学者的学术交流、增强云南大学天文学科与国内外同行的合作。我们希望通过该活动营造充满活力和创新精神的学术文化氛围。

What academic activities are you currently involved in?

Since the end of last year, I have served for four times as reviewer for major international astronomical journals including *ApJL*, *ApJ*, and *JHEAP*. This year I also contribute to the drafting of “Fast radio bursts and gravitational wave bursts”, that form parts of a white book on the medium and long-term plan of Chinese astronomy, sponsored by the National Natural Science Foundation of China (NSFC). Moreover, in terms of academic activities, I have been in charge since this semester of the SWIFAR Lunch Talks, which aims to promote national and international academic exchanges amongst young scholars and to enhance the cooperation between the astronomers of Yunnan University and their counterparts both in China and abroad. We hope to create a vibrant and innovative academic culture at SWIFAR through these activities.

作为昆明本地人，您对 SWIFAR 来自外地甚至外国的师生在本地的生活、旅游和美食各方面都有哪些建议呢？

我家在昆明市区里，个人感觉呈贡和市区还是有很多区别的。比如呈贡这边校园和周边的环境都非常优美，但和市区相比也多了一份冷清，一些刚到的老师和同学可能比较难体验到昆明丰富多彩的文化娱乐生活。我建议他们周末放假时可以到市区、尤其是翠湖附近感受昆明的文化氛围和历史遗迹。比如中国国歌的作曲者聂耳年少时就在翠湖习乐，翠湖附近还有吴三桂勒死南明皇帝永历父子的“逼死坡”和他们的殉国纪念碑，以及闻一多故居、朱德讲武堂等。另外，翠湖旁边就是云大和云师大的老校区，这里也有很久的历史，包括抗战期间的

图 5.3: 杨元培老师拍摄的翠湖的荷花

Photo of a lotus in bloom at Lake Cuihu, taken by Assistant Professor Yuanpei Yang

西南联合大学旧址、林徽因设计的学生宿舍等等。美食方面我最喜欢家里做的豆花米线。前段时间在时代俊园小区里吃到的宣威菜也很不错，可以推荐给喜欢麻辣口味的同好。生活方面我唯一担心的就是外国的同事在昆明就医时可能会遇到困难，因为当地的医院里会说英语的人不多，建议他们有空时可以学一些中文。

As a native of Kunming, what advice would you give to the faculty and students of SWIFAR who come from other parts of China and the rest of the world about the local life, tourist sights, food, etc.?

I'm a native of "downtown" Kunming, which is kind of different from the Chenggong District. For example, while the natural environment of the Chenggong campus and the surrounding area deserve to be called superb, life can sometimes be monotonous here, and the newcomers might find it difficult to fully enjoy the various local cultural and recreational activities. Thus, I suggest they go to the vicinity of Lake Cuihu in downtown Kunming on weekends or holidays to experience the cultural atmosphere and visit the historical relics: as you may or may not know, Er Nie, the composer of China's national anthem, used to learn music by Lake Cuihu when he was a young boy; the "Death hill" where the historical figure Sangui Wu strangled Emperor Yongli and his son, as well as the monument of their martyrdom are also situated near Lake Cuihu; not to mention Yiduo Wen's former residence, De Zhu's Lecture Hall, etc. Next to Lake Cuihu you can also find the old campus of Yunnan University and Yunnan Normal University, where the historical site of the National SouthWest Associated University, founded during the Resistence War Against Japan, along with the student dormitory designed by Huiyin Lin, the first female architect in modern China, is located. When it comes to food, I must admit I like the homemade local speciality—"tofu pudding rice noodles" the most; but the Xuanwei dish I had tried in the Shidai Junyuan neighbourhood some time ago is equally tasty, I highly recommend it to those who are addicted to spicy food. The only concern I have for my foreign colleagues at SWIFAR is that they may encounter difficulties when seeking medical treatment in Kunming because few people in the local hospital speak English. My advice for them would be to learn some Chinese in their spare time.

六、 学术活动 Academic Activities

学术报告 Colloquia

时间：2020 年 4 月 2 日（星期四）下午 3:00
报告人：沈世银（中国科学院上海天文台）
题目：基于 SDSS 和 LAMOST 光谱巡天的致密星系系统研究
地点：视频会议
摘要：在本次报告中，我将首先介绍 LAMOST 光谱巡天的互补星系样本，该样本针对的是斯隆巡天（SDSS）的主星系样本中由于光纤重叠效应而没有进行红移测量的低红移星系。这些星系主要分布在致密星系系统中（如星系对、三体星系和致密星系群），是研究星系-星系相互作用和并合过程的理想实验室。将互补星系样本与 SDSS 主要星系样本相结合，构建了迄今为止最大、最完整的星系对以及致密星系群样本。基于该样本，我们第一次用一种新的统计方法量化了两个星系是如何成对的。利用积分场光谱学提供的运动学数据，我们可以进一步量化两个星系的并合过程。利用星系群成员星系的光谱红移，我们首次表征了致密星系群的动力学特性，并揭示了致密星系群与普通星系群之间的联系。

Time: 3:00 PM, Thursday, April 2, 2020
Speaker: Shiyin Shen (SHAO)
Title: Compact galaxy systems in Sloan Digital Sky Survey and LAMOST spectral survey
Venue: Video Conference
Abstract: In this talk, I will first introduce the complementary galaxy sample in the LAMOST spectral survey, which targets the low redshift galaxies without redshift measurements in the main galaxy sample of the Sloan Digital Sky Survey（SDSS）due to the fiber collision effect. These galaxies are mainly in the compact galaxy systems, e.g., galaxy pairs, triplets, and compact galaxy groups, which are ideal labs for studying the galaxy-galaxy interaction and merging process. By combining the complementary galaxy sample with the SDSS main galaxy sample, we have built the largest and the most complete galaxy pair and compact galaxy group sample to date. With the large galaxy pair sample, we have first time quantified how two galaxies are paired with a novel statistical approach. With kinematical data from integral field spectroscopy, we may further quantify the merging phase of individual galaxy pairs. With the spectroscopic redshifts of the group members, we characterized the dynamical properties of the compact galaxy groups for the first time and thus revealed the connection between the compact galaxy groups and the normal galaxy groups.

时间：2020 年 4 月 9 日（星期四）下午 3:30
报告人：Daichi Kashino（苏黎世联邦理工学院物理系）
报告题目：利用 Subaru/HSC 探索再电离的末尾阶段
报告地点：视频会议
报告摘要：在宇宙再电离结束时，星系际介质（IGM）与星系之间的联系包含了早期再电离过程的物理信息。一个值得注意的观测事实是，Lyα 线系在类星体的观测视线方向上不透明度变化很大。观测到的 HI 光深空间分布的不同情况可预测中性氢残留量和星系分布之间的不同关系。为了区分这些模型，我们使用 Subaru/HSC 星系巡天观测，对 z>6 明亮的类星体进行探测，这些类星体的 Lyα 线系告诉我们视线范围内的中性氢分布。作为第一个引人注目的结果，我们指出在红移 z~5.7 的 Lyα 线一处高效光深区域与星系密度不足有关。这一观测结果与由于星系主导的

紫外背景的波动，或者与在低至 z~5.5 或更低的红移时结束的电离作用所导致的残余中性氢产生了较大的光深波动的情况所造成的结果是一致的。

Time: 3:30 PM, Thursday, April 9, 2020
Speaker: Daichi Kashino (Department of Physics, ETH Zurich)
Title: Exploring the tail end of reionization with Subaru/HSC
Venue: Video Conference
Abstract: The connection between the IGM and galaxies at the end of cosmic reionization encodes information about the reionization process at earlier epochs. A remarkable observational fact is that the Lya forest opacity is widely varying across quasar sightlines. Different possible scenarios accounting for the observed spatial variations in the HI optical depth predict different relations between the amount of residual neutral hydrogen and galaxy distribution.
To distinguish these models, we are carrying out galaxy surveys using Subaru/HSC at z~5-6 in the fields of z>6 bright quasars, whose Lyα forest spectra tell us about the neutral hydrogen structure along the sightlines. As the first remarkable result, we present evidence that a region of high effective Lyα optical depth at z~5.7 is associated with an underdensity of galaxies. This observation is consistent with scenarios in which large optical depth fluctuations arise due to fluctuations in the galaxy-dominant UV background, or due to residual neutral islands that are expected from reionization that ended at redshifts as low as z~5.5 or lower.

时间：2020 年 4 月 16 日（星期四）下午 3:00
报告人：黄志琦（中山大学）
报告题目：超新星等演化和 PAge 近似法
报告地点：视频会议
报告摘要：Ia 型超新星光度的环境依赖性证据激发了最近关于宇宙后期的讨论：宇宙加速是否仍被超新星数据所支持（Kang et al. 2020）。我们采用了一个额外的扰动参数，该参数描述了超新星绝对星等对其前身星年龄的依赖性。利用 Pantheon 超新星数据、宇宙年龄的下限 12Gyr 以及假设哈勃常数 70 ± 2 km/s/Mpc 的先验概率，我们重建了宇宙膨胀过程。在平坦的 LCDM 框架内，我们仍然发现宇宙加速膨胀超过了 5.6 σ 。这是因为一个物质主导的减速膨胀宇宙会导致我们所构建的宇宙太年轻，与观测到的年老恒星相矛盾。然而，一个减速膨胀但非平坦的宇宙与数据也有着一定的统计一致性，只是在存在负的空间曲率——比目前宇宙微波背景数据所提供的约束条件高出了两个数量级。最后，我们提出了一个基于宇宙年龄的更通用的参数设定(PAge)，它与暗能量概念没有直接联系，因此对于检验宇宙加速度膨胀十分理想。我们发现，对于 Kang 等人定义的星等演化率，一个平坦且减速膨胀的 PAge 宇宙与超新星数据和宇宙年龄约束条件完全一致，并且与观测到的 CMB 声角尺度的几何约束相符。

Time: 3:00 PM, Thursday, April 16, 2020
Speaker: Zhiqi Huang (SYSU)
Title: Supernova Magnitude Evolution and PAge Approximation
Venue: Video Conference
Abstract: The evidence of environmental dependence of Type Ia supernova luminosity has inspired recent discussions about whether the late-universe cosmic acceleration is still supported by supernova data (Kang et al. 2020). We adopt the Δ HR/Δ age parameter, which describes the dependence of supernova absolute magnitude on the age of supernova progenitor, as an additional nuisance parameter. Using the Pantheon supernova data, a lower bound 12 Gyr on the cosmic age, and a Gaussian prior 70 ± 2km/s/Mpc on the Hubble constant, we reconstruct the cosmic expansion history. Within the flat LCDM framework, we still find a 5.6σ detection of cosmic acceleration. This is because a matter-dominated decelerating universe would be too young to accommodate observed old stars. A decelerating but non-

flat universe is marginally consistent with the data, however, only in the presence of a negative spatial curvature ~ two orders of magnitude beyond the current constraint from cosmic microwave background data. Finally, we propose a more general Parameterization based on the cosmic Age (PAge), which is not directly tied to the dark energy concept and hence is ideal for a null test of the cosmic acceleration. We find that for a magnitude evolution rate defined in Kang et al., a spatially flat and decelerating PAge universe is fully consistent with the supernova data and the cosmic age bound, and has no tension with the geometric constraint from the observed CMB acoustic angular scales.

时间：2020 年 4 月 23 日（星期四）下午 3:00
报告人：Miho Kawabata（日本京都大学）
报告题目：对邻近星系中年轻的 Ia 型超新星的快速后随观测
报告地点：视频会议
报告摘要：对于 Ia 型超新星，峰值光度和光变曲线下降速率之间存在着确立已久的相关性，这就是所谓的光度-宽度关系（Phillips 1993）。这种关系使得 SNe Ia 可以作为精确的标准烛光来测量我们与遥远星系的宇宙尺度距离，进而测量宇宙学参数（Riess et al. 1998; Perlmutter et al. 1999）。然而，关于 SNe Ia 的爆发机制仍在争论之中。人们提出了一些区分不同前身星的方法。例如，在单简并情况下，一些研究指出在爆炸后的几天内就可以看到超新星爆发和伴星之间的相互作用（e.g., Kasen 2010）。当喷出物与伴星相撞时，会在最初的几天里产生一个冲击冷却信号。该信号取决于伴星的大小、距离和观测角度。我使用 Higashi-Hiroshima 天文台的 1.5 米 Kanata 望远镜和 Okayama 天文台的 3.8 米 Seimei 望远镜对刚刚爆发的 Ia 型超新星进行了快速后随观测。在本次演讲中，我将介绍光学和近红外后随观测策略和在 Ia 型超新星爆炸后几天内获得的良好的样本数据（details for Kawabata et al. 2020）。

Time: 3:00 PM, Thursday, April 23, 2020
Speaker: Miho Kawabata (Kyoto University)
Title: Rapid follow-up observations of young Type Ia supernovae in the nearby galaxy
Venue: Video Conference
Abstract: There is a well-established correlation between the peak luminosity and the light-curve decline rate, known as the luminosity-width relation (Phillips 1993). This relation allows SNe Ia to be used as precise standardized candles to measure the cosmic-scale distances to remote galaxies and thus the cosmological parameters (Riess et al. 1998; Perlmutter et al. 1999). However, there are still under debate about the progenitor system of SNe Ia. Some methods to distinguish the progenitor scenario are suggesting. For example, in the single degenerate scenario, some previous studies suggest the interaction between the ejecta of SN and companion can be seen within a few days from the explosion (e.g., Kasen 2010). When the ejecta collides with the companion, it creates a shock cooling signature over the first few days. The signature depends on the size, distance of the companion, and the viewing angle. From the data at few days after the explosion, the rapid follow-up observations of SNe Ia was performed using the 1.5m Kanata telescope at Higashi-Hiroshima Observatory, and 3.8m Seimei telescope at Okayama Observatory. In this talk, I introduce the optical and NIR follow-up observational strategy and good sample from which data was obtained within a few days from the explosion (details for Kawabata et al. 2020).

时间：2020 年 4 月 30 日（星期四）上午 10:00
报告人：David Garofalo（肯尼索州立大学）
报告题目：跨越空间和时间的黑洞
报告地点：视频会议
报告摘要：近 60 年前，在一次关于新发现的类星体的会议上，当第一个能从实质上解释黑洞的文章被提交给与会天文学家时，其被认为是无关紧要的。但此后不久，特别是在最近的 20 年里，

黑洞在我们寻求理解星系结构和演化的过程中变得至关重要。我将介绍将黑洞推向天文学中心舞台的观测结果以及最近的理论见解。

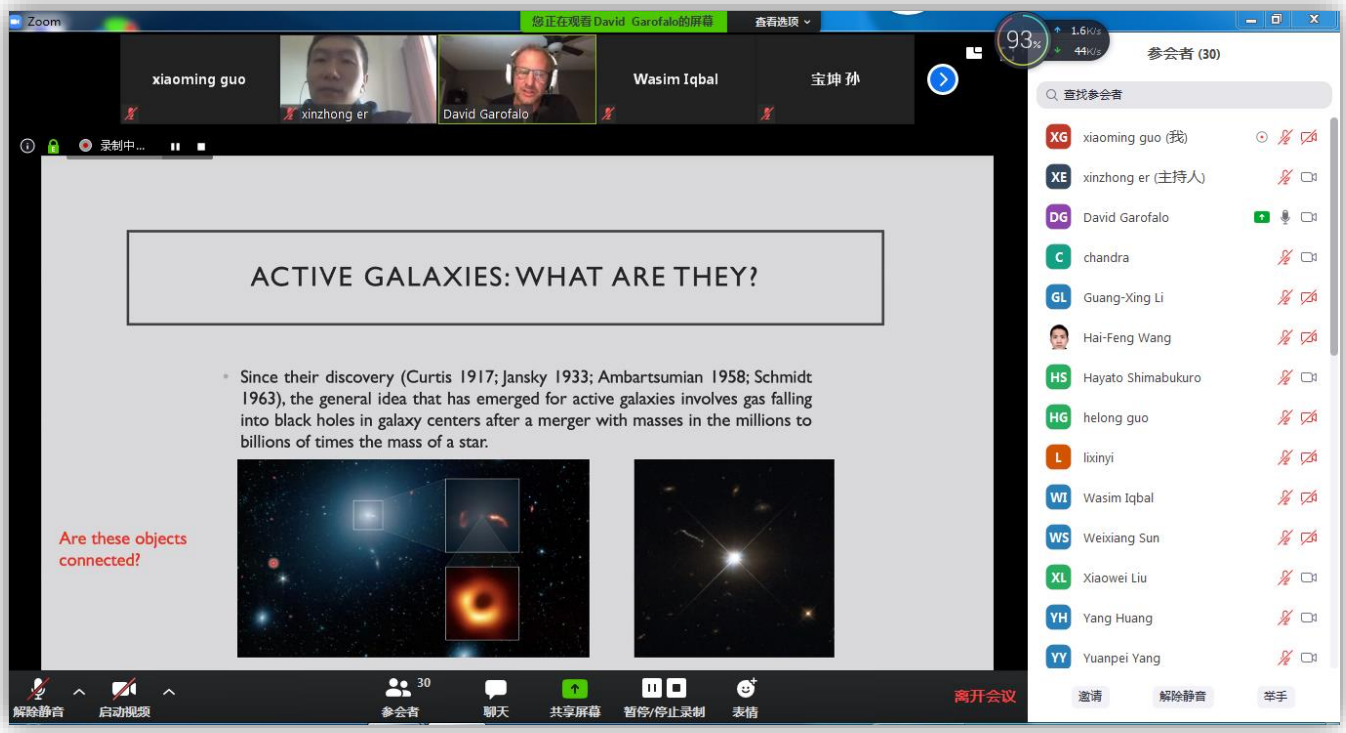

图 6.1: David Garofalo 助理教授通过视频会议作学术报告
Assistant Professor David Garofalo giving a colloquium via video conferencing

Time: 10:00 AM, Thursday, April 30, 2020
Speaker: David Garofalo (Kennesaw State)
Title: Black holes across space and time
Venue: Video Conference
Abstract: When the first realistic black hole solution was presented almost 60 years ago to astronomers at a conference on the newly discovered quasars, it was brushed off as irrelevant. But shortly thereafter and especially over the past two decades, black holes have become critical in our quest to understand the structure and evolution of galaxies. I will describe both the observations that have propelled the black holes center stage in astronomy and recent theoretical insights.

时间：2020 年 5 月 14 日（星期四）下午 15:00
报告人：孙谋远（厦门大学）
报告题目：论超大质量黑洞的宇宙学增长
报告地点：视频会议
报告摘要：在过去的几十年里，人们发现超大质量黑洞（处于典型的大质量星系中）在星系的形成和演化中发挥着不可替代的作用。然而，人们对超大质量黑洞如何增长以及其与宿主星系的相互作用知之甚少。随着我们在多波段和多历元巡天方面的努力，这种情况正在被改变。我将展示现代多波段巡天是如何告诉我们超大质量黑洞及其宿主星系的（共同）演化的。同时，我还将讨论现代时域多历元巡天如何能够为我们提供基本的黑洞基本参数测量，即黑洞质量、吸积率，从而帮助我们更好地去理解超大质量黑洞的宇宙成长史。除了黑洞基本参数外，时域观测可使我们了解黑洞附近的 MHD 物理学。

Time: 15:00 PM, Thursday, May 14, 2020
Speaker: Mouyuan Sun (XMU)

Title: On the Cosmological Growth of Supermassive Black Holes
Venue: Video Conference
Abstract: In the past decades, it has been revealed that supermassive black holes (which are harbored in typical massive galaxies) play an irreplaceable role in galaxy formation and evolution. However, very little is known about how supermassive black holes grow and interplay with their host galaxies. This situation is changing with the efforts of the multi-wavelength and multi-epoch surveys. I will show how modern multi-wavelength surveys can teach us about the (co-)evolution of supermassive black holes and their host galaxies. Meanwhile, I will also discuss how modern time-domain multi-epoch surveys might be able to provide us fundamental black hole parameters, i.e., black hole mass, accretion rate, and thereby facilitating understanding of the cosmic growth history of supermassive black holes. Beyond black hole parameters, time-domain surveys might enable us to understand the MHD physics near the black holes.

时间：2020 年 5 月 21 日（星期四）下午 15:00
报告人：冯麓（中国科学院国家天文台）
报告题目：2017-2019 年中国西部地区天文台选址简况及阿里站地面湍流监测结果
报告地点：视频会议
报告摘要：众所周知，中国西部地区是光学/红外望远镜的潜在主力地区。这是因为该地区的站点具有良好适用光学/红外望远镜的环境，例如，良好的视野、低天光背景、较少的云层覆盖、低沉积气流波动等。在大型光学/红外望远镜项目的推动下，中科院国家天文台、云南天文台、新疆天文台、南京天光所和上海天文台联合开展了望远镜选址试验活动，探索适合放置望远镜的地点，并在随后对选定的三个站点进行长期连续监测。这是中国首次尝试用统一校准的仪器和数据收集/处理方法对三个候选站点进行为期两年的长期性能评估。其结果将发表在下一期的 RAA 特刊上。在本报告中，我将简要叙述这次站点测试活动和取得的结果。还将介绍 2019 年利用我们的月球闪烁计数器对阿里 A 站点地面湍流的一些监测结果。

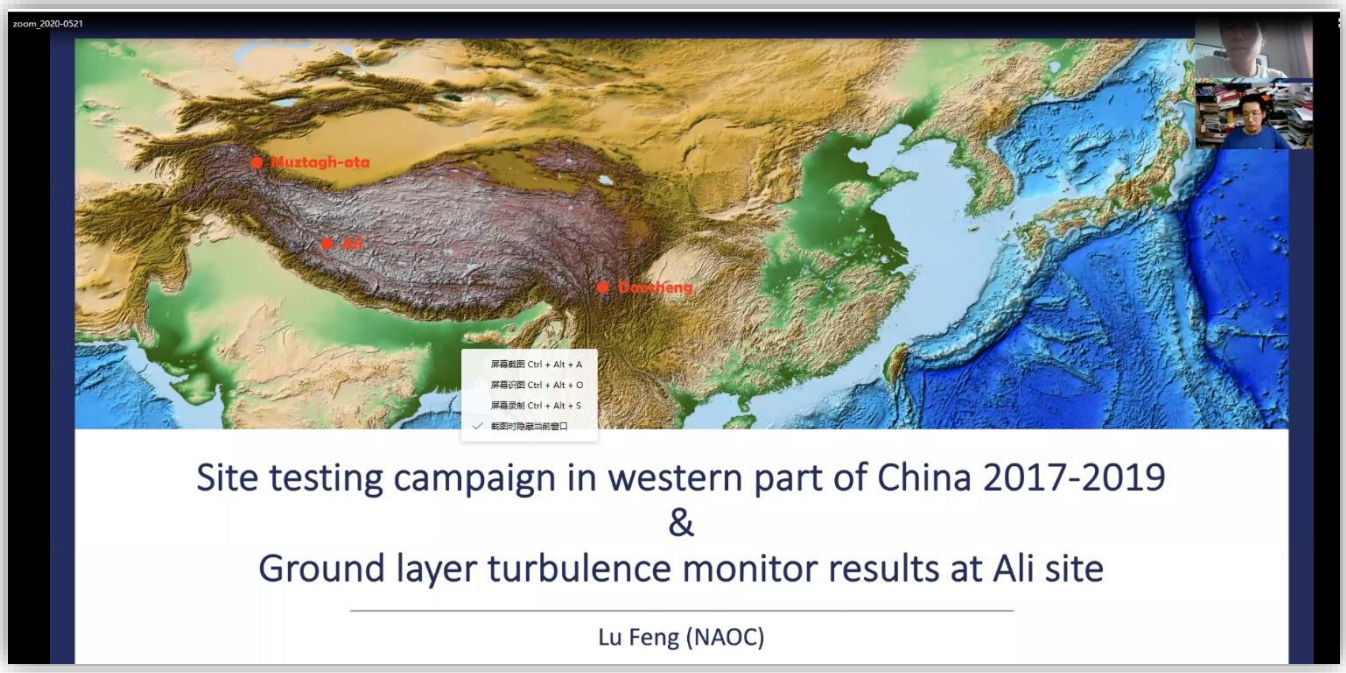

图 6.2: 冯麓副研究员通过视频会议作学术报告
Associate Researcher Lu Feng giving a colloquium via video conferencing

Time: 15:00 PM, Thursday, May 21, 2020
Speaker: Lu Feng (NAOC)

Title: Brief review of the site testing campaign in the western part of China, 2017-2019 and ground layer turbulence monitor results at Ali site
Venue: Video Conference
Abstract: The western part of China is well known to be a potential host for optical/infrared telescope. This is because sites in this region have favorable characteristics for optical/infrared telescope, such as excellent seeing, low sky background, less cloud coverage, and low precipitable wave vapor, etc. Initiated by the Large Optical/Infrared Telescope project, NAOC, YAO, XAO, NIAOT, and SHAO joined together and set forth a site testing campaign to explore the suitable location for the telescope, and later specifically, to monitor three chosen sites continuously in the long term. This is the first attempt to evaluate long term performances of three candidate sites with uniformly calibrated instruments and data collecting/processing methods for a two-year span in China. Its results are going to be published in the next special issue of RAA. In this report, I will briefly review this site testing campaign and results obtained. I will also introduce some of the monitoring results of ground-layer turbulence at Ali site A using our lunar scintillometer in 2019.

时间：2020 年 6 月 4 日（星期四）下午 15：00
报告人：王俊贤（中国科学技术大学）
报告题目：再电离时期的 Lyα 星系
报告地点：视频会议
报告摘要：早期宇宙中的年轻星系被预期为强 Lyα 线发射体（LAEs），可以通过窄带成像高效率地对其进行证认。星系际介质（IGM）中的中性氢原子会散射/减弱原始星系的 Lyα 发射线，使得 LAEs 成为宇宙再电离的敏感探针。我将对该领域进行介绍，简要叙述该领域内世界前沿的进展，并介绍“再电离时期的 Lyα 星系”（LAGER）项目。该项目是一个国际合作项目，旨在通过大型暗能量相机进行窄带巡天，寻找红移为 7.0 的 Lyα 星系。

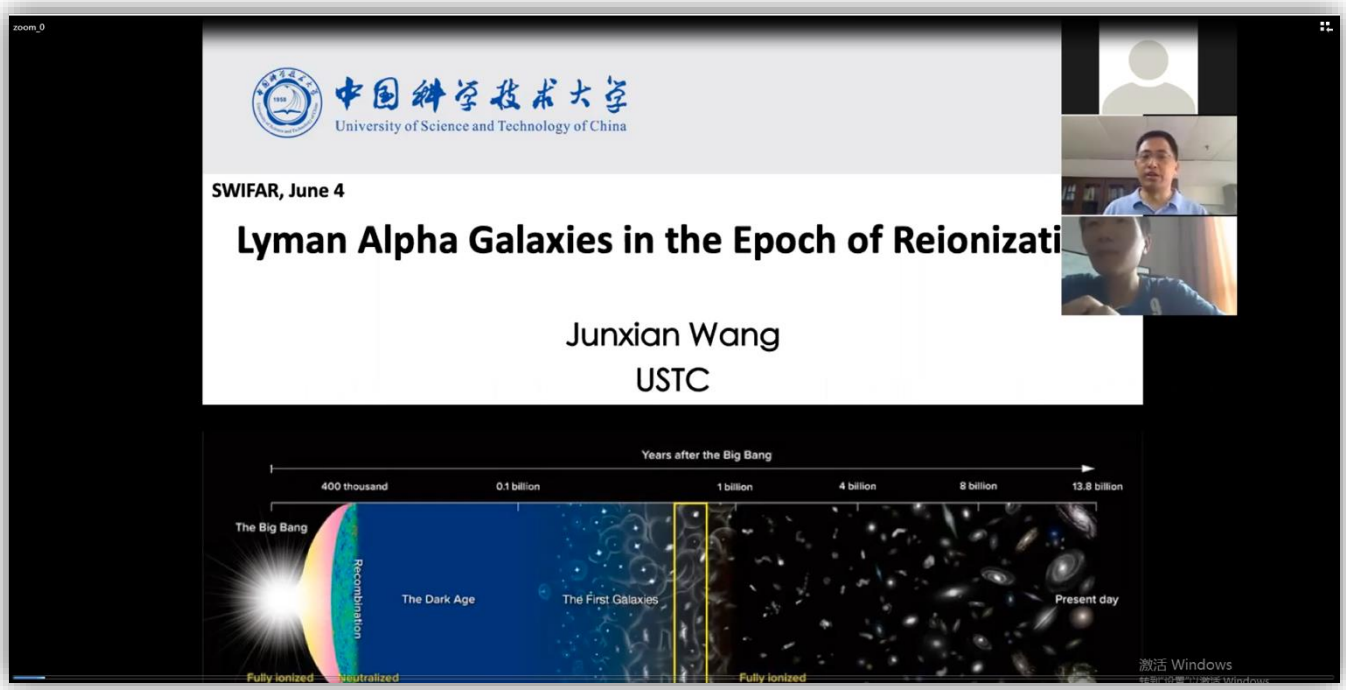

图 6.3：王俊贤教授通过视频会议作学术报告
Professor Junxian Wang giving a colloquium via video conferencing

Time: 15:00 PM, Thursday, June 4, 2020
Speaker: Junxian Wang (USTC)

Title: Lyman Alpha Galaxies in the Epoch of Reionization
Venue: Video Conference
Abstract: Young galaxies in the early universe are expected to be strong Lyα emitters (LAEs) and can be selected with high efficiency via narrowband imaging. The neutral hydrogen atoms in the IGM scatter/attenuate the Lyα emission from primordial galaxies, making LAEs a sensitive probe to cosmic reionization. I will give an introduction to the field, briefly review world-wide progress, and present the project “Lyman Alpha Galaxies in the Epoch of Reionization” (LAGER), an international collaboration in searching for LAEs at a redshift of ~ 7.0 with large area Dark Energy Camera narrowband survey.

时间：2020 年 6 月 18 日（星期四）下午 15：00
报告人：郑振亚（中国科学院上海天文台）
报告题目：中国空间站望远镜多通道成像仪载荷介绍
报告地点：视频会议
报告摘要：自 1990 年发射入太空，哈勃太空望远镜在其运行的近 30 年的时间里，为天文和天体物理领域带来了诸多革命性的发现。然而，哈勃太空望远镜很可能在 2020 年代中期停止运行。之后，哈勃太空望远镜在紫外和光学波段的角色有望被中国空间站望远镜所替代。在本次报告中，我将简单为大家介绍哈勃太空望远镜和中国空间站望远镜建造相关的故事，之后，我会重点介绍中国空间站望远镜的多通道成像仪载荷。多通道成像仪由上海天文台和上海技术物理所联合研制，它是类比哈勃太空望远镜第三代广域相机 WFC3 的设计，但有其独特优势。我将介绍多通道成像仪的设计、研究现状和它的主要科学目标。

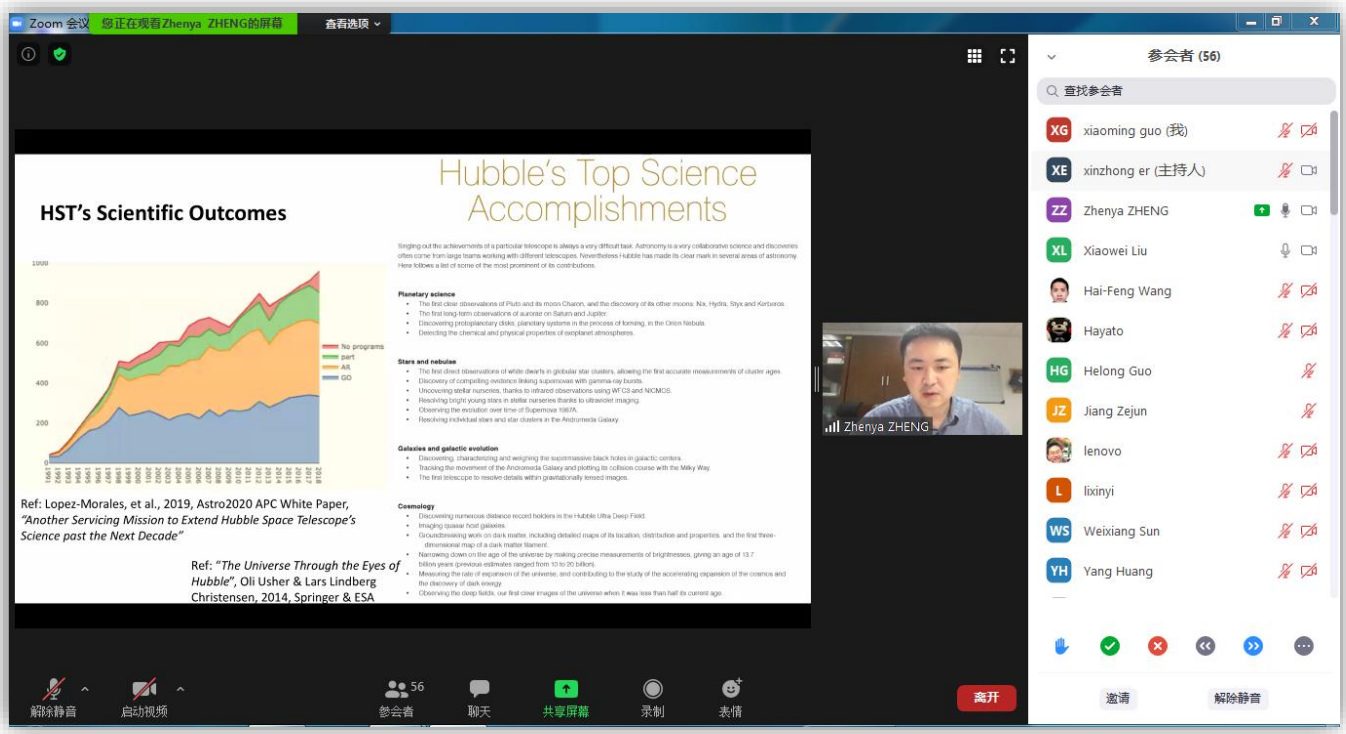

图 6.4: 郑振亚研究员通过视频会议作学术报告
Researcher Zhenya Zheng giving a colloquium via video conferencing

Time: 15:00 PM, Thursday, June 18, 2020
Speaker: Zhenya Zheng (SHAO)
Title: An introduction of MCI of Chinese Space Station Telescope
Venue: Video Conference

Abstract: Since the launch of Hubble Space Telescope in 1990, HST has provided tremendous discoveries in astronomy and astrophysics in the past 30 years. However, HST will face a shutdown in the middle of the 2020s. After that, the baton will hand to the Chinese Space Station Telescope (CSST). In this talk, I will briefly give the story about the construction of HST and CSST. I will focus on the MCI, which will be loaded on CSST. MCI has been constructed by SHAO and SITP. Although it will serve a similar function as WFC3 on HST, the special design will allow its unique advantages. I will introduce the design, current status, and its main science targets as well.

午餐讨论会 Lunch talks

时间：2020 年 4 月 15 日（星期三）下午 12：30
报告人：苑海波（北京师范大学）
报告地点：视频会议
报告题目：J-PLUS 巡天毫星等精度的定标及其应用
报告摘要：J-PLUS 是一个正在进行的大视场测光巡天。该巡天将提供 500 万恒星和星系的 12 个波段（5 个宽波段和 7 个窄波段）的高精度测光，用于精确描绘这些天体的谱能量分布。报告人首先介绍他们如何利用恒星颜色回归的方法，结合 LAMOST 和 Gaia 观测数据，将 J-PLUS DR1 的所有波段测光定标到毫星等精度。之后将重点讨论 J-PLUS 多波段测光数据在获取恒星参数方面的能力，具体参数包括恒星有效温度、表面重力加速度、[Fe/H]、[a/Fe]、[C/Fe]、[N/Fe]、[Mg/Fe]和[Ca/Fe]的丰度等。

Time: 12:30 pm, Wednesday, April 15, 2020
Speaker: Haibo Yuan (BNU)
Venue: Video Conference
Title: Calibration of the J-PLUS survey to a few mmag precision and implications
Abstract: The Javalambre-Photometric Local Universe Survey, J-PLUS, is an on-going wide-field imaging survey using 12 filters. Seven intermediate and narrowband filters are dedicated to probing key stellar spectral features that allow us to retrieve very accurate spectral energy distributions for more than 5 million stars in our Galaxy. In the first part of the talk, I will present our work on calibrating the J-PLUS DR1 data to a few mmag precision for all the filters, with the Stellar Color Regression method by combining datasets of the LAMOST and Gaia. In the second part, I will focus on capabilities of the J-PLUS filters in deriving a number of stellar parameters, including effective temperature, surface gravity, [Fe/H], [a/Fe], [C/Fe], [N/Fe], [Mg/Fe] and [Ca/Fe] abundances.

时间：2020 年 4 月 20 日（星期一）下午 12：30
报告人：王舒（中国科学院国家天文台）
报告地点：视频会议
报告题目：光学到中红外消光——需要优化的 Rv = 3.1 曲线
报告摘要：准确的消光规律对解释天文观测至关重要。通常色余比和相对消光值被用于表征消光规律，其中相对消光值的测量更具挑战。本报告中，我将介绍我们最近发布的高精度消光规律。该消光规律支持可见光消光比 CCM Rv = 3.1 消光要小，在近红外幂指数为 2.07。该工作中，我们考虑了消光的曲线增长，因此色余比的测量精度大大提升。基于 APOGEE 样本，消光规律在 4 kpc 内，V 波段消光量小于 6 个星等的情况下是普适的。最后，我们介绍了消光的精确改正方法，包括 1 级 2 级近似；同时强调曲线消光需要在消光改正中被考虑。

Time: 12:30 pm, Monday, April 20, 2020

Speaker: Shu Wang (NAOC)
Venue: Video Conference
Title: The Optical to Mid-Infrared Extinction Law--An Adjustment to the Classic Rv = 3.1 Extinction Law
Abstract: A precise interstellar dust extinction law is critically important to interpret observations. There are two indicators of extinction: the color excess ratio (CER) and the relative extinction. Compared to the CER, the wavelength-dependent relative extinction is more challenging to be determined. In this talk, I will present the results of our high-precision CERs (reddening law) and extinction ratios (extinction law) from optical to mid-infrared (IR) bands. For the first time, we calibrate the curvature of CERs; hence, the precision of CERs is significantly improved. Given no bias toward any specific environment, our observed extinction law supports an adjustment in parameters of CCM Rv = 3.1 curve together with the near-IR power law index alpha = 2.07. Based on the APOGEE sample, the extinction law is universal within 4 kpc and Av < 6 mag. As the observed reddening/extinction tracks are curved, the curvature correction needs to be considered when applying extinction correction.

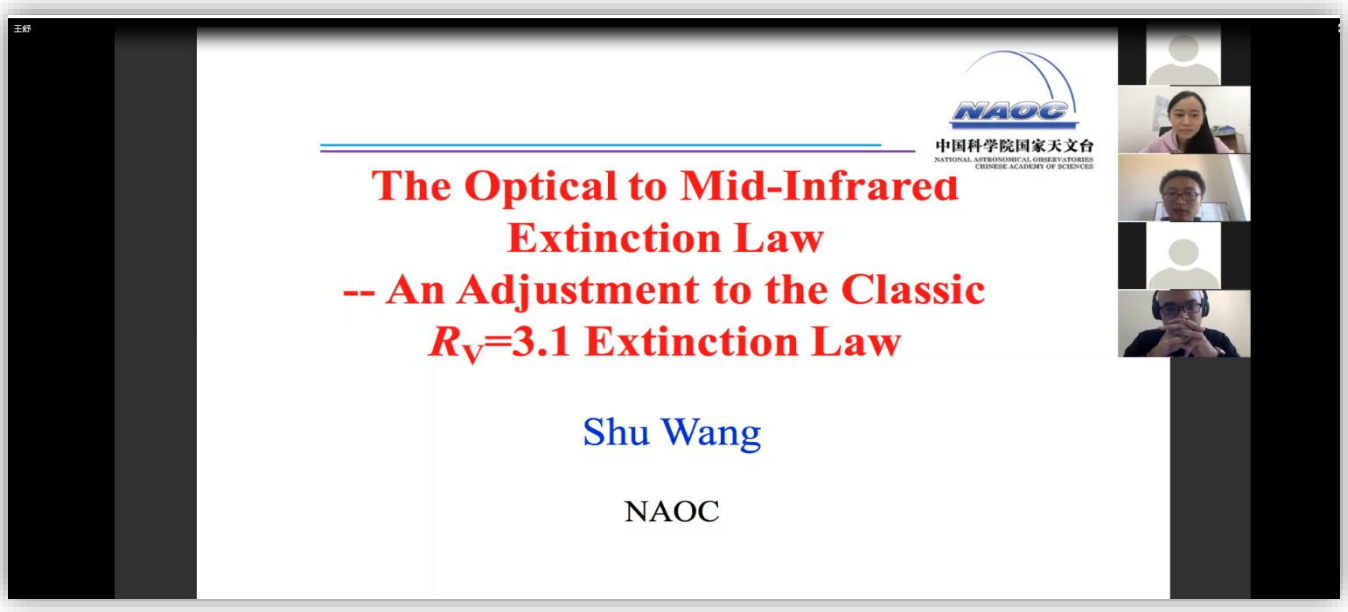

图 6.5: 王舒博士通过视频会议作午餐讨论会报告 Dr. Shu Wang giving a lunch talk via video conferencing

时间：2020 年 4 月 24 日（星期五）下午 12：30
报告人：陈孝钿（中国科学院国家天文台）
报告地点：视频会议
报告题目：大数据时代——百万周期变星
报告摘要：最近几年，已知的周期变星数量快速增加。本报告中，我们将介绍利用 WISE 和 ZTF 发现的 80 万周期变星。与之前变星星表相比，我们 80%的周期变星为新发现或新证认的变星。该变星样本的误识率只有 1%，周期准确率达到 98%；我们星表中大多数变星分布在银盘上。基于大样本的造父变星，天琴座 RR 型，盾牌座 delta 型星和相接食双星，我们可以在完备性、覆盖范围、年龄分辨等方面更好的研究银河系银盘的结构和演化，尤其是对北翘曲和银盘边缘的研究。对于自转变星，我们对 RS CVN 型星和 BY Dra 型星进行了分类，大样本的自转变星有益于对恒星色球活动性的物理研究。

Time: 12:30 pm, Friday, April 24, 2020
Speaker: Xiaodian Chen (NAOC)
Venue: Video Conference
Title: Millions of periodic variables in the era of big data

Abstract: The number of known periodic variables has grown rapidly in recent years. Here, we report about 800,000 periodic variables found in Wide-field Infrared Survey Explorer (WISE), the Zwicky Transient Facility (ZTF). Comparison with previously published catalogs shows that 80% of them are newly discovered or newly classified. The typical misclassification rate and period accuracies are about 1% and 98%, respectively. 80% of our variables are located at Galactic latitudes. This large sample of Cepheids, RR Lyrae, Delta Scuti stars, and EW-type eclipsing binaries helps investigate the Galaxy's disk structure and evolution with improved completeness, areal coverage, and age resolution. Specifically, the northern warp and the disk's edge at distances of 15 to 20 kpc are better covered. Among rotational variables, RS CVN and BY Dra variables are well separated. Our knowledge of stellar chromospheric activity would benefit from the statistical analysis of these types of variables.

时间：2020 年 4 月 27 日（星期一）下午 12：30
报告人：成忠群（武汉大学）
报告地点：视频会议
报告题目：银河系球状星系团的 X 射线研究
报告摘要：在本次报告中，我将介绍他们利用钱德拉 X 射线太空望远镜运营二十年以来对银河系球状星系团所积累的观测数据，研究星团动力学演化的最新成果。通过将 X 射线源作为示踪星团中恒星动力学相互作用的探针，我们研究了球状星团中 X 射线源数目丰度和空间位置分布等特征，并讨论了以上观测现象与球状星团中“双星燃烧”、质量演化分层效应等动力学演化过程的联系。

Time: 12:30 pm, Monday, April 27, 2020
Speaker: Zhongqun Cheng (WHU)
Venue: Video Conference
Title: A Chandra Survey of Milky Way Globular Clusters
Abstract: In this talk I will report the recent X-ray survey results of Galactic GCs with archival Chandra data accumulated in the past 20 years. Using the X-ray sources as sensitive probes of cluster stellar dynamical interactions, we study the abundance and radial distribution of X-ray sources in GCs, and discuss their relations to cluster dynamical evolution processes, such as “binary-burning” processes and mass segregation effect.

时间：2020 年 5 月 11 日（星期一）下午 12：30
报告人：蔡振翼（中国科学技术大学）
报告地点：视频会议
报告题目：在时域天文学时代利用 AGN 光变检验吸积盘理论
报告摘要：报告人对活动星系核光变的主要观测特征进行了简要综述，包括 X 射线到紫外光学波段间的相关性和时延。X 射线再照射模型普遍被用来理解这些光变特性，然而，更细致的光变分析结果挑战了这一传统图像。报告人在他们最近的工作中表明，活动星系核的这些光变特征可能与吸积盘湍流相关，有望用吸积盘热涨落图像加以解释。

Time: 12:30 pm, Monday, May 11, 2020
Speaker: Zhengyi Cai (USTC)
Venue: Video Conference
Title: AGN variability testing accretion disk theory in the era of time domain astronomy

Abstract: I will briefly overview the main observational characteristics of AGN variability, including the inter-band correlations and lags among X-ray/UV/optical continua. These variation properties are usually understood within the widespread X-ray reprocessing scenario; however, several challenges against this scenario have been found. Instead, I will show that we, in our recent works, demonstrate that the AGN variability is probably attributed to disk turbulences using a fluctuating accretion disk model.

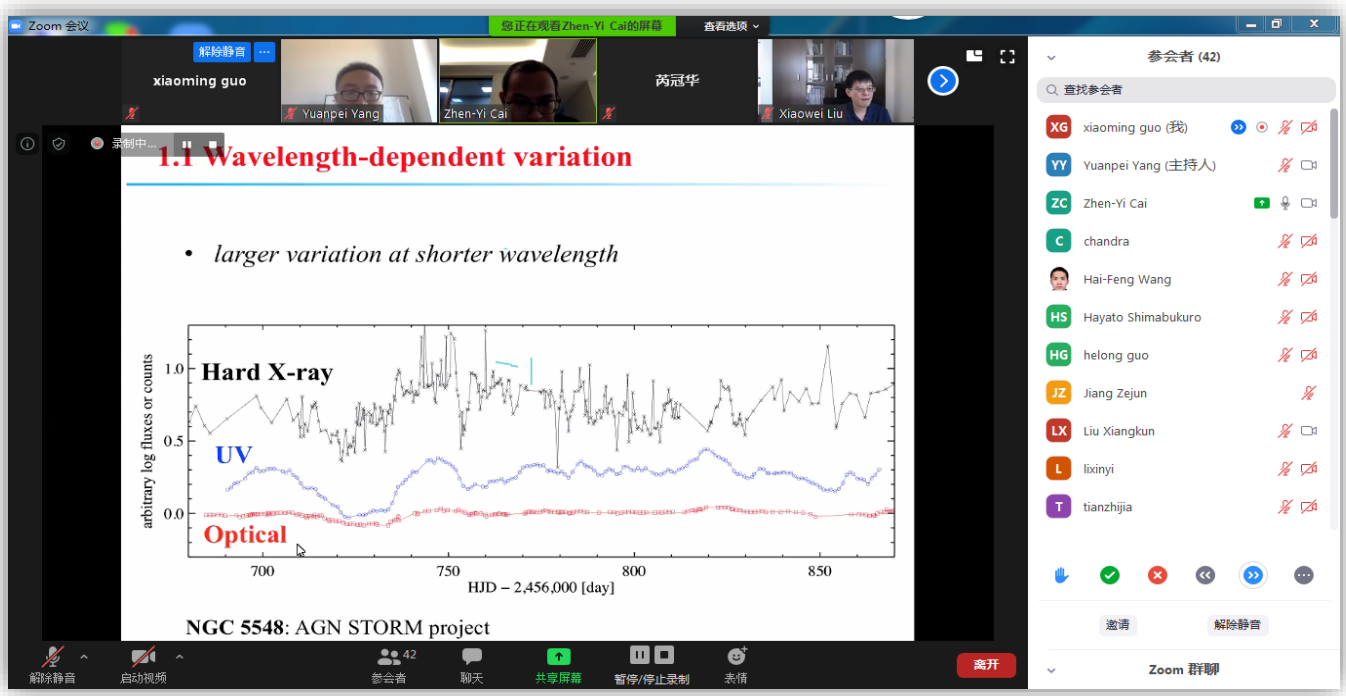

图 6.6: 蔡振翼博士通过视频会议作午餐讨论会报告 Dr. Zhengyi Cai giving a lunch talk via video conferencing

时间：2020 年 5 月 18 日（星期一）下午 12：30
报告人：欧建文（中山大学）
报告地点：视频会议
报告题目：星震学：从恒星到行星
报告摘要：行星的外部特征，包括质量、半径、轨道参数等，非常有助于对行星系统进行描述，而进一步认识这些行星则需要了解其内部结构和大气环境。星震是指恒星的震动，通过恒星震动不仅能够获得精确的行星参数，还可以借助震动的基本原理来研究行星内部结构和大气特征。报告人将报告他们在恒星震动上取得的研究成果，以及将要运用到行星上的初步工作。

Time: 12:30 pm, Monday, May 18, 2020
Speaker: Jianwen Ou (SYSU)
Venue: Video Conference
Title: Asteroseismology: from star to planet
Abstract: The planetary fundamental properties, including mass, radius, and orbital parameters, are helpful for the description of the planet system. Further understanding of these planets requires studying their internal structures and atmospheres. Asteroseismology is the study of oscillations in stars. Asteroseismology method not only provides accurate planetary parameters but also probe the internal structure and atmospheric characteristics of exoplanets through the basic principles of oscillation. In this talk, I will present an overview of their research on stellar oscillations and the preliminary work that will be applied to exoplanets.

时间：2020 年 5 月 25 日（星期一）下午 12：30

报告人：余海（上海交通大学）
报告地点：视频会议
报告题目：以强引力透镜效应作为“巨型望远镜”定位引力波事件的宿主星系
报告摘要：基于引力波并合事件的“标准汽笛”宇宙学需要依靠对宿主星系及其红移的证认和测量。然而，引力波事件区域数目众多的星系候选体使得对宿主星系的证认和红移测量变得异常困难。我们指出通过强引力透镜带来的额外观测限制，被强引力透镜的引力波的宿主星系的候选体数目会成数量级地显著减少。对于下一代引力波探测器，如爱因斯坦望远镜，只要引力波事件的定位误差小于十个平方度，宿主星系候选体的数目会显著减少到一个。这意味着今后爱因斯坦望远镜和宇宙探针探测到的引力波事件如果被引力透镜的话，它们宿主星系将有希望被唯一证认以及进行红移测量，进而大大促进“标准汽笛”宇宙学的发展。此外，我们还讨论了引力波引力透镜事件对于理解引力波的演化过程和环境的应用。

图 6.7: 余海博士通过视频会议作午餐讨论会报告 Dr. Hai Yu giving a lunch talk via video conferencing

Time: 12:30 pm, Monday, May 25, 2020
Speaker: Hai Yu (SJTU)
Venue: Video Conference
Title: Strong lensing as a giant telescope to localize the host galaxy of gravitational wave event
Abstract: Standard siren cosmology of gravitational wave (GW) merger events relies on the identification of host galaxies and their redshifts. But this can be highly challenging due to numerous candidates of galaxies in the GW localization area. We point out that the number of candidates can be reduced by orders of magnitude for strongly lensed GW events, due to extra observational constraints. For the next-generation GW detectors like Einstein Telescope (ET), we estimate that this number is usually significantly less than one, as long as the GW localization uncertainty is better than ∼ 10 deg2. This implies that the unique identification of the host galaxy of the lensed GW event detected by ET and Cosmic Explorer (CE) is possible. This provides us a promising opportunity to measure the redshift of the GW event and facilitate the standard siren cosmology. We also discuss its potential applications in understanding the evolution process and environment of the GW event.

时间：2020 年 6 月 8 日（星期一）下午 12：30
报告人：张志翔（厦门大学）

报告地点：视频会议
报告题目：对类星体 3C 273 的十年反响映射观测
报告摘要：报告人介绍了从 2008 年 11 月至 2018 年 3 月长达十年的对 3C 273 的反响映射观测结果。长期并且高信噪比的光变曲线使我们能够精确测量发射线和连续谱光变曲线之间的时间延迟。静止参考系下，Hβ 相对于 5100 Å 连续谱的时间延迟为 146.8 天。Hγ 发射线的时间延迟与 Hβ 相当。Fe II 发射线的时间延迟为 322.0 天，是巴尔默线时间延迟的两倍左右。Hβ 发射线速度分解的时间延迟轮廓显示出复杂的结构，可以被解释成一个盘成分主导的宽线区同时伴随一定的内流成分。连续谱和发射线光变曲线之间存在一个明显不一致的长期趋势，可能是来自喷流的贡献。我们的 Balmer 发射线的时间延迟和 GRAVITY 对 Paschen-α 的测量结果非常一致，这是对两种方法的一个非常好的相互检验。

Time: 12:30 pm, Monday, June 8, 2020
Speaker: Zhixiang Zhang (XMU)
Venue: Video Conference
Title: A 10-yr RM observation of 3C 273
Abstract: We report a reverberation mapping campaign of 3C 273 carried out from 2008 November to 2018 March. The long-term and high SNR light curves allow us to measure the time lags between emission lines and the variable continuum in high precision. The time lag of variations in Hβ relative to those of the 5100 Å continuum is 146.8 days in the rest frame. The time lag of the Hγ emission line is found to be nearly the same as that for Hβ. The lag of the Fe II emission is 322.0 days, longer by a factor of ∼2 than that of the Balmer lines. The velocity-resolved lag measurements of the Hβ line show a complex structure that can be possibly explained by a rotation-dominated disk with some inflowing radial velocity in the Hβ-emitting region. A long trend was found between the continuum light-curve and emission-line light-curves, which can be explained as the contribution of Jet. The time lags of Balmer emission lines in this campaign agree very well with the Paschen-α region measured by the GRAVITY at The Very Large Telescope Interferometer, which is a good mutual verification of RM and GRAVITY results.

时间：2020 年 6 月 15 日（星期一）下午 12：30
报告人：侯立刚（中国科学院国家天文台）
报告地点：视频会议
报告题目：银河系的旋臂结构
报告摘要：银河系旋臂的形态和运动学性质是天文学中的一个基本问题。这个报告中，首先将简述银河系旋臂的研究历史，着重讨论银盘大范围区域的旋臂结构特征以及最近的研究进展。此外，在过去几年中，对于太阳邻近区域的旋臂细节特征，人们的认知有了很大的进步，报告中也将对这一部分进行回顾和讨论。除了描绘银河系的旋臂图样，银河系旋臂的形成机制也是一个长期未解决的问题，观测上还难以给出很强的限制，报告的第三部分将介绍一些基于观测数据的检验结果。最后，对银河系旋臂结构的相关研究进行了一些展望。

Time: 12:30 pm, Monday, June 15, 2020
Speaker: Ligang Hou (NAOC)
Venue: Video Conference
Title: The spiral structure of the Milky Way Galaxy
Abstract: The morphology and kinematic properties of the Galaxy spiral structure are basic, but long-standing questions in astronomy. In this talk, first, I will briefly review the research history of the Galaxy spiral structure. Then, I will focus on the spiral pattern in the large portions of the Galactic disk. Some recent signs of progress will be talked about. In the past few years, our understanding of the detailed features of nearby spiral arm segments has also been improved significantly, which will be reviewed and

discussed. Besides mapping the spiral pattern of the Milky Way, the formation mechanism of Galaxy spiral arms has not been well determined from observations. I will talk about some observational tests. Finally, some prospects will be discussed.

时间：2020 年 6 月 22 日（星期一）下午 12：30
报告人：姜晨（中山大学）
报告地点：视频会议
报告题目：通过星震学研究恒星的年龄
报告摘要：通过为银河系不同区域的数千颗恒星提供精确测定的恒星性质，星震学可以帮助我们理解银河系的形成历史和演化过程。在这次报告中，报告人将介绍利用星震学数据确定矮星和巨星年龄的方法，并讨论它们的预期测量精度。

Time: 12:30 pm, Monday, June 22, 2020
Speaker: Chen Jiang (SYSU)
Venue: Video Conference
Title: Stellar ages from asteroseismology
Abstract: Asteroseismology can make a substantial contribution to our understanding of the formation history and evolution of our Galaxy by providing precisely determined stellar properties for thousands of stars in different regions of the Milky Way. In this talk, I present the methods for determining the ages of dwarfs and giants using asteroseismic data and discuss their expected level of precision.

文献研讨会 Journal Club

- 研究生文献研讨会 Postgraduate Journal Club

题目：卡耐基超新星巡天项目-II: 一种基于测光证认极端 Ia 型超新星子类的新方法
报告人：邓文强
时间：2020 年 4 月 2 日（星期四）下午 16:30
地点：视频会议

Title: Carnegie Supernova Project-II: A new method to photometrically identify sub-types of extreme Type Ia Supernovae
Speaker: Wenqiang Deng
Time: 16:30 pm, Thursday, April 2, 2020
Venue: Video Conference

题目：银河系中心丰度研究：一类富金属 alpha 增丰星族的存在证据
报告人：李新意
时间：2020 年 4 月 2 日（星期四）下午 16:30
地点：视频会议

Title: Detailed abundances in the Galactic center: Evidence of a metal-rich alpha-enhanced stellar population
Speaker: Xinyi Li
Time: 16:30 pm, Thursday, April 2, 2020

Venue: Video Conference

题目：大质量中微子对星系自旋反转现象的影响
报告人：刘赟
时间：2020 年 4 月 9 日（星期四）下午 16:30
地点：视频会议

Title: The effect of massive neutrinos on the galaxy spin flip phenomenon
Speaker: Yun Liu
Time: 16:30 pm, Thursday, April 9, 2020
Venue: Video Conference

题目：球状星团 NGC 6652 的年龄及化学组成
报告人：孙伟祥
时间：2020 年 4 月 16 日（星期四）下午 16:30
地点：视频会议

Title: Age and chemical composition of the globular cluster NGC 6652
Speaker: Weixiang Sun
Time: 16:30 pm, Thursday, April 16, 2020
Venue: Video Conference

题目：高能宇宙中微子的 Glashow 共振对中微子衰变的新限制
报告人：徐竹
时间：2020 年 4 月 16 日（星期四）下午 16:30
地点：视频会议

Title: New limits on neutrino decay from the Glashow resonance of high-energy cosmic neutrinos
Speaker: Zhu Xu
Time: 16:30 pm, Thursday, April 16, 2020
Venue: Video Conference

题目：分子云中心区大质量云团的 ALMA 观测：金斯碎裂及星团形成
报告人：郭贺龙
时间：2020 年 4 月 23 日（星期四）下午 16:30
地点：视频会议

Title: ALMA Observations of Massive Clouds in the Central Molecular Zone: Jeans Fragmentation and Cluster Formation
Speaker: Helong Guo
Time: 16:30 pm, Thursday, April 23, 2020
Venue: Video Conference

题目：Omega Centauri (NGC 5139) 中的最贫金属星
报告人：王涛
时间：2020 年 4 月 23 日（星期四）下午 16:30
地点：视频会议

Title: The Most Metal-poor Stars in Omega Centauri (NGC 5139)
Speaker: Tao Wang
Time: 16:30 pm, Thursday, April 23, 2020
Venue: Video Conference

题目：PAU 巡天：利用转移学习测量模拟数据的测光红移
报告人：刘云龙
时间：2020 年 4 月 23 日（星期四）下午 16:30
地点：视频会议

Title: The PAU Survey: Photometric redshifts using transfer learning from simulations
Speaker: Yunlong Liu
Time: 16:30 pm, Thursday, April 23, 2020
Venue: Video Conference

题目：CMB 引力透镜和 BAO 测量之间的哈勃常数不一致性
报告人：张天宇
时间：2020 年 4 月 30 日（星期四）下午 16:30
地点：视频会议

Title: Hubble constant tension between CMB lensing and BAO measurements
Speaker: Tianyu Zhang
Time: 16:30 pm, Thursday, April 30, 2020
Venue: Video Conference

题目：临近尘埃云团的分解
报告人：沈涵
时间：2020 年 4 月 30 日（星期四）下午 16:30
地点：视频会议

Title: Resolving nearby dust clouds
Speaker: Han Shen
Time: 16:30 pm, Thursday, April 30, 2020
Venue: Video Conference

题目：碰撞流中年轻大质量星团的形成
报告人：周元
时间：2020 年 5 月 7 日（星期四）下午 16:30
地点：视频会议

Title: The formation of young massive clusters by colliding flows
Speaker: Yuan Zhou
Time: 16:30 pm, Thursday, May 7, 2020
Venue: Video Conference

题目：宇宙延展结构的空间相关性
报告人：赵安
时间：2020 年 5 月 7 日（星期四）下午 16:30

地点：视频会议

Title: Spatial correlations of extended cosmological structures
Speaker: An Zhao
Time: 16:30 pm, Thursday, May 7, 2020
Venue: Video Conference

题目：系外行星的微引力透镜射电辐射
报告人：周吉璇
时间：2020 年 5 月 14 日（星期四）下午 16:30
地点：视频会议

Title: Microlensed Radio Emission from Exoplanets
Speaker: Jixuan Zhou
Time: 16:30 pm, Thursday, May 14, 2020
Venue: Video Conference

题目：利用原初曲率扰动产生的随机引力波背景验证超轻原初黑洞的前景
报告人：芮冠华
时间：2020 年 5 月 14 日（星期四）下午 16:30
地点：视频会议

Title: Prospects for probing ultralight primordial black holes using the stochastic gravitational-wave background induced by primordial curvature perturbations
Speaker: Guanhua Rui
Time: 16:30 pm, Thursday, May 14, 2020
Venue: Video Conference

题目：宇宙膨胀的测量
报告人：张一纬
时间：2020 年 5 月 21 日（星期四）下午 16:30
地点：视频会议

Title: Measuring the expansion of the universe
Speaker: Yiwei Zhang
Time: 16:30 pm, Thursday, May 21, 2020
Venue: Video Conference

题目：利用引力波推断并合中子星的最大及最小质量
报告人：冯鑫铭
时间：2020 年 5 月 28 日（星期四）下午 16:30
地点：视频会议

Title: Inferring the maximum and minimum mass of merging neutron stars with gravitational waves
Speaker: Xinming Feng
Time: 16:30 pm, Thursday, May 28, 2020
Venue: Video Conference

题目：作为标准烛光的碳星- I. 麦哲伦云中碳星的光度函数
报告人：宋哲武
时间：2020 年 5 月 28 日（星期四）下午 16:30
地点：视频会议

Title: Carbon stars as standard candles - I. The luminosity function of carbon stars in the Magellanic Clouds
Speaker: Zhewu Song
Time: 16:30 pm, Thursday, May 28, 2020
Venue: Video Conference

题目：利用 8 个强引力透镜类星体检验超大质量黑洞与其寄主星系之间相关性的演化规律
报告人：李梓炜
时间：2020 年 6 月 4 日（星期四）下午 16:30
地点：视频会议

Title: Testing the Evolution of the Correlations between Supermassive Black Holes and their Host Galaxies using Eight Strongly Lensed Quasars
Speaker: Ziwei Li
Time: 16:30 pm, Thursday, June 4, 2020
Venue: Video Conference

题目：利用 LAMOST 主序拐点及 OB 型星研究 GAIA DR2 数据揭示的恒星对角凸起模式的演化规律
报告人：杨勇
时间：2020 年 6 月 4 日（星期四）下午 16:30
地点：视频会议

Title: On the evolution of Diagonal Ridge pattern found in Gaia DR2 with LAMOST Main-Sequence-Turn-Off and OB type Stars
Speaker: Yong Yang
Time: 16:30 pm, Thursday, June 4, 2020
Venue: Video Conference

题目：VMC 巡天 – XXXVIII. 麦哲伦云桥的自行
报告人：李新意
时间：2020 年 6 月 11 日（星期四）下午 16:30
地点：视频会议

Title: The VMC survey – XXXVIII. Proper motion of the Magellanic Bridge
Speaker: Xinyi Li
Time: 16:30 pm, Thursday, June 11, 2020
Venue: Video Conference

题目：红团簇星的颜色-金属丰富关系及其指向麦哲伦云的红化研究
报告人：郭贺龙
时间：2020 年 6 月 11 日（星期四）下午 16:30
地点：视频会议

Title: On the Color-Metallicity Relation of the Red Clump and the Reddening Toward the Magellanic Clouds
Speaker: Helong Guo
Time: 16:30 pm, Thursday, June 11, 2020
Venue: Video Conference

题目：基于低温且自相互作用暗物质模型模拟隐藏的巨型结构
报告人：刘赟
时间：2020 年 6 月 18 日（星期四）下午 16:30
地点：视频会议

Title: Simulating the “hidden giant” in cold and self-interacting dark matter models
Speaker: Yun Liu
Time: 16:30 pm, Thursday, June 11, 2020
Venue: Video Conference

题目：大质量混合系统：一个大的矮星系和一个类银河系并合过程的研究
报告人：孙伟祥
时间：2020 年 6 月 18 日（星期四）下午 16:30
地点：视频会议

Title: A massive mess: When a large dwarf and a Milky Way-like galaxy merge
Speaker: Weixiang Sun
Time: 16:30 pm, Thursday, June 18, 2020
Venue: Video Conference

- 教师文献研讨会 Faculty Journal Club

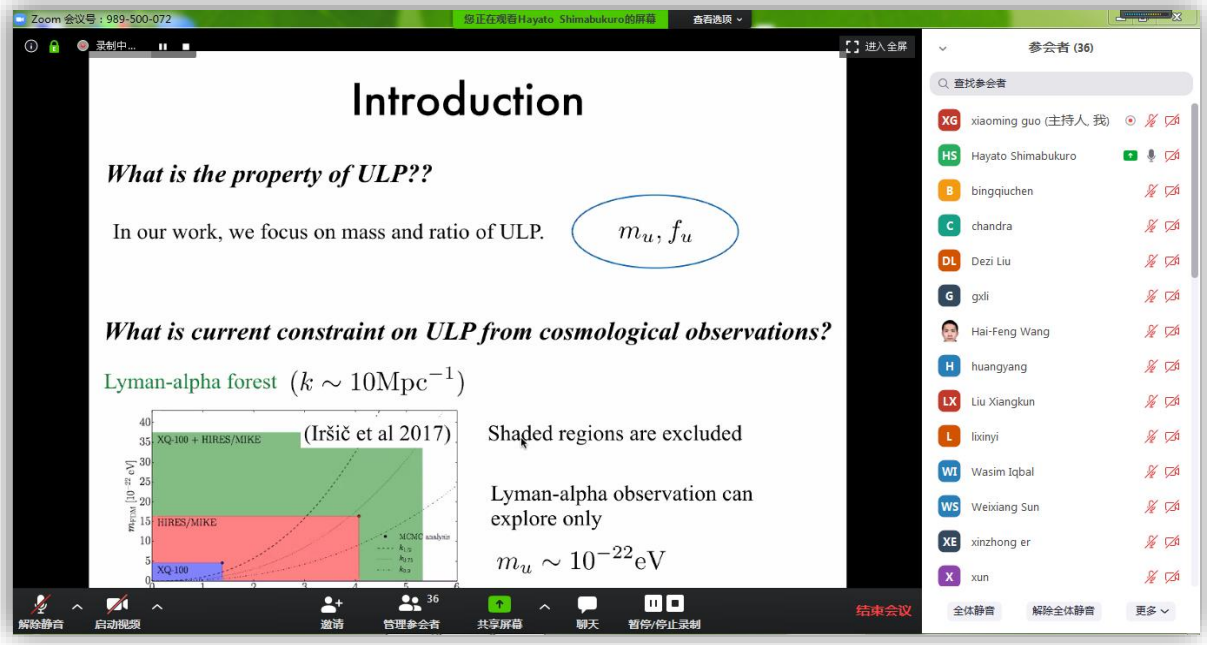

图 6.8: 岛袋隼士助理教授通过视频会议作文献研讨会报告
Assistant Professor Hayato Shimabukuro giving a Journal Club lecture via video conferencing

题目：基于 21 厘米森林限制极轻暗物质例子的本质
报告人：岛袋隼士
时间：2020 年 4 月 7 日（星期二）下午 16:30
地点：视频会议

Title: Constraining the nature of ultra lihgt dark matter particles with the 21cm forest
Speaker: Hayato Shimabukuro
Time: 16:30 pm, Tuesday, April 7, 2020
Venue: Video Conference

题目：黑洞吸积盘内的磁场重连接与热斑形成
报告人：钱德拉·巴哈杜尔·辛格
时间：2020 年 4 月 14 日（星期二）下午 16:30
地点：视频会议

Title: Magnetic reconnection and hot-spot formation in black-hole accretion disks
Speaker: Chandra Bahadur Singh
Time: 16:30 pm, Tuesday, April 14, 2020
Venue: Video Conference

题目：微引力透镜中活动星系核结构研究
报告人：刘德子
时间：2020 年 4 月 21 日（星期二）下午 16:30
地点：视频会议

Title: Revealing the structure of AGN through microlensing
Speaker: Dezi Liu
Time: 16:30 pm, Tuesday, April 21, 2020
Venue: Video Conference

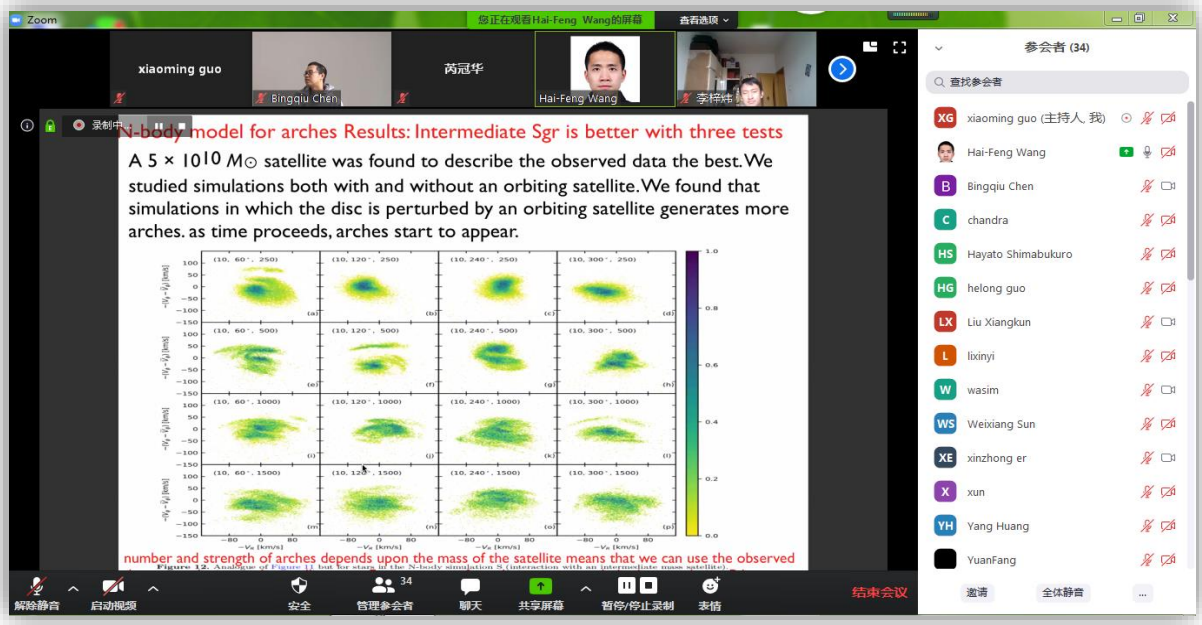

图 6.9: 王海峰博士后通过视频会议作文献研讨会报告
Postdoctoral Fellow Haifeng Wang giving a Journal Club lecture via video conferencing

题目：GALAH 巡天与 Gaia 第二版数据：银河系动力学中条纹、弧线及垂直波间的联系
报告人：王海峰
时间：2020 年 4 月 28 日（星期二）下午 16:30
地点：视频会议

Title: The GALAH survey and Gaia DR2: Linking ridges, arches and vertical waves in the kinematics of the Milky Way
Speaker: Haifeng Wang
Time: 16:30 pm, Tuesday, April 28, 2020
Venue: Video Conference

题目：基于 Gaia 第二版数据研究半人马座星流中球状星团成员与候选体
报告人：方圆
时间：2020 年 5 月 12 日（星期二）下午 16:30
地点：视频会议

Title: Globular Clusters in the Sagittarius stream Revising members and candidates with Gaia DR2
Speaker: Yuan Fang
Time: 16:30 pm, Tuesday, May 12, 2020
Venue: Video Conference

题目：冷的天体物理环境中的尘埃颗粒冰包层研究
报告人：瓦西姆·伊克巴尔
时间：2020 年 5 月 19 日（星期二）下午 16:30
地点：视频会议

Title: Ice coverage of dust grains in cold astrophysical environments
Speaker: Wasim Iqbal
Time: 16:30 pm, Tuesday, May 19, 2020
Venue: Video Conference

题目：卡耐基超新星项目：Ia 型超新星的内禀颜色
报告人：尔欣中
时间：2020 年 6 月 9 日（星期二）下午 16:30
地点：视频会议

Title: The Carnegie Supernova project: intrinsic colors of Type Ia supernovae
Speaker: Xinzhong Er
Time: 16:30 pm, Tuesday, June 9, 2020
Venue: Video Conference

题目：搜寻猎户座星云中的高速逃离星
报告人：陈丙秋
时间：2020 年 6 月 16 日（星期二）下午 16:30
地点：视频会议

Title: Hunting for Runaways from the Orion Nebula Cluster

Speaker: Bingqiu Chen
Time: 16:30 pm, Tuesday, June 16, 2020
Venue: Video Conference

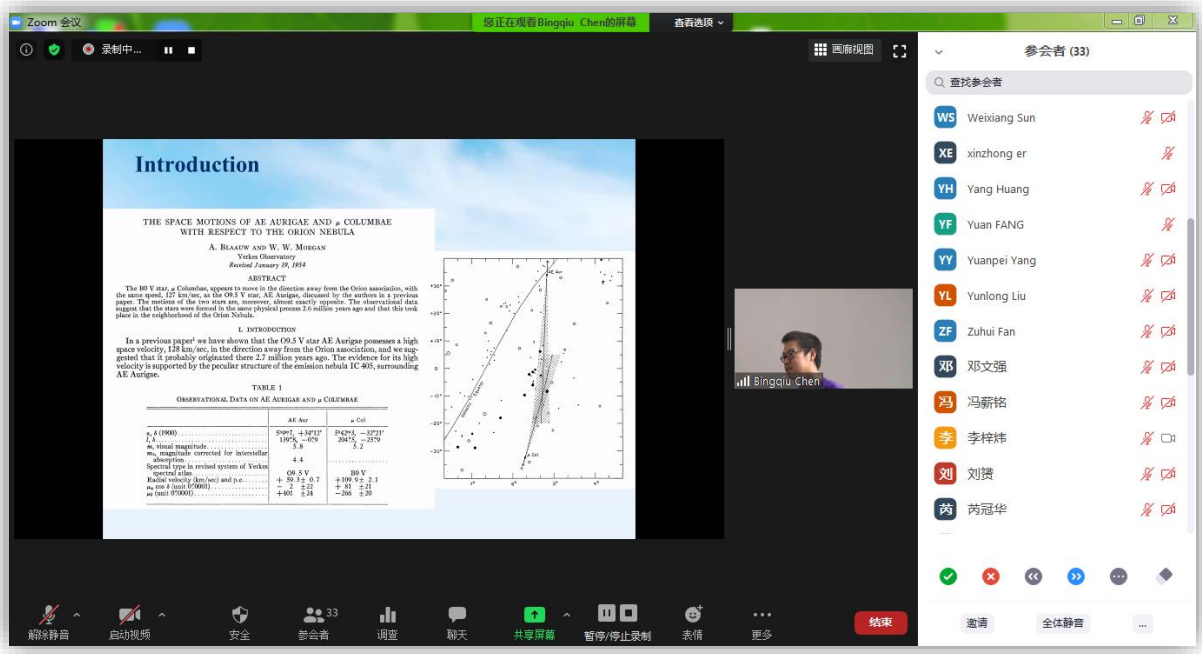

图 6.10: 陈丙秋副教授通过视频会议作文献研讨会报告
Associate Professor Bingqiu Chen giving a Journal Club lecture via video conferencing

咖啡时间 Coffee Break

随着疫情趋于稳定，研究所恢复了“咖啡时间”。成员通过每日下午 15:00-15:30 咖啡茶歇时间进行交流，加强所内沟通，营造活跃的科研氛围。

With the pandemic being brought well under control, SWIFAR resume the “Coffee break”. Faculties and students sit together and chat during the breaks between 15:00 and 15:30 every day to foster an active research atmosphere.

图 6.11: 中国西南天文研究所老师参加咖啡时间讨论 SWIFAR faculty during a Coffee Break discussion