Chinesisch-Deutsches Zentrum für Wissenschaftsförderung
中德科学中心

林岛诺贝尔奖获得者大会申请书

主题	交叉学科（化学、物理学和医学\生理学）		
林岛会议时间	2026.06.28-07.03		
学术访问时间	具体时间另行通知		
举办地点	德国林岛和德国学术参访城市		
申请人姓名	周霖	性别	男
出生日期	2001/06/08	出生地	广西北海市
学校/单位	华中科技大学/物理学院		
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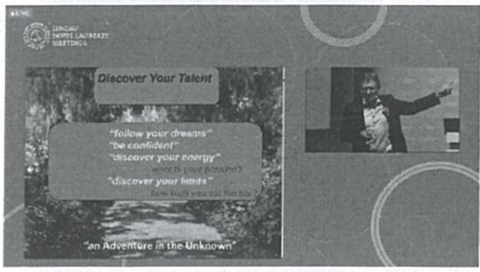
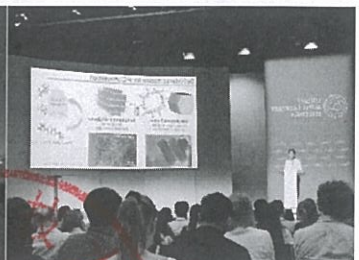
研究领域	天体物理，GRB，数据科学		
外语水平	英语六级 (CET6): 458		
预计毕业时间	2029 年 6 月		



1、个人陈述（采用宋体字五号，单倍行距）

研究领域

我的研究方向聚焦于高能天体物理领域的伽马射线暴探测，核心课题围绕“基于多平台观测数据的GRB 物理机制解析及暂现源探测技术研发” 展开。目前的成果如下：基于 TESS 卫星观测数据的 GRB 搜寻，通过构建数据筛选与特征识别算法，从 3 年时长的数据集中共挖掘出 2 个 GRB 余辉信号及 1 个瞬时辐射信号；针对 GRB221009A 的 TeV 能段喷流特性研究，自主搭建数学模型对 LHAASO 观测的 TeV 光变曲线进行拟合，成功获取小偏轴角参数，结果与当前主流喷流理论框架一致，相关成果发表于期刊 MNRAS，DOI 号：10.1093/mnras/stae1644。目前正在研究 LHAASO 观测站微弱暂现源探测技术开发。已完成适用于 LHAASO 数据的叠加 Pipeline 搭建，通过多组模观测数据验证了其可行性，后续计划利用该 pipeline 来进行伽马射线暴的叠加搜寻。
本研究具有跨学科属性，属于物理学（诺贝尔奖学科）与数据科学（自然科学分支）的交叉。研究涉及高能天体物理，机器学习、数据挖掘技术等数据科学技术。是数据科学在高能物理领域下的应用。

选题缘由

攻读博士学位的决定，源于对天体物理领域的热爱和探索欲。当前选题主要受三方面影响：1.LHAASO 等新一代地面高能观测装置的建成，为国内学者开展高水平研究提供了独特平台，尤其是其在 TeV 能段的高灵敏度观测能力，可填补国际上 GRB TeV 辐射研究的部分空白，选择这一方向能充分利用国内大科学装置优势，实现研究的差异化突破；2.导师在高能天体物理与跨学科研究方面的指导；3.周围老师同学们的支持。

国际交流经验

目前仅有在 LHAASO Collaboration Conference 中做过海报汇报。没有在其他的国际会议作过学术报告

发展规划

1. 博士期间聚焦当前的研究，力争发表 2 篇高水平学术论文，参加国际学术交流，提升科研协作和组织能力；
2. 后期如果有机会入职 LHAASO 天体物理研究团队，继续参加 “高能暂现源跨学科研究” ，推进 GRB 物理机制与探测技术研究。

申明

我们用签名确认：申请者提供的信息真实，我单位愿意推荐该申请者参加中德科学中心组织的第 75 届诺贝尔奖获得者大会选拔。

申请者签名：

周霖

华中科技大学 研究生院

单位负责人签名/公章：

华中科技大学 物理学院

附件:

1、 由本单位导师或学术委员会提供的推荐信（请根据模板填写，须研究生院或学术委员会盖章）；

2、 个人简历并列出不超过 5 篇代表作（请列出全部作者、论文题目、期刊名称及卷/期号页码，共同第一作者用#标注、通讯作者用*号标注）；
（该部分最多一页，采用宋体字五号，单倍行距）；

3、 个人身份证复印件;

4、 支撑材料（如已发表论文、获奖证书、外语水平证明等）。

尊敬的中德科学中心遴选委员会专家：

我很荣幸向你们推荐我的博士研究生周霖参加明年（2026 年）于德国林岛举办的林岛诺贝尔奖获得者大会。自 2023 年加入课题组以来，周霖同学一直保持科研的热情，具有突出的学术潜力和出色的跨文化学术沟通能力。

周霖同学自本科阶段至当前于高海拔宇宙线观测站（LHAASO）宇宙线中心联合培养期间的研究经历展现了其优秀的学术素养。本科学习阶段，其参与基于凌日系外行星巡天卫星（TESS）数据的伽马射线暴搜寻项目，从三年期观测数据中成功识别 2 例 GRB 余辉信号及 1 例瞬时辐射信号。2023 年 8 月，其围绕 GRB221009A 的 TeV 能段喷流离轴角展开研究，独立构建数学模型，经拟合验证其结果与领域主流理论高度契合。相关研究成果已纳入《Determining the viewing angle from TeV light curve of GRB 221009A》一文（DOI: 10.1093/mnras/stae1644），充分展现其学术研究能力。在 LHAASO 联合培养期间，该同学独立完成弱暂现源探测数据叠加处理流程的架构设计，并通过多组测试验证其技术可行性。

周霖同学具有独立规划与执行研究活动的基础能力储备和跨文化学术交流能力。在相关工作推进过程中，该同学主动开展文献及技术资料调研，积极与合作导师团队进行学术探讨，且能针对关键技术问题提出具有针对性的解决方案，证明其具有独立规划与执行研究活动的基础能力储备。目前周霖同学已通过 CET-6，且在 LHAASO 学术会议中进行过海报展示。证明其具有跨文化学术交流能力。

此外，周霖同学为人勤恳待人大方，乐于分享自己的知识与经验。他对天文学科怀有持续热情，主动追踪领域前沿动态，并在系外行星探测、高能宇宙线物理及引力波等多个子领域均有涉猎。同时，他也有许多兴趣爱好，例如星空摄影，日语和绘画艺术等。他的全面发展相信能让他更容易与他人建立友谊。

林岛诺贝奖获得者大会是青年学者接触科学前沿、拓宽国际视野的珍贵平台。这对于他是一次难得的机会。我相信他能成为大会上一名优秀的学者，与世界各地杰出科学家交流学习，为期未来科研之路奠定更坚实的基础，为今后两国的科学研究做出更大的贡献。

因此，我强烈推荐周霖同学参加林岛诺贝尔奖获得者大会，并相信其能展现出优秀的科学才能。如需进一步了解相关信息，请随时联系我。

诚挚地，
邹远川

教授、博导
华中科技大学 物理学院
2025.10.14
湖北省武汉市洪山区关山街道珞瑜路 1037 号华中科技大学精密重力测量科学中心大楼

华中科技大学 物理学院

华中科技大学 研究生院

个人履历

教育经历

2019.09-2023.06 华中科技大学物理学院获得学士学位
2023.09-至今 华中科技大学硕博连读

会议与荣誉

2024 年 8 月参加云南 2024 LHAASO 暑期学校；

2024 年 10 月参加 2024 年第一届高海拔宇宙线观测站（LHAASO）合作会议并做海报报告；

2025 年 8 月参加云南 2025 LHAASO 暑期学校；

学术论文列表

[1]Zhou, L. and Zou, Y.-C., “Determining the viewing angle from TeV light curve of GRB 221009A”, <i>Monthly Notices of the Royal Astronomical Society</i>, vol. 532, no. 2, OUP, pp. 2189 - 2195, 2024. doi:10.1093/mnras/stae1644.

Sino-German Center for Research Promotion
Shuangqing Road 83
Haidian District
Beijing 100085, VR China

Chinesisch-Deutsches Zentrum für Wissenschaftsförderung
中德科学中心

Dear applicant,

Thank you for submitting your application for the Lindau programme to the Sino-German Center for Research Promotion (SGC). In order to comply with relevant regulations on personal data protection, we need to obtain your informed consent by signing the following statement. Please return the signed form to us, both as a hard copy and a scanned copy by e-mail to Ms. Zhu Meilan (Zhu@sinogermanscience.org.cn).

The Sino-German Center for Research Promotion

Informed Consent form for applicants in the Sino-German Center for Research Promotion Lindau programme

☑ I hereby agree to the Sino-German Center for Research Promotion (hereinafter referred to as SGC) and its parent institutions (National Nature Science Foundation of China and Deutsche Forschungsgemeinschaft) storing and processing my personal information (including but not limited to: surname, first name, academic title, field of research and specialism, country, gender, date of birth, telephone number, postal address, e-mail address, current university/research institution) and the application materials for the purpose of review and funding management in the SGC's programme. I consent to my data being shared with the reviewers in the course of the application evaluation process, with the Lindau Foundation and the Lindau Council in case of a positive decision, and with Third Party data Processors such as Evaluation Agencies supporting the SGC in assessment of its funding programmes.
I am aware that I can withdraw my consent, partially or wholly, at any time, with or without giving reasons, by writing to Ms Zhu Meilan under zhu@sinogermanscience.org.cn. If my consent is withdrawn, any processing of my data which occurred on my consent before the withdrawal of the same shall not be considered objectionable.

☑ I also agree to the SGC using my contact data for informational purposes and to including me in the Lindau Alumni information network.

For more details please see the attached file for personal information processing.

Lin Zhou
Name in print

2025/10/11 Lin Zhou 周霖
Date, Signature

Huazhong University of Science and Technology
Name of University/Research Institution

华中科技大学 物理学院

华中科技大学 研究生院

身份证复印件


姓名 周霖
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中华人民共和国
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有效期限 2021.08.05-2031.08.05

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MNRAS 532, 2189–2195 (2024)
Advance Access publication 2024 July 8
https://doi.org/10.1093/mnras/stae1644

Determining the viewing angle from TeV light curve of GRB 221009A

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[2]Purple Mountain Observatory, Chinese Academy of Sciences, Nanjing 210023, China

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ABSTRACT

Gamma-ray bursts (GRBs) are among the most powerful explosive events in the Universe. LHAASO recently observed the most luminous one: GRB 221009A, and unveiled its TeV light curve. The light curve exhibits a distinct jet break at around 670 s, enabling the derivation of the viewing angle based on the smoothness of the jet break. We constructed two models with or without considering the high-latitude radiation, where the viewing angle was treated as a free parameter, to fit the TeV light curve. The viewing angles obtained were 9.4×10^{-4} and 5.9×10^{-3} rad, respectively. These values closely resemble an on-axis scenario, given the opening angle is 1.4×10^{-2} rad.

Key words: gamma-ray burst: individual: GRB 221009A – stars: jets.

1 INTRODUCTION

Gamma-ray bursts (GRBs) are one of the most powerful explosive events in the Universe, releasing extremely highly energetic gamma-ray radiation. For a long time, GRBs have been a fascinating research topic for astronomers because their origins and nature involve a series of complex physical processes.

On 2022 October 9, the brightest GRB (GRB 221009A) initially triggered at 13:16:59.988 UTC by the *Fermi* Gamma-Ray Burst Monitor (*Fermi*-GBM; Meegan et al. 2009) in the gamma-ray band (Lesage et al. 2022; Veres et al. 2022). This event was also detected (Pillera et al. 2022) by the *Fermi* Large Area Telescope (*Fermi*-LAT; Atwood et al. 2009). The Large High Altitude Air Shower Observatory (LHAASO; Cao et al. 2019) also reported the detection of gamma-rays, reaching up to 18 TeV (Huang et al. 2022). *Swift* Burst Alert Telescope (*Swift*-BAT; Barthelmy et al. 2005) also detected the same event approximately an hour after the initial trigger. About 143 s later, the *Swift* X-ray Telescope (*Swift*-XRT; Burrows et al. 2005) pinpointed the target, with the *Swift* Ultraviolet/Optical Telescope (UVOT; Roming et al. 2005), locating it at (RA, Dec.) = (288.26452°, 19.77350°) with a 90 per cent confidence error radius of about 0.61 arcsec (Dichiara et al. 2022). The event was quickly classified as a GRB (Veres et al. 2022), and according to X-shooter/VLT reports, it occurred at a redshift of 0.151 (Izzo et al. 2022), confirming it as the brightest event ever recorded by any GRB detector. After 2 d, reports of a soft X-ray ring due to dust scattering were released, based on observations from the *Swift*-XRT (Tiengo et al. 2022). Multiwavelength observations were reported later (e.g. Bright et al. 2022; Kennea et al. 2022).

The variation in the light curve and the corresponding physical processes of GRB 221009A have become a highly discussed research topic. The half-opening angle and the viewing angle are elements that influence the light curve during the afterglow decay phase. The half-opening angle θ_{jet} is the angle at which the cone-shaped region extends from the central axis of the jet towards one side. The viewing angle θ_{obs}, also known as the observer's angle, represents the angular deviation of the observer from the cone axis. Both lead to a steepening decay in the late afterglow.

GRB 221009A is believed to have a narrow opening angle and a slightly off-axis direction, as evidenced by the jet break in the later stages of the afterglow light curve.

Considerable amount of studies have been devoted to the investigation of the jet opening angles of this GRB (e.g. Laskar et al. 2023; Ren et al. 2023; Williams et al. 2023). However, limited attention has been given to the consideration of off-axis angles. LHAASO Collaboration (2023) estimated a half-opening angle θ_{jet} to be approximately 0.8°, equivalent to 0.140 rad. This determination was made using the jet break time and applying their late afterglow model (e.g. Sari, Piran & Halpern 1999), assuming a viewing angle of zero. O'Connor et al.'s (2023) findings yielded $\theta_{obs} \lesssim 0.016$ rad and $\theta_{jet} \geq 0.4$ rad with a structured jet model. This study discussed a situation about a structured jet with extended wings and determined the viewing angle.

Gill & Granot (2023) built a semi-analytical model to analyse an adiabatic spherical blast wave and extended the model to angular structured jets. They found that the viewing angle was comparable to the core angle of the energy profile, $\theta_{obs} \sim \theta_{c,\epsilon}$, which was determined to be 0.02 rad. This was employed to explain the high fluence of the gamma-ray emission and to interpret the multiwaveband light curve.

Polarimetry was used to infer the viewing angle (e.g. Ghisellini & Lazzati 1999). Negro et al. (2023) took a set of parameters to give a polarization consistent with the IXPE spectropolarimetric measurement and found it favours a jet opening angle approximately 1.5°, and a viewing angle about two-thirds of the jet opening angle, which correspond to 0.026 and 0.017 rad, respectively.

In this work, we focus on the TeV light curve around the jet break. We draw Fig. 1 as a sketch. If the viewing angle is zero,

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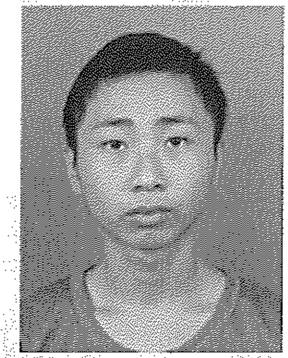

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笔　试

准考证号：420021211206517

考试时间：2021年6月

总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
458	180	136	142

口　试

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考试时间：--

等级	--

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校验码：OVE6 ZF92 UNA9 E4FE

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