Zheng Xiong, Ph.D. Student

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Education

2019 – now

Ph.D. student, Institute of High Energy Physics in Beijing, China.
I am a collaborator in the LHAASO (Large High Altitude Air Shower Observatory) Collaboration. I cooperated with my supervisor, Prof. Huihai He, to finish a research article on the Lorentz violation constraint using the LHAASO-KM2A early-stage observation in 2021. Now, my Ph.D. research revolves around cosmic-ray electron studies.
Main Work:
Measurement of cosmic-ray electron spectrum above 20 TeV with ground-based arrays is still challenging because of the difficulty of rejection of hadronic extensive air shower background.
In the feasibility research stage (2022), I found that the current hadron rejection power of the LHAASO-KM2A is insufficient to measure cosmic-ray electrons. I developed a new method to use WCDA to measure the muonic content in each shower. With the help of WCDA, the rejection power of LHAASO-KM2A has the potential to measure the cosmic-ray electron spectrum over 20 TeV. In the current research stage (2023), I am increasing the simulated statistics to get optimized discrimination cuts for KM2A. These results have already been reported at a recent conference, ICRC 2023. And I expect to see the early result of the cosmic-ray electron spectrum measured by LHAASO in 2024.

2015 – 2019

Bachelor.Engineering. Material Science and Engineering, Wuhan University of Technology in Wuhan, Hubei Province, China.
Thesis title: *The first principle calculation on the optical property on Barium-based complex perovskite* $(Ba(B'B'')O_3)$ *ceramic*. Advisor: Prof. Wen Chen, co-advisor: Prof. Jie Shen **(Archived link)**

Research Publications

Journal Articles

1. **Xiong, Zheng***, S. Wu, and H. H. He, "Method to measure muon content of extensive air showers with LHAASO KM2A-WCDA synergy," *(article submitted for) Nuclear Instruments and Methods in Physics Research Section A*, 2023.
2. L. Chen, **Xiong, Zheng***, C. Li, S. Chen, and H. He, "Strong constraints on lorentz violation using new γ-ray observations around PeV," *Chinese Physics C*, vol. 45, no. 10, p. 105 105, 2021. URL: https://iopscience.iop.org/article/10.1088/1674-1137/ac1166/meta.

Conference Proceedings

1. H. H. He, **Xiong, Zheng**, and S. Wu, "Method to measure muon content of extensive air showers with LHAASO KM2A-WCDA synergy," PoS(ICRC2023)314, vol. PCRI1-13, Nagoya, Japan, 2023. URL: https://pos.sissa.it/444/314/pdf.
2. **Xiong, Zheng***, S. Wu, and H. H. He, "Measurement of cosmic-ray electrons with LHAASO KM2A-WCDA synergy," PoS(ICRC2023)315, vol. CRI7-03, Nagoya, Japan, 2023. URL: https://pos.sissa.it/444/315/pdf.

Popular Science Writing / Translation

Articles and Blogs

1. Z. Xiong and X. Q. Dong, "在校园捕捉来自宇宙的信息——2021年"国际宇宙日"活动概览(to capture the information from universe at campus - digest on 2021 cosmic day)," *Modern Physics*, vol. 34, no. 02, pp. 47–53, 2022, ISSN: 1001-0610. DOI: 10.13405/j.cnki.xdwz.2022.02.017.
2. ParadoX, "超越费米悖论(Beyond Fermi Paradox)," in ser. Beyond Fermi Paradox 8/16, Mar. 2021. URL: https://mp.weixin.qq.com/s/9EqbGyC7wJtVuMysE7N1sA.
3. ParadoX, "天文学家如愿以偿得到了想要的数据,却发现"哈勃常数危机"加剧了(Astronomers Get Their Wish, and a Cosmic Crisis Gets Worse)," in ser. IHEP Doctorial Scope 1/3, Dec. 2020. URL: https://mp.weixin.qq.com/s/hPDKQVW60trVTOAw8Mrp_A.
4. ParadoX, "天文学家的备忘手册(Astronomer's Toolbox)," in ser. Astronomer's Toolbox, 2020. URL: https://mp.weixin.qq.com/s/l0kYWIsxJZn-FotJNb-BAA.

Service

2020.09 – 2020.09 — **Intern Technician.** Maintenance and verification of the KM2A-ED detectors, Shandong University.

2020.10 – 2020.11

2021.04 – 2022.05 — **Intern Technician.** Installation and verification of the KM2A-MD detectors after 1/2 KM2A stage on-site service at the Large High Altitude Air Shower Observatory (LHAASO), Institute of High Energy Physics, CAS.

Skills

Languages — Strong reading, writing, and speaking competencies in English, and Mandarin Chinese. Fluent in Japanese speaking and reading.

Coding — C, C++, Python, cuda, LaTeX, …

Software — CERN ROOT, CORSIKA, GEANT4, CASTEP

Misc. — Academic research, teaching, training, consultation, LaTeX typesetting and publishing.

Miscellaneous Experience

Awards and Achievements

2016 - 2019 — **WHUT Prize for Outstanding Student Performance**, Wuhan University of Technology.

2021 - 2022 — **Department Prize for Outstanding Student Performance**, Institute of High Energy Physics.

Certifications

2018 — **Certified Advanced Students Training**. Awarded by XLAB Göttinger Experimentallabor in Georg-August-Universität Göttingen.

2022 — **Certified Data Analysis Skill**. Awarded by LHAASO Collaboration 2022 Summer School.

References

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