Zigong Xu

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Education

PhD in Space Physics, *University of Kiel* 2018.09 — 2023.08
Member of Lunar Lander Neutron & Dosimetry Experiment (LND) and Solar Orbiter Energetic Particle Detector (EPD, High Energy Telescope (HET))
Master in Astrophysics, *Nanjing University* 2015.09 — 2018.06
2016-2017 National scholarship for graduate students; 2016 Excellent Student Cadre
Bachelor in Space science and Technology, *Nanjing University* 2011.09 — 2015.06
2015 Outstanding Graduates Awards

Research Experience

Postdoctoral Scholar Research Associate in Physics **Sep 2023 - present**
Parker Solar Probe and Interstellar Mapping and Acceleration Probe
California Institute of Technology
Advisor: C.M.S. Cohen *Pasadena, CA, USA*

Research Associate, Project manager **Sep 2018 — Aug 2023**
Lunar Lander Neutron & Dosimetry Experiment (LND)/ Chang'E-4
University of Kiel, Advisor: Robert F. Wimmer-Schweingruber *Kiel, Germany*

- Reported the first SEPs observed by the LND, identified as a widespread but impulsive SEP event.
- Determined the primary (GCR) and the albedo proton flux during the 24/25 solar minimum based on the LND measurement on the lunar far-side surface.
- Calibrated the data products of LND, using Geant-4 simulation. Skilled in data analysis and data visualization.

Research Associate **Sep 2020 — Present**
High Energy Telescope (HET)/Solar Orbiter
University of Kiel,
Advisor: Robert F. Wimmer-Schweingruber *Kiel, Germany*

- Analyzed the energetic particle data of EPD including multiple large and wide-spread solar energetic particle events and studied the radial gradient of ACR and GCR measured by the SOLO/EPD/HET.
- Cross-calibrated the data of the High Energetic Telescope (HET) with other instruments.

Research Assistant **Sep 2015 — June 2018**
Nanjing University,
Advisor: Chuan Li, Mingde Ding *Nanjing, China*

- Analyzed remote-sensing solar images, radio burst data, soft and hard X-ray data (SDO, STEREO, SOHO, RHESSI, GOES) , and in-situ measurements of energetic particles (GOES, ACE, WIND). Skilled at IDL.

Postgraduate Research & Practice Innovation Program of Jiangsu Province (KYCX17_0023, 15K RMB) **May 2017 – June 2018**
Nanjing University,
Advisor: Chuan Li *Nanjing, China*

- Project Title: Study on resource and acceleration mechanism of Solar Energetic Particle (SEP) events

Mission Experience

Member of IMAP/HIT team 2025.09 - present **Member of PSP/IS⊙SI/EPi-Hi team** 2023.09- present
Member of SOLO/EPD team 2020.09 - 2023.09
Project Manager of Lunar Lander Neutron and Dosimetry Experiments (LND) 2019.06 - 2023.09

Publications

Selected Paper

- Wensai Shang, Ji Liu, **Zigong Xu**(both first authors) et al (2024) Evidence for a galactic cosmic ray cavity in Earth-Moon space, under review
- **Xu Z**, et. al, Solar Orbiter EPD measurements of Anomalous cosmic ray Helium-4 in the inner heliosphere from 0.3 AU to 1 AU, under review

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- **Z. G. Xu**, et al "Parker Solar Probe observations of solar energetic particle (SEP) events with inverse velocity arrival (IVA) features", under review.
- **Z. G. Xu**, CM S Cohen, RA Leske, GD Muro, AC Cummings, DJ McComas, NA Schwadron, ER Christian, ME Wiedenbeck, RL McNutt, DG Mitchell, GM Mason, A Kouloumvakos, RF Wimmer-Schweingruber, GC Ho, J Rodriguez-Pacheco(2024), "Composition Variation of the 2023 May 16 Solar Energetic Particle Event Observed by SolO and PSP". ApJL 2024 976 L3
- **Xu Z**, Guo J, Wimmer-Schweingruber RF, Dobynde MI, Kühl P, Khaksarighiri S and Zhang S (2022), "Primary and albedo protons detected by the Lunar Lander Neutron and Dosimetry experiment on the lunar farside". Front. Astron. Space Sci. 9:974946
- **Zigong Xu**, Jingnan Guo, Robert F. Wimmer-Schweingruber, *et al.* (2020), "First Solar Energetic Particles Measured on the Lunar Far-side", The Astrophysical Journal Letters, 902 (2), L30
- **Zigong Xu**, Chuan Li, Mingde Ding , "Observations of a Coronal Shock Wave and the Production of Solar Energetic Particles" ,The Astrophysical Journal, 2017, 840 (1), 38
- Jingnan Guo, Xiaolei Li, Jian Zhang, Mikhail I Dobynde, Yuming Wang, **Zigong Xu**, Thomas Berger, Jordanka Semkova, Robert F Wimmer-Schweingruber, et al. (2023), "The first ground level enhancement seen on three planetary surfaces: Earth, Moon, and Mars", Geophysical Research Letters, 50, e2023GL103069
- R. F. Wimmer-Schweingruber, N. Janitzek, D. Pacheco, I. Cernuda, F. Espinosa Lara, R. Gómez-Herrero, G. M. Mason, R. C. Allen, **Z. G. Xu**, F. Carcaboso, A. Kollhoff, P. Kühl, J. L. Freiherr von Forstner, L. Berger, J. Rodriguez-Pacheco, G. C. Ho, et al. (2021), "First year of energetic particle measurements in the inner heliosphere with Solar Orbiter's Energetic Particle Detector", A&A 656, A22 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- R. C. Allen, I. Cernuda, D. Pacheco, L. Berger, **Z. G. Xu**, *et al* (2021), "Energetic Ions in the Venusian System: Insights from the First Solar Orbiter Flyby", A&A 656, A7 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- G. M. Mason, G. C. Ho, R. C. Allen, **Z. G. Xu**, *et al.* (2021), "Quiet-time low energy ion spectra observed on Solar Orbiter during solar minimum", A&A 656, L5 (2021), Solar Orbiter First Results (Cruise Phase) Special issue

Other co-author papers

- G.D.Muro, C.M.S.Cohen, **Z. Xu**, et al, Radial Dependence of Ion Fluences in the 2023 July 17 Solar Energetic Particle Event from Parker Solar Probe to STEREO and ACE, The Astrophysical Journal, 981:8 (10pp), 2025 March 1
- C. M. S. Cohen, **Z. G. Xu**, et al, Longitudinal Dependence of Heavy Ion Composition in the 2021 October 28 Ground Level Enhancement Event, The Astrophysical Journal Letters, 978:L35 (6pp), 2025 January 10
- L. Yang, ..., **Z. Xu**, et al, Dynamic acceleration of energetic protons by an interplanetary collisionless shock, Astronomy and Astrophysics, 686, A132 (2024)
- G. Livadiotis, ..., **Z. Xu**, et al, Kappa-tail Technique: Modeling and Application to Solar Energetic Particles Observed by Parker Solar Probe, The Astrophysical Journal, 973:6 (13pp), 2024 September 20.
- M. E. Cuesta, ..., **Z. Xu**, et al, Observations of Kappa Distributions in Solar Energetic Protons and Derived Thermodynamic Properties, The Astrophysical Journal, 973:76 (10pp), 2024 October 1
- C. M. S. Cohen, ..., **Z. G. Xu**, et al, Observations of the 2022 September 5 Solar Energetic Particle Event at 15 Solar Radii, The Astrophysical Journal, 966:148 (13pp), 2024 May 10
- Robert F. Wimmer-Schweingruber ... **Zigong Xu**, Unusually long path length for a nearly scatter-free solar particle event observed by Solar Orbiter at 0.43 au, Astronomy and Astrophysics, 678, A98 (2023)
- R. Bučík ... **Z. G. Xu**, The first gradual solar energetic particle event with an enhanced 3He abundance on Solar Orbiter, Astronomy and Astrophysics, 669, A13 (2023)
- Yang L, Heidrich-Meisner V, Berger L, ... **Xu Z,** et al. Acceleration of suprathermal protons near an interplanetary shock. Astronomy and Astrophysics, 2023, 673: A73.

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- Nina Dresing, ... **Zigong Xu**, et al, The 17 April 2021 widespread solar energetic particle event, Astronomy and Astrophysics, 674, A105 (2023)
- Alexander Kollhoff, Lars Berger, Maximilian Brüdern, Nina Dresing, ..., **Zigong Xu** (2023), "Multi-spacecraft observations of near-relativistic electron events at different radial distances", A&A, 675, (2023) A155
- David Lario, Nicolas Wijsen, Ryun Young Kwon, Beatriz Sánchez-Cano, IG Richardson, Daniel Pacheco, ..., **Zigong Xu**, Alexander Kollhoff (2022), "Influence of Large-scale Interplanetary Structures on the Propagation of Solar Energetic Particles: The Multispacecraft Event on 2021 October 9" The Astrophysical Journal, 934:55, 2022
- Robert F. Wimmer-Schweingruber, ..., **Zigong Xu**, et al, Advances in energetic particle physics with Solar Orbiter, Proceedings of Science, (2022)
- Wang chi, Li Lei, ..., **Xu zigong**, et al 2022, Journal of Deep Space Exploration, "The Solar Wind and Particle Radiation Environment on the Surface of the Moon—New Observations from Chang'E-4", Journal of Deep Space Exploration
- J. L. Freiherr von Forstner, M. Dumbović, C. Möstl, J. Guo, A. Papaioannou, R. Elftmann, **Z. G. Xu**, *et al* (2021), "Radial evolution of the April 2020 stealth coronal mass ejection between 0.8 and 1 AU. Comparison of Forbush decreases at Solar Orbiter and near the Earth", A&A 656, A1, Solar Orbiter First Results (Cruise Phase) Special issue
- Zhang, S., Hou, D., Wimmer-Schweingruber, R. F., Sun, Y., Wang, C., Chang, Z., **Xu Z.**, Shen G., Yuan B. Xue, C. (2021). Radiation Dose of LND on the Lunar Surface in Two Years. Chinese Journal of Space Science, 41(3), 439-444
- A. Kollhoff, A. Kouloumvakos, D. Lario, N. Dresing, R. Gómez-Herrero, ..., **Z. G. Xu**, et al (2021), "The first widespread solar energetic particle event observed by Solar Orbiter on 2020 November 29", A&A 656, A20 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- A. Aran, D. Pacheco, ... **Z. G. Xu** et al (2021), "Evidence for local particle acceleration in the first recurrent galactic cosmic ray depression observed by Solar Orbiter- The ion event on 19 June 2020", A&A 656, L10 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- R. Gómez-Herrero, D. Pacheco, A. Kollhoff, ..., **Z. Xu** et al (2021), "First near-relativistic solar electron events observed by EPD onboard Solar Orbiter", A&A 656, L3 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- R. C. Allen, G. M. Mason, G. C. Ho, ..., **Z. Xu** et al (2021), "Suprathermal particles from corotating interaction regions during the first perihelion pass of Solar Orbiter", A&A 656, L2 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- R. Bučík, G. M. Mason, R. Gómez-Herrero, ..., **Z. G. Xu**, et al (2021), "The long period of 3He-rich solar energetic particles measured by Solar Orbiter 2020 November 17–23", A&A 656, L11 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- G. M. Mason, C. M. S. Cohen, G. C. Ho, D. G. Mitchell, R. C. Allen, M. E. Hill, ..., **Z. G. Xu**, et al (2021), "Solar energetic particle heavy ion properties in the widespread event of 2020 November 29", A&A 656, L12 (2021), Solar Orbiter First Results (Cruise Phase) Special issue
- Robert F. Wimmer-Schweingruber, Jia Yu, ... **Z. G. Xu** *et al* (2020), "The Lunar Lander Neutron and Dosimetry (LND) Experiment on Chang'E 4", Space Science Reviews 216 (6), 1-40
- Shenyi Zhang, Robert F. Wimmer-Schweingruber, ..., **Z. G. Xu** *et al* (2020), "First measurement of the radiation dose on the lunar surface", Science Advances 6 (39), eaaz1334
- W. H. Lei, C. Li, F. Chen, S. J. Zhong, **Z. G. Xu** and P. F. Chen (2020), Do the solar flares originating from an individual active region follow a random process or a memory-dependent correlation?, Monthly Notices of the Royal Astronomical Society 494 (1), 975-982.
- C. Li, S. J. Zhong, **Z. G. Xu** et al (2018), Waiting time distributions of solar and stellar flares: Poisson process or with memory?, MNRAS, 479, L139.

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Professional Experience/Talks/poster (selected)

- AGU Fall meeting 2025, Dec, **invited talk**, *Multi-spacecraft observations of solar energetic particle events with inverse velocity arrival (IVA) features: PSP and SolO*
- AGU Fall meeting 2024, 9-13, Dec, 2024, poster, *Inverse velocity arrival (IVA) feature of solar energetic particle events* SH33C-2743
- Cospar 2024, 12-19, July, 2024, oral, *Composition variations in the May 16, 2023 solar energetic particle event.*
- AGU Fall meeting 2023, 11-15, Dec, 2023, oral, *Combined investigation on Solar Energetic Particle (SEP) events: Insights from SOLO, PSP, and observers at 1 au*
- Solar Orbiter NASA/GSFC Workshop (24-25-26 October 2023) *Solar Orbiter EPD measurements of cosmic rays in the inner heliosphere from 0.3 AU to 1 AU*
- AGU Fall meeting 2022, 12-16, Dec 2022, oral, online, *Solar Orbiter EPD measurements of ACR and GCR in the inner heliosphere from 0.3 AU to 1 AU*
- COSPAR ATHENS 2022, 44th Scientific Assembly, 16-24, July 2022, oral, *Primary and albedo protons measured by the Chang'E 4 Lunar Lander Neutron and Dosimetry (LND) experiment on the lunar far side*
- AGU Fall meeting 2021, oral, online, *P51B-02 - Primary and albedo protons measured by the Chang'E 4 Lunar Lander Neutron and Dosimetry (LND) experiment on the lunar far side*
- EGU General Assembly 2021, oral, online, *The High Energy Telescope (HET) on the SolarOrbiter Mission: Overview and First Data*
- 4th Institute Space Science Summer School- Artificial Intelligence for Astronomy, Institute of Space Sciences Barcelona-Spain (Virtual), 2021.7.12-16
- AGU Fall meeting 2020, oral, online, *First Solar Energetic Particles Measured On The Lunar Far-side*
- EGU General Assembly 2020, oral, online, *First Solar Energetic Particles Measured On The Lunar Far-side*
- AGU Fall meeting 2019, poster, San Francisco, *SH41D-3340 - Energetic particles measurements on the lunar far side by Lunar Lander Neutron and Dosimetry(LND) experiment*
- Summer school: Exploring the physics of planetary environments, KTH, Stockholm, Sweden, 2019.8.13-22
- The 4th Asia-Pacific Solar Physics Meeting (APSPM2017), oral, Japan, *Observations of the CME shocks and the production of SEPs*

Grants, Awards, and Honors

- National Aeronautics and Space Administration Group Achievement Award of Parker Solar Probe Team
- 2017 National scholarship for graduate students
- 2016 Excellent Student Cadre
- 2015 Outstanding Graduates Awards

Teaching, Mentoring, and Outreach

- **Outreach**
  - Popular science book translation: The Sun (Kosmos) and *Traveller's Guide to Mars*
- **Mentoring**
  - mentor of FSRI 2025.
  - Summar Volunteer for high school student (minor) at Caltech: Julian Du, Kexuan Wang, LND SEP data analysis
  - Interns from Ricarda-Huch-Schule (2019/04-2019/06): Python usage and data analysis of Chang'E-4/LND and MSL/RAD measurements
- **Journal reviewer:** ApJ, GRL, PSS, Advances in Space Research (AISR), Results in Engineering, Support NASA HGIO panel review.

Personal interests/Additional activities

Hobbies Volleyball referee with license, diving, ice skating,