

Kexin Liu

Tsinghua University, Department of Physics
30 Shuangqing Road, Haidian District
Beijing 100084, China

* Born: 28 Aug 1998, Jinan, China

☎ +86 1500 6800 259

✉ lkx21@mails.tsinghua.edu.cn

🆔 0009-0004-1437-5716

Last update: 2 Nov 2025

Hey ghost particles, let's take a selfie!

Education

- 2021–present **Ph.D. in Physics**, *Tsinghua University*, Beijing, (*Expected Jun 2026*)
Thesis (tentative): First Measurement of the Solar ^8B $\text{CE}\nu\text{NS}$ in XENONnT
Advisor: Prof. Fei Gao
- 2017–2021 **B.Sc. in Physics**, *Sun Yat-sen University*, Guangzhou, *Honors graduate*
Thesis Title: Study of Accidental Coincidence Background in XENON1T

Research Experience

XENONnT Dark Matter Experiment — Low-Energy Rare Signal Searches

- 2024–present **Enhanced Measurement of Solar ^8B $\text{CE}\nu\text{NS}$ in XENONnT**, *Convener of Signal and Detector Analysis Team*
Leading the analysis effort for the next-generation measurement of solar ^8B neutrinos and the search for light WIMPs, with focus on event reconstruction, background modeling, and statistical inference.
- 2023–2024 **First Measurement of Solar ^8B $\text{CE}\nu\text{NS}$ in XENONnT**, *Corresponding Author*
Spearheaded the analysis, building on the accidental coincidence background model I developed, which led to the first observation of $\text{CE}\nu\text{NS}$ from solar neutrinos in a dark-matter detector. Published in *Phys. Rev. Lett.* and selected as an APS **Highlights of the Year**.
- 2021–2023 **Accidental Coincidence Background Modeling in XENONnT**
Developed and implemented a precision model for non-physical low-energy backgrounds, achieving a suppression by orders of magnitude. This analysis framework was foundational to key XENONnT results, including low-energy electronic recoil searches (*Phys. Rev. Lett.* 129, 161805, 2022) and WIMP-nucleon searches (*Phys. Rev. Lett.* 131, 041003, 2023).
- Liquid Xenon Detector R&D
- 2025–present **Measuring Radon Daughter Plate-out on LXe TPC Electrodes**, *CJPL Ultra-Low Background Facility*
Measuring surface radioactivity of XENONnT electrodes, investigating treatment procedures, and assessing their impact as potential background sources.
- 2021–2023 **Design and Commission of Liquid Xenon Circulation and Purification System**
Designed and operated the first full-function LXe system at Tsinghua University.

Visits and Internships

- May–Oct 2023 **Visiting Scholar**, *Columbia University*, New York, NY, US, Advisor: Prof. Elena Aprile
Conducted the solar ^8B CE ν NS analysis in XENONnT.
- Sep–Dec 2019 **Visiting Student**, *University of California, Berkeley*, Berkeley, CA, US, UC Berkeley International Study Program (BISP)
- Jun–Aug 2019 **Undergraduate Summer Internship**, *CHIPS Experiment, Wisconsin IceCube Particle Astrophysics Center*, Hoyt Lakes, MN, US, Advisor: Prof. Jennifer A. Thomas
Contributed to the construction of a water Cherenkov neutrino detector, including testing photomultiplier tubes (PMTs) and assembling detector planes.

Honors and Awards

- 2025 **Chien-Shiung Wu Diploma**, *International School of Subnuclear Physics*, Erice, Italy,
Awarded to outstanding PhD students for scientific merit and presentation at the prestigious international school.
- 2024 **Most Popular Poster Award & Best Talk Award**, *National Top PhD Student Summit*, Hefei, China,
Dual awards at a national Ph.D. summit. The Poster Award was chosen by faculty and student vote, with one award per university.
- 2024 **Best Presentation Award**, *International Workshop on the Identification of Dark Matter (IDM 2024)*, L'Aquila, Italy,
Selected as the best presentation among all talks in the dark matter direct detection parallel session.
- 2024, 2022 **National Scholarship for Graduate Students**, *Ministry of Education, China*, Beijing, China
Among the highest academic honors for Ph.D. students in China. Awarded to the top 0.2% of Ph.D. students nationally, representing the top 2% at Tsinghua.
- 2021–2026 **Future Scholars Fellowship**, *Tsinghua University*, Beijing, China
A prestigious fellowship awarded to top-ranked incoming Ph.D. students across the university (10 out of 80 in physics).

Talks

Conferences

- 2025 **First Measurement of Solar ^8B CE ν NS in XENONnT**, *19th International Conference on Topics in Astroparticle and Underground Physics (TAUP 2025)*, Xichang, China
- 2025 **Into the Neutrino Fog: Latest Results from the XENONnT Experiment**, *30th Weak Interactions and Neutrinos (WIN 2025)*, Brighton, UK
- 2024 **Accidental Coincidence Background in XENONnT for Low-Energy Nuclear Recoil Search**, *15th International Workshop on the Identification of Dark Matter (IDM 2024)*, L'Aquila, Italy, Best presentation Award
- 2022 **XENONnT Progress: First Results on Electronic Recoil Events**, *11th International Conference on New Frontiers in Physics (ICNFP 2022)*, Crete, Greece (online participant)

Invited Seminars

- 2024 **First Measurement of Solar ^8B CE ν NS in XENONnT**, *Sun Yat-sen University*, Guangzhou, China
- 2024 **First Measurement of Solar ^8B CE ν NS in XENONnT**, *Institute of High Energy Physics*, Beijing, China

Teaching and Mentoring

- 2025 **Organizer and Main Lecturer**, *Introduction to Neutrino and Dark Matter Detection (Online Undergraduate Research Training Course)*, Nanjing Normal University & Westlake University
Designed curriculum and delivered lectures on fundamental principles and modern detection techniques for an interdisciplinary undergraduate audience.
- 2024 **Co-organizer and Lecturer**, *XENONnT Newcomers Workshop*, XENON Collaboration, Assergi, Italy
Lectured on cut design and software implementation for new collaboration members.
- 2022 **Teaching Assistant**, *Tsinghua University*, Beijing, China
Undergraduate General Laboratory course (Optics experiments) for physics and engineering majors. Guided the experimental procedures and data analysis.

Organization and Service

- 2025 **Conference Organization Team**, *International Conference on Topics in Astroparticle and Underground Physics (TAUP 2025)*, Xichang, China
Contributed to local organization and facilitated communication for international participants.
- 2024 **Conference Organization Team**, *Conference on Frontiers of Underground and Space Particle Physics and Cosmophysics (COUSP 2024)*, Xichang, China
- 2023 **Conference Organization Team**, *Symposium on Frontiers of Underground Physics*, Chengdu, China
- 2022–present **Public Relations Team Support Group**, *XENON Collaboration*, Prepared press release material for results and outreach on social media.
- 2021–present **Co-organizer of HEP Experiment Seminars**, *Tsinghua University*
Coordinated seminar logistics, including speaker communication, poster preparation, and announcements.

Selected Publications

- E. Aprile et al., *First Indication of Solar ^8B Neutrinos via Coherent Elastic Neutrino–Nucleus Scattering with XENONnT*. *Phys. Rev. Lett.* **133**, 191002 (2024). **Corresponding Author**
Featured in Physics; Editors' Suggestion; APS Highlights of the Year 2024; Collection of the Year 2024.
Citations: **103**

- E. Aprile et al., *First Search for Light Dark Matter in the Neutrino Fog with XENONnT*.
Phys. Rev. Lett. **134**, 111802 (2025). **Major Contributor**
Editors' Suggestion.
Citations: **21**

- E. Aprile et al., *WIMP Dark Matter Search using a 3.1 tonne \times year Exposure of the XENONnT Experiment*.
Phys. Rev. Lett. (accepted, Sept 2025). **Major Contributor in Event Selection and Background Modeling**
Citations: **35**

- E. Aprile et al., *First Dark Matter Search with Nuclear Recoils from the XENONnT Experiment*.
Phys. Rev. Lett. **131**, 041003 (2023). **Major Contributor in Event Selection and Background Modeling**
Featured in Physics; Editors' Suggestion.
Citations: **554**

- E. Aprile et al., *Search for New Physics in Electronic Recoil Data from XENONnT*.
Phys. Rev. Lett. **129**, 161805 (2022). **Major Contributor in Background Modeling**
Featured in Physics; Editors' Suggestion.
Citations: **372**

- E. Aprile et al., *XENONnT WIMP Search: Signal and Background Modeling and Statistical Inference*.
Phys. Rev. D **111**, 103040 (2025). **Writing Team Member**
Citations: **16**