北京大学量子材料科学中心
International Center for Quantum Materials, PKU

Seminar

Search for New Physics with Electron Dipole Moments –and beyond–

Xing Fan

Northwestern University

Time: 3:00 pm, Aug. 19, 2024 (Monday)

时间：2024年8月19日 （周一）下午3:00

Venue: Room w563, Physics Building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

A major goal of modern particle physics is to search for phenomena that are in conflict with our best theoretical understanding of nature, the Standard Model (SM). One approach in the search occurs at the laboratory scale where the SM's most precise predictions are tested by the most precise measurements of fundamental particles. Deviations at this high-precision frontier would inform the search for Beyond the SM (BSM) physics.

The electron Magnetic Dipole Moment (so-called g-factor) is the most precise prediction of the SM. In our most recent measurement, a 2-sigma deviation was observed with the SM prediction. The deviation, together with the muon g-factor discrepancy, motivates new theories beyond the SM. The key techniques, involving an isolated electron in an ion trap and quantum measurement, will be presented.

The electron Electric Dipole Moment (EDM) serves as a sensitive probe of physics Beyond the SM. The ACME experiment uses a cold molecule beam to establish a stringent constraint on the eEDM. With the goal of improving the sensitivity by a factor of 40, a new beamline is being constructed at Northwestern University. I will present the principles of this eEDM measurement and my contribution to the experiment.

About the speaker

Dr. Xing Fan received his Ph.D. degree from Harvard University in 2022. He is currently a research assistant professor at Northwestern University. He will become an assistant professor at Harvard University starting 2025/07. His research interest lies in precision measurement and test of the standard model, including measurements of the electron and positron magnetic moments, as well as the electron electric dipole moment.