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清华大学安全科学学院

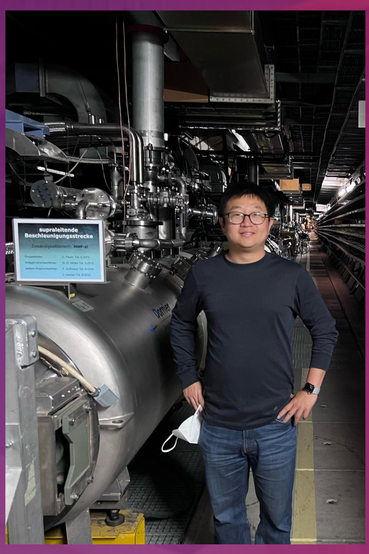
第022期“安全科学论坛”

题　　目：Convergent-beam X-ray diffraction — resolving tructures in space and time
汇聚X光衍射方法 — 结构的时空分辨

报 告 人：李楚峰（CFEL，DESY, Senior Scientist）
报告时间：2026年11月12日周四 10：00-11：30
报告地点：自强科技楼4号（吕大龙楼） 101会议室

主 持 人：郑　昕　副研究员
王科迪　助理研究员

报告人简介



Chufeng Li, senior scientist at Center for Free-Electron Laser Science CFEL, Deutsches Elektronen-Synchrotron DESY, possesses extensive expertise in computational cystallography and coherent diffractive imaging. His research endeavors are dedicated to the development of novel diffraction methods and computational approaches for structural studies in the fields of biological and materials sciences. In recent years, he has concentrated on advancing convergent-beam X-ray diffraction methods and techniques. These endeavors are aimed at providing spatiotemporally resolved molecular structures within heterogeneous crystals, facilitating the study of ultrafast processes and dynamics. Multiple X-ray imaging modalities enabled by convergent beam optics serve as potent tools for cross-scale studies of functional materials and devices.

报告摘要

We present a novel method, convergent-beam X-ray crystallography, for structural studies with resolving capabilities in space and time domains and across scales. Convergent beam X-ray diffraction (CBXD) encodes the position of each diffracting voxel within the crystal into the diffraction pattern, thereby enabling the space-resolving capability of CBXD [1]. When the crystal is rotated in the convergent beam, each Bragg reflection streak scans across the crystal and forms a 2D projection image of the crystal along the beam direction, which is termed *CBXD topograph*. This capability allows us to sort the diffraction data according to 3D real space coordinates, to improve the accuracy of structure factors for detecting small structural changes by accounting for the inhomogeneities across the crystal. The development of the CBXD topographic [1] methods, combined with other complimentary imaging modalities such as (Bragg) ptychography, will lead us to a new approach to cross-scale analysis of the 3D strain field in functional materials and devices. CBXD also encodes time into the diffraction pattern with deep sub-femtosecond precision [2].

[1] C. Li et al., *J. Appl. Cryst.* (2026). **59**, 1200–1218
[2] H.N. Chapman, C. Li, et al., *Struct. Dyn.* (2025). **12**, 014301.