



Seminar

Lattice dynamic coupling in order-disorder phase transitions studied using neutron scattering techniques

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Time: 3:00 pm, Jan. 10, 2024 (Wednesday)

时间: 2024年1月10日 (周三) 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

Lattice dynamics is an important content of condensed matter, which builds a fundamental quantum basis for many physical properties, such as specific heat, thermal expansion, phase transition, thermal conductivity, and so on. The coupling between lattice dynamics and charges, spins, and orbitals can lead to the formation of novel matter states, such as superconductors, charge density waves, superionic state, plastic crystal, etc. Among them, the superionic and plastic crystal states are intermediate between the ordered crystalline state and the disordered liquid. Their crystal structures simultaneously have both long-range ordering and short-range disordering characteristics. The coupling variation of sublattice dynamics affects many physical properties of superionic and plastic crystal materials, including phase transitions, heat transport, and ionic conductivity. In this report, I will briefly introduce the China Spallation Neutron Source and neutron scattering techniques. Then, I will demonstrate that the lattice dynamics coupling behavior in the superionic and plastic crystal materials correlates to lattice anharmonicity, strongly impacting the order-disordering behavior in these novel matter states.

About the speaker

任清勇, 中国科学院高能物理研究所引进人才, 副研究员。2016年12月毕业于澳大利亚新南威尔士大学科学学院, 获凝聚态物理学博士学位; 2017年3月至2020年8月在上海交通大学物理与天文学院从事博士后研究工作。于2020年9月, 加入中国科学院高能物理研究所散裂中子源。目前主要从事我国首台高能直接几何非弹性中子散射飞行时间谱仪的建设与运行, 并开展中子散射科学应用研究。研究兴趣包括有序-无序相变、热电材料、磁相变材料等的微观晶体结构与晶格动力学行为。在物理与材料领域期刊Nat. Mater., Nat. Phys., Nat. Commun., Chem. Mater. 等发表论文30余篇。