

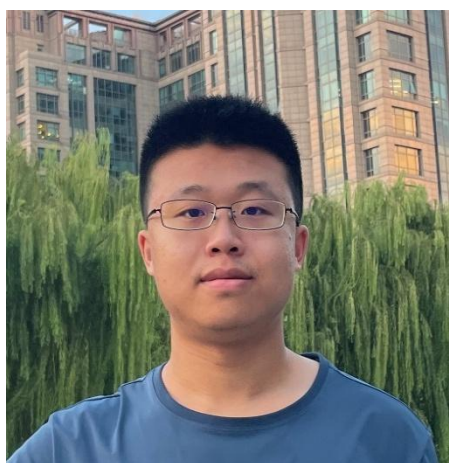


Seminar

Interaction-enhanced sensing in solid-state spin ensembles

高昊阳

哈佛大学



Time: 1:30 pm, June 5, 2026 (Friday)

时间: 2026年6月5日 (周五) 下午1:30

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

Solid-state spin ensembles have emerged as a leading platform for micro- and nanoscale sensing, combining high sensitivity, nanoscale spatial resolution, and operation under ambient conditions. At high spin densities, magnetic dipole-dipole interactions typically limit sensing performance by reducing coherence, but can in principle be harnessed to enhance sensitivity. Realizing such interaction-enhanced sensing in practice, however, remains challenging due to the intrinsic anisotropy of dipolar interactions and the random spatial distribution of spins.

This talk presents a series of experimental works that culminate in a practical interaction-enhanced magnetometer based on ensembles of nitrogen-vacancy (NV) centers in diamond. Our approach is based on collective, one-axis-twisting-like (OAT-like) dynamics engineered from native dipolar interactions using controlled nanoscale spin textures, in combination with a dressed-state qubit encoding that significantly extends the sensor coherence time. These results open the door to practical deployment of interaction-enhanced quantum sensors for nanoscale biological imaging and material characterization.

About the speaker

高昊阳, 哈佛大学博士, 本科就读于北京大学和麻省理工学院。从事量子传感、量子多体物理方面的研究。曾将Floquet engineering技术推广到自旋 $>1/2$ 情形 (PRX 14, 031017)。在利用偶极-偶极相互作用改善量子传感性能方面有深入研究 (Nature 646, 68 - 73; arXiv:2506.11920; PRL 136, 200802)。