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應用物理及材料工程研究院
INSTITUTO DE FÍSICA APLICADA E ENGENHARIA DE MATERIAIS
INSTITUTE OF APPLIED PHYSICS AND MATERIALS ENGINEERING

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IAPME Seminar

Celebrating the 45th Anniversary of the University of Macau: First-Principles Exploration of Emergent Quantum Phenomena in Low-Dimensional Materials

21 May 2026

Prof. Cong WANG
Renmin University of China

Venue: N23-3022
Time: 11:00 - 12:00
Hosted by: Prof. Yongqing CAI

Abstract

In recent years, with integration of first-principles calculations with experimentally relevant structures and observables, we explore the two-dimensional magnetic materials, moiré-related physics, and kagome electronic structures. Through realistic atomistic simulations combined with electronic structure analysis, the interlayer hybridization and stacking reconstruction is revealed to tune magnetic exchange interactions and induce novel correlated states in layered materials such as CrI_3 and other magnetic bilayers. In addition, through high-throughput discovery, transition-metal oxide monolayers have been explored and kagome materials with potentially exotic topological and magnetic properties are predicted to provide new candidate platforms for quantum states in reduced dimensions. Kagome lattices have attracted intense interest because they host exotic quantum phenomena including flat bands, Dirac fermions, frustrated magnetism, and topological electronic states. The seminar will discuss our recent efforts on kagome materials and correlated electronic structures in reduced dimensions.

Biography

Prof. Cong WANG is an Associate Professor at the School of Physics, Renmin University of China. His research focuses on applying density functional theory, combined with experimental data, to simulate and predict novel physical properties—such as magnetism and ferroelectricity—in low-dimensional materials and to modulate their performance. He has published 36 papers as (co-)first author or corresponding author in high-impact journals, including Nature Materials, Nature Nanotechnology, Nature Communications, Advanced Materials, Physical Review B, Nano Letters, ACS Nano, and Science Bulletin. Among these, three are ESI highly cited papers, and his work has received more than 1400 citations. He has led a project funded by the National Natural Science Foundation of China and serves as a reviewer for ACS Nano and ACS Applied Electronic Materials.