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Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme
Fachbereich Physik, Universität Stuttgart

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Login data will be announced by e-mail and on the colloquium webpage.

Dienstag, 21. Dezember 2021 | **16.15 Uhr** | **Online**

Stuttgarter Max-Planck-Institute, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

The role of crystalline symmetries in topological materials

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Abstract

Since the theoretical proposal of the first 2D and 3D topological insulators (TIs) more than 15 years ago, solid-state realizations of topological materials have been discovered at a rapid pace. The recently developed theories of Topological Quantum Chemistry and Symmetry-Based Indicators (SIs), based on symmetry eigenvalues and irreducible representations have in particular facilitated high-throughput materials discovery and revealed that topological phases in band structures are more common than originally thought. Indeed, over half of all of the known stoichiometric, solid-state, nonmagnetic materials are topological at the Fermi level, over 85% of the known stoichiometric materials host energetically isolated topological bands, and that just under 2/3 of the energetically isolated bands in known materials carry the stable topology of a TI or TCI. In this talk we will introduce topological electronic materials discovery in nonmagnetic and magnetic crystalline solids from the prediction based on TQC. We will also show that for a subset of the topologically trivial insulators, knowing only their electron number and the Wyckoff positions of the atoms we can separate them into two groups: the obstructed atomic insulator (OAI) and the atomic insulator (AI). The interesting group, the OAI, have a center of charge not localized on the atoms and therefor, surface states can be displayed at certain surfaces.