Accelerating Materials Discovery by Empowering Users—the MIP Difference

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An enlightened and seasoned scientist had a bold vision—to make a new type of topological insulator in a form that could be relevant to technology. The dream compound involved a material predicted to have the desired band structure, but it had never been realized. The group tried for two years to make a simpler version of the material in their own lab, but could not find the right conditions. The group came to PARADIM and in two visits totaling six weeks of round-the-clock molecular-beamtime, they succeeded!

Guided by thermodynamic calculations from Platform collaborators at Penn State, a growth protocol was designed and implemented on PARADIM's signature tool that enabled exquisite control of the sample growth. All relevant measurements were made without exposing the sample to air to assess and optimize its crystalline perfection and electronic structure. The bandstructure of the new material was measured and compared to calculated expectations provided by PARADIM's Theory & Simulation Facility. This new type of topological insulator should be more readily tuned by the underlying substrate and layering to provide desired and technologically useful properties than traditional topological insulators.

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