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Towards Properties on Demand in Quantum Materials

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Abstract: *Over the last ten years, there has been a significant surge in the study of quantum materials. Notable findings include the prospect and identification of new Landau-symmetry-broken phases in correlated electron systems, topological phases in systems with strong spin-orbit coupling, and materials platforms based on two-dimensional van der Waals crystals that are extremely manipulable. One of the main objectives of contemporary condensed-matter physics is to find ways to experimentally realize quantum phases of matter and control their properties. This field holds promise for the development of new electronic/photonic devices with functionalities that are currently unattainable and probably unimaginable. In this Review, we discuss new approaches that are being developed to deliberately alter the parameters of microscopic interactions, which may be used to change materials into the desired quantum state. Recent advances in the use of strong fields, impulsive electromagnetic stimulation, nanostructuring, and interface engineering to modify the characteristics of electronic interactions will be highlighted in particular. When combined, these methods provide a possible road map for the age of demand-driven quantum events.*

Keywords: Quantum Technology, Material Engineering.

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