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Special Issue Reprint

New Spin on Metal-Insulator Transitions

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Metal–insulator transitions (MITs) constitute a core subject of fundamental condensed matter research. The localization of conduction electrons occurs in a large variety of materials and engenders intriguing quantum phenomena such as unconventional superconductivity and exotic magnetism. Nearby an MIT, minuscule changes of the interaction strength via chemical substitution, doping, physical pressure, or even disorder can trigger spectacular resistivity changes from zero in a superconductor to infinity in an insulator near T = 0. While approaching an insulating state from the conducting side, deviations from Fermi-liquid transport in bad and strange metals are the rule rather than the exception. As the drosophila of electron–electron interactions, the Mott MIT receives particular attention from theory as it can be studied using the Hubbard model. On the experimental side, organic charge-transfer salts and transition metal oxides are versatile platforms for working toward solving the puzzles of correlated electron systems. This Special Issue provides a view into the ongoing research endeavors investigating emergent phenomena around MITs.

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