

Fluctuation Effects in Topological Semimetals

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Topological semimetals represent an interesting class of materials that can be classified according to the symmetry properties of relativistic electronic states close to the Fermi energy. They are related to other topological materials, as 2D or 3D topological insulators that show edge or surface states. Famous concepts have been developed, as the quantum spin Hall effect (in 2D) and topological magneto-electric effects or superconductivity.

Experimentally, transport studies, e.g. in magnetic fields, and angle resolved photoemission are important techniques. Only recently it has been understood that also optical techniques using nonlinear or resonance effects can be used to probe the electronic dynamics. We will review the experimental and some theoretical basis of topological systems and then discuss in detail the effect of interband and intraband fluctuations on the Raman and optical response. Also the recent topic twisted light using photons with orbital angular momentum will be addressed.

Work supported by QUANOMET NL-4, DFG LE967/16-1, and DFG EXC 2123.