

# Seminar on Condensed Matter Theory

Group of Theoretical Physics at the Department of Condensed Matter Physics of Charles University has a pleasure to invite you to attend the seminar

**on 11 March 2021 at 13:00  
as an online webinar**

Contact K. Carva ([carva@karlov.mff.cuni.cz](mailto:carva@karlov.mff.cuni.cz)) for the online access information.



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## Topological Insulators and Magnetic Order

The occurrence of various defects can strongly influence the physical properties of real materials. Depending on their type, new outstanding features can arise, but also characteristic behavior might be lost. It is also the case of the Bi<sub>2</sub>Se<sub>3</sub> compound, a well-known topological insulator. Despite possessing a band gap in the bulk, this compound hosts unique metallic surface states protected by the time-reversal symmetry. Thus the surface states are robust against perturbations, which respect the protecting symmetry. Thanks to their linear dispersion those states are called Dirac states resembling effectively Dirac massless particles. Besides, according to their spin-polarization and the time-reversal symmetry, the back-scattering is suppressed there, promising great surface conductivity. However, the time-reversal symmetry might be broken by a nonzero magnetization. This could be achieved by magnetic doping and leads to the opening of the surface gap. Therefore, we focus on the influence of the Mn magnetic dopant on the Bi<sub>2</sub>Se<sub>3</sub> electronic structure and related magnetic exchange interaction, which can be employed to determine particular ordering temperatures. For a thorough description, both bulk and thin layered systems are considered, while their differences are discussed. We do not restrict only to magnetic defects in different crystallographic positions, but also try to cover the impact of native chemical defects likely occurring in the real samples. We show the dependence of Bi<sub>2</sub>Se<sub>3</sub> magnetic properties on their type and concentration. Calculating layered systems, we are not limited only to point defects. For instance, the behavior of planar defects, which can influence Bi<sub>2</sub>Se<sub>3</sub> electronic structure, might be inspected. Thus, the distribution of twin planes and their interplay with chemical defects is extensively discussed



For more information follow: [theory.kfkl.cz/seminars.php](http://theory.kfkl.cz/seminars.php)

If you wish to receive regular updates on forthcoming seminars, contact K. Carva ([carva@karlov.mff.cuni.cz](mailto:carva@karlov.mff.cuni.cz)).