



School of Nano Science (IPM)



Condensed Matter & Statistical  
Physics Group (IPM)

## Weekly Webinar

### Andreev reflection at the interface of the type-I and type-II Weyl semimetals

Speaker: **Dr. Babak Abdollahipour**

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Weyl semimetals (WSMs) are 3D topological materials. They have recently attracted an extensive interest due to their exotic topological properties and protected energy spectrum. A WSM possesses an even number of Weyl nodes, which are points where conduction and valence bands touch each other and have linear energy dispersion around them. These points appear in pairs with different chiralities and are protected by the symmetry of the material. Two different types of WSMs can be recognized. One is the type-I or conventional WSM with a point like Fermi surface, and the other is type-II WSM with an over-tilted conical spectrum and hyperboloidal Fermi surface. Andreev reflection at the interface of a time-reversal invariant type-I WSM and a type-II WSM is highly anisotropic and reveals exotic features. There is a critical junction direction relative to the band tilting direction, which below that the Andreev reflection acquires distinct properties. The perfect specular and retro Andreev reflections can occur in this junction at the subgap energies. The zero-energy conductance shows a universal value independent of the chemical potential on each side of the junction. In the ferromagnet-superconductor junction, the Andreev reflection can change between the specular and retro regimes by varying the exchange energy. This leads to different asymptotic values for conductance at high exchange energies depending on the junction direction is below or above the critical direction.

**Wednesday, 9 September 2020 (۱۳۹۹ شهریور ۱۹), 14:00-15:00**

Virtual Meeting Room (please log in as a guest):

<https://www.skyroom.online/ch/schoolofphysics/school-of-nano-science>

