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**CMM PDE Seminar**

**Speaker:** Marie Fialová, Institute of Science and Technology Austria (ISTA)

**Title:** Undestanding the APS boundary condition for the zero modes of the Dirac operator.

**Abstract:** How many zero modes (states with zero energy) are there of the Dirac operator with magnetic field in two dimensions? This question was answered by Aharonov and Casher in 1979 for the case of plane. They showed that this number is given by the flux of the magnetic field, more precisely the integer part of it. Moreover, the zero modes are chiral, aligning with the direction of the magnetic field. We investigate the same problem for the case of a plane wih holes considering the Atiyah--Patodi--Singer (APS) boundary condition (BC). This BC was introduced by APS in their famous series of three papers on the index theorem on manifolds with boundary in 1970's.

If the manifold has a product structure near the boundary this BC allows extending the zero modes as square integrable functions to a semi-infinite cylinder glued to the boundary. I will discuss some qualitative properties of the zero modes in case this product structure near the boundary is missing.

This talk is based on my PhD work supervised by Jan Philip Solovej and a current work in progress with Hanne Van Den Bosch.

El link para acceder por zoom:

**https://uchile.zoom.us/j/97334653203?pwd=WHJVRGQ0WDdPenVrTXFlcFFpK2NaQT09**

**December 11, 2023 at 12 Santiago time.**

**Venue: Online via Zoom / Sala de Seminarios CMM 5th floor, Beauchef 851**

For further information, see our webpage: **https://eventos.cmm.uchile.cl/pdeseminar/**