



# THEMATIC PROGRAM IN MATHEMATICAL PHYSICS

*SPECTRAL THEORY, SEMI-CLASSICAL ANALYSIS,  
AND CONDENSED MATTER PHYSICS*

---

## Mini-Courses

*November 2020 - March 2021*

## International Conference

Mathematics of Condensed Matter and Beyond (MCMB)

*February 22-25, 2021*

## Monthly Seminars

### **Seminar by Dr. Nicolas Popoff, University of Bordeaux**

Title: Eigenvalues and Resonances Asymptotics in slightly perturbed waveguide: twisting and bending

Date and Time: **March 25, 2021**

Registration Link: <https://aub.webex.com/aub/onstage/g.php?PRID=bcd6e0e0bd955780f29df69a53370559>

Abstract:

We consider the Dirichlet Laplacian in a three-dimensional waveguide that is a small deformation of a periodically twisted tube. The existence of discrete spectrum for such a model is a widely studied question. The deformation is given by a bending and an additional twisting of the tube, both parametrized by a coupling constant  $\delta$ . We expand the resolvent of the perturbed operator near the bottom of its essential spectrum and we show the existence of exactly one resonance, in the asymptotic regime of  $\delta$  small. We are able to perform the asymptotic expansion of the resonance in  $\delta$ , which in particular permits us to give a quantitative geometric criterion for the existence of a discrete eigenvalue below the essential spectrum.