

## Francis NIER (Université Sorbonne Paris Nord)

Title: *Bar codes and small eigenvalues of the Witten and Bismut hypoelliptic Laplacians*

Abstract: In two collaborations with Claude Viterbo and Dorian Le Peutrec, we showed how the exponential scales of the small eigenvalues of Witten Laplacians in the semiclassical limit are exactly determined by topological quantities. In the second work, we used the bar codes of persistent homology and proved results valid for general smooth functions with a finite number of critical values. This approach is radically different from the instanton approach commonly used in such problems, and it does not assume that the potential is a Morse function. I will explain the motivations and some ideas for this analysis.

After this, I will present more recent and similar results obtained for Bismut hypoelliptic Laplacians with Xingfeng Sang and Francis White, in the double asymptotic regime of large frictions and small temperatures.