

**LABORATORY Institut Fourier**  
**Quantum internship – Academic year 2025-2026**

**Open Scattering Quantum Walks on Graphs**

**Level : M1**

**General Scope :** The dynamics of open quantum systems, when discretized in time and space, can be modeled by various types of open quantum walks on graphs. Moreover, these discrete approximations often exhibit strong connections with classical Markov chains.

The scope of this project consists in considering particular cases of the recent proposal [1] to acquire a certain familiarity with the topic and with the mathematical methods used in the analysis of the dynamics of open quantum systems.

[1] “Unitary and Open Scattering Quantum Walks on Graphs”, A. Joye, arXiv:2409.08428

**Research topic :** Analysis of the discrete-time dynamics of finite dimensional quantum systems defined by open scattering quantum walks, determination of their asymptotic states, relation with classical Markov chains.

**Facilities :** Library

**Required skills :** A taste for mathematics, particularly for linear algebra, spectral analysis, and Markov chains. Numerical skills could be a plus.

**Starting date and duration :** March 16, for two months.

**Contact :**

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