

Contrats doctoraux 2026

Titre du projet de thèse : Exploring entanglement and coherences with anyons

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Résumé du projet de thèse (en 20 lignes maximum) :

Recent groundbreaking experiments based on HOM or Fabry–Pérot interferometry have revealed signatures of anyonic statistics [Bartolomei et al., 2020]. An HBT experiment carried out in the fractional quantum Hall regime with the application of a classical voltage confirmed that these experiments can be interpreted in terms of braiding between fractional-statistics excitations in the time domain and excitations arising from thermal fluctuations [Jonckheere et al., 2023].

However, all these experiments concern limited families of states, namely stationary states generated by a QPC or gauge-transformed vacuum states through the application of a time-dependent potential.

The next generation of experiments will need to aim at manipulating anyonic excitations at the quantum level. The formal construction of the Fock space of such excitations exists [Goldin and Majid, 2004; Liguori and Mintchev, 1995] but has not been explored or studied in concrete experimental contexts. Understanding these next generation experiments will require to develop new theoretical tools among which is the notion of anyonic coherence. The goal of this thesis is to develop the foundations of a theory of quantum coherence and entanglement for anyonic excitations [Kato et al., 2014; Vidal et al., 2021]. It will show that one can indeed manipulate anyonic excitations, an important step toward applications, particularly in the context of topological quantum computing.

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Remarques/commentaires supplémentaires :
