basque center for applied mathematics

Scientific Seminar

Mathematical Physics (Quantum Mechanics)

March 2, 2017, 16:00-17:00

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A MEAN-FIELD MODEL FOR ALMOST BOSONIC ANYONS

Anyons are particles with quantum statistics different from those of bosons and fermions, the only known types of fundamental particles. They can occur only in low dimensions, 2D being the relevant case for this talk. There is sound theoretical evidence that certain quasi-particles occuring in quantum Hall physics should behave as anyons, although this remains to be unambiguously observed.

A possible description of 2D anyons is to treat them as ordinary bosons or fermions coupled to magnetic flux tubes. This leads to a model in terms of a strongly interacting bosonic or fermonic Hamiltonian, which contains long-range (and rather peculiar) two- and three-body interactions. This Hamiltonian is notoriously hard to solve even in simple cases, and well-controled simplifications are highly desirable. In this talk we shall present recent results on the mean-field approximation for "almost bosonic" 2D anyons. The model we study is based on a new one-particle energy functional with self-consistent magnetic field, and the associated highly non-linear partial differential equation.

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EXCELENCIA SEVERO OCHOA

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