Seminario de Análisis y Aplicaciones

Miércoles, 3 de abril de 2019

15:00 h., Aula Naranja (ICMAT)

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ICMAT

Approximation theorems for the Schrodinger equation and vortex reconnections in quantum fluids

Resumen:

The quantum vortices of a superfluid are described as nodal lines of a solution to the time-dependent Gross-Pitaevskii equation. Experiments in Lab and extensive numerical computations show that quantum vortices cross, each of them breaking into two parts and exchanging part of itself for part of the other. This phenomenon, known as quantum vortex reconnection, occurs even though the superfluid does not lose its smoothness. This usually leads to a change of topology of the quantum vortices. In this talk I will show that, given any initial and final congurations of quantum vortices (which do not need to be topologically equivalent) and any conceivable way of reconnecting them (that is, of transforming one into the other), there is a Schwartz initial datum whose associated solution is smooth and realizes this specific vortex reconnection scenario. Key for the proof of this result is a new global approximation property of the linear Schrodinger equation. It ensures that a function that satisfies the Schrodinger equation in a spacetime set satisfying certain mild topological properties, can be approximated, in a suitable norm, by a global solution defined by a Schwartz initial datum. This is based on joint work with Alberto Enciso.

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