
Effective models for Ginzburg-Landau vortices

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Abstract

Ginzburg-Landau type equations are models for superconductivity, superfluidity, Bose-Einstein condensation, etc. A crucial feature is the presence of quantized vortices, which are topological zeroes of the complex-valued solutions. This talk will review some results on the derivation of effective models to describe the statics and dynamics of these vortices, with particular attention to the situation where the number of vortices blows up with the parameters of the problem. We will start with results in collaboration with Etienne Sandier on mean-field models for minimizers of the Ginzburg-Landau equation and the description of their finer microscopic vortex patterns. We will finish with the derivation of effective models for the dynamics of many vortices starting from the parabolic Ginzburg-Landau equation or the Gross-Pitaevskii (=Schrodinger Ginzburg-Landau) equation.

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