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Raum 915, Physikhochhaus

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Stochastic Modeling of Quasi-condensates

Abstract:

Experiments with ultracold, quantum gases are now routinely performed on so-called atom chips, which has opened up the way to study very elongated inhomogeneous quasi-one-dimensional geometries; such systems are both interesting and challenging to model, as the low dimensionality gives rise to a strong role of fluctuations in the condensate phase (a homogeneous 1d system would exhibit no Bose-Einstein condensation). In this talk I will present a theory that is well-suited to describe such experiments, known as the 'stochastic Gross-Pitaevskii equation'; this is essentially a non-linear Langevin equation describing the low-lying modes of the system cumulatively, without making a special case for a 'condensate mode'. The reason for this choice will be justified by comparison to other competing models and its ability to ab initio predict a range of atom chip experiments measuring density profiles, density fluctuations and phase fluctuations, without any free parameters.