SFB/TRR 21 - Seminar

29. Juli 2014, Ulm

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Static and dynamic properties of spin-orbit-coupled Bose gases

The recent realization of synthetic spin-orbit coupling represents one of the most important achievements in the physics of ultracold atomic gases. In my talk I shall illustrate the properties of a Bose-Einstein condensate with equal Rashba and Dresselhaus spin-orbit coupling. This system presents a rich phase diagram, which exhibits a tricritical point separating a zero-momentum phase, a spin-polarized plane-wave phase, and a stripe phase. In the stripe phase translational invariance is spontaneously broken, in analogy with supersolids. Spin-orbit coupling also strongly affects the dynamics of the system. In particular, the excitation spectrum exhibits intriguing features, including the quenching of the sound velocity, the emergence of a, roton minimum in the plane-wave phase, and the appearance of a double gapless band structure in the stripe phase. In the final part of the talk I will briefly discuss an optimization procedure to make the stripe phase experimentally visible.

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