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Weakly Interacting Bose Gas on a Sphere[1] NATALIA MOLLER, University of Kaiserslautern, Germany, VANDERLEI BAGNATO, University of Sao Paulo, Brazil, AXEL PELSTER, University of Kaiserslautern, Germany — Here we explore how to describe a weakly interacting Bose gas on a sphere. To this end we start with considering a radial harmonic trap, which confines the three-dimensional Bose gas in the vicinity of the surface of a sphere. Following the notion of dimensional reduction as outlined in Ref. [1] we assume a large enough trap frequency so that the radial degree of freedom of the field operator is fixed despite of thermal and quantum fluctuations to the ground state of the radial harmonic trap and can be integrated out. With this we obtain an effective many-body field theory for a Bose-Einstein condensate on a quasi two-dimensional sphere, where the thickness of the cloud is determined self-consistently.

At first we determine the critical temperature of a Bose Gas on a sphere, where we recover in the limit of an infinitely large radius the case of a quasi two-dimensional plane with a vanishing critical temperature in accordance with the Mermin-Wagner theorem [2]. Afterwards, we analyze at zero temperature the mean-field physics of a Bose-Einstein condensate on a sphere by deriving the underlying time-dependent Gross-Pitaevskii equation.

[1] L. Salasnich et al., Phys. Rev. A **65**, 043614 (2002)
[2] N. Mermin and H. Wagner, Phys. Rev. Lett. **17**, 1133 (1966)

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