

abstract

MATHEMATICAL PHYSICS SEMINAR

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

The effect of interparticle interactions on the critical temperature for Bose-Einstein condensation has been a controversial issue in the physics literature. Various approximation schemes lead to different conclusions, concerning both the sign and the magnitude of the shift in the critical temperature. We shall examine this question from a mathematical point of view. While lower bounds seem to be out of reach of present methods, we show that an upper bound can be established rather easily. For a three-dimensional Bose gas, our bound shows that in the presence of repulsive interactions the critical temperature can not increase by more than the square root of $a \rho^{1/3}$, with ρ the density and a the scattering length of the interaction potential. Our method also yields valuable information in the case of a two-dimensional Bose gas. While there is no Bose-Einstein condensation in this case, a Kosterlitz-Thouless type phase transition is expected at a definite critical temperature. We prove that off-diagonal correlations decay exponentially above this temperature. (This is joint work with D. Ueltschi.)