

On the energy of the dilute Bose gas

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The ground state energy density $e(\rho)$ of a large system of interacting bosons in 3 dimensions at density ρ satisfies the formula

$e(\rho) = 4\pi\rho^2 a \left(1 + \frac{15}{128\sqrt{\pi}} \sqrt{\rho a^3} \right) + \text{higher order terms, in the dilute limit } \rho a^3 \ll 1$. Here a is the scattering length of the interaction potential. This is the celebrated Lee-Huang-Yang formula for the energy density.

In this talk, I will review the proof of the lower bound in this formula. I will also comment on the harder 2-dimensional case and how the proof can be modified to accommodate this case.

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