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The scattering length at positive temperature

A positive temperature analogue of the scattering length of a potential V can be defined via integrating the difference of the heat kernels of $-\Delta$ and $-\Delta + V$, with $-\Delta$ the Laplacian. An upper bound on this quantity is a crucial input in the derivation of a bound on the critical temperature of a dilute Bose gas, obtained in 2009 by R. Seiringer and D. Ueltschi. This bound on the critical temperature was given in the case of finite range potentials and sufficiently low temperature. In this paper, we improve the bound on the scattering length and extend it to potentials of infinite range. (Joint work with R. Seiringer)