On the order of the phase transition of the weakly interacting Bose gas in the Hartree-Fock approximation

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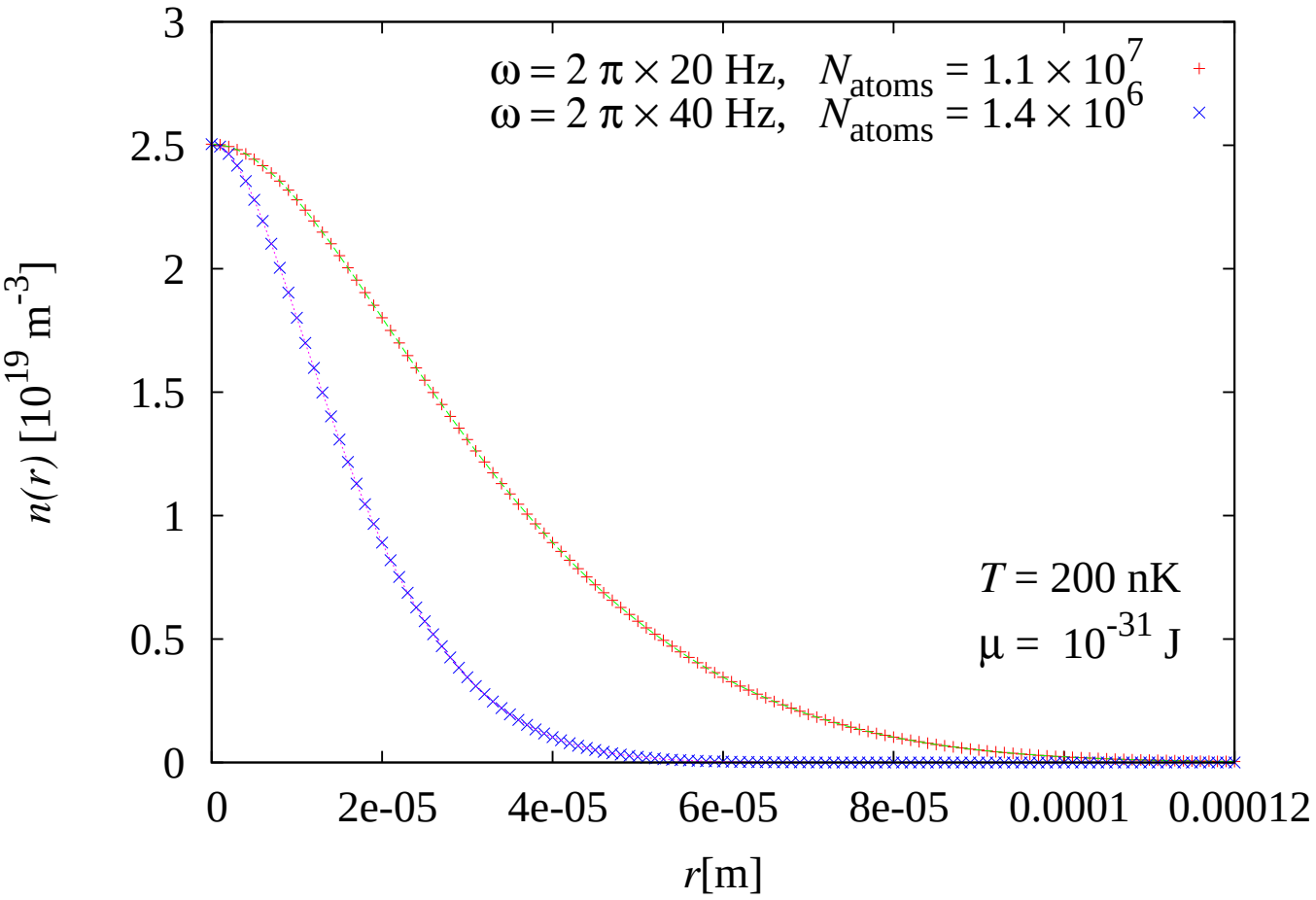
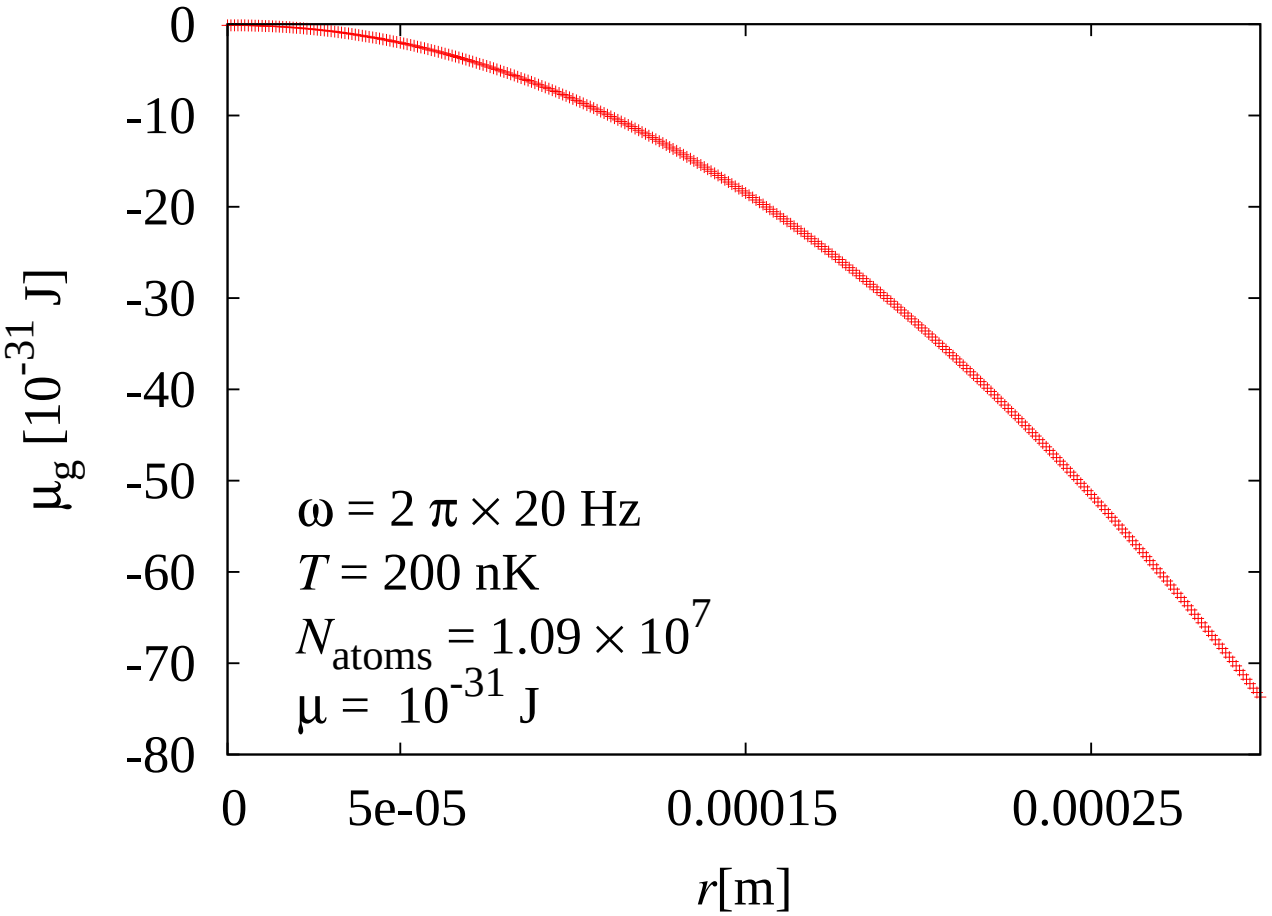
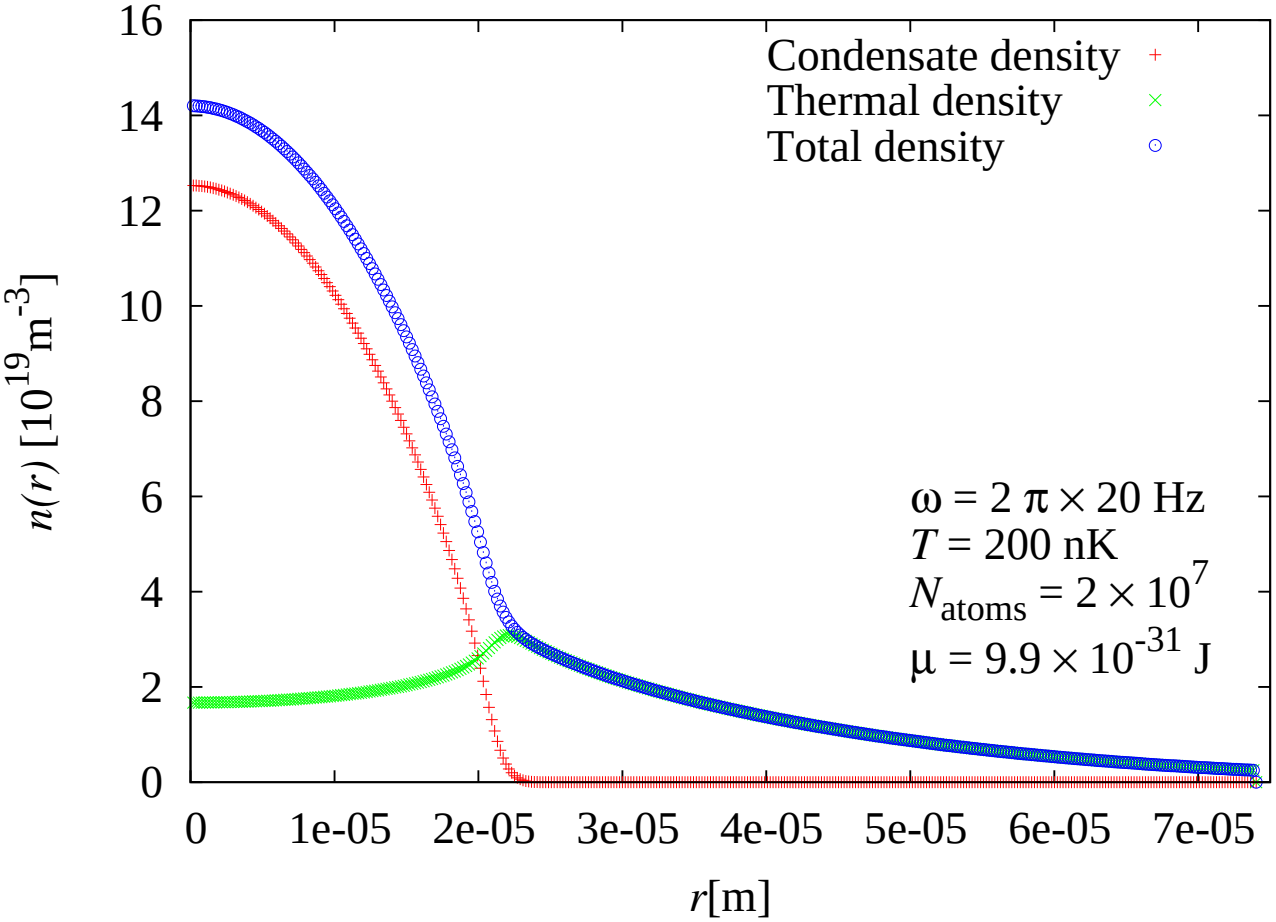


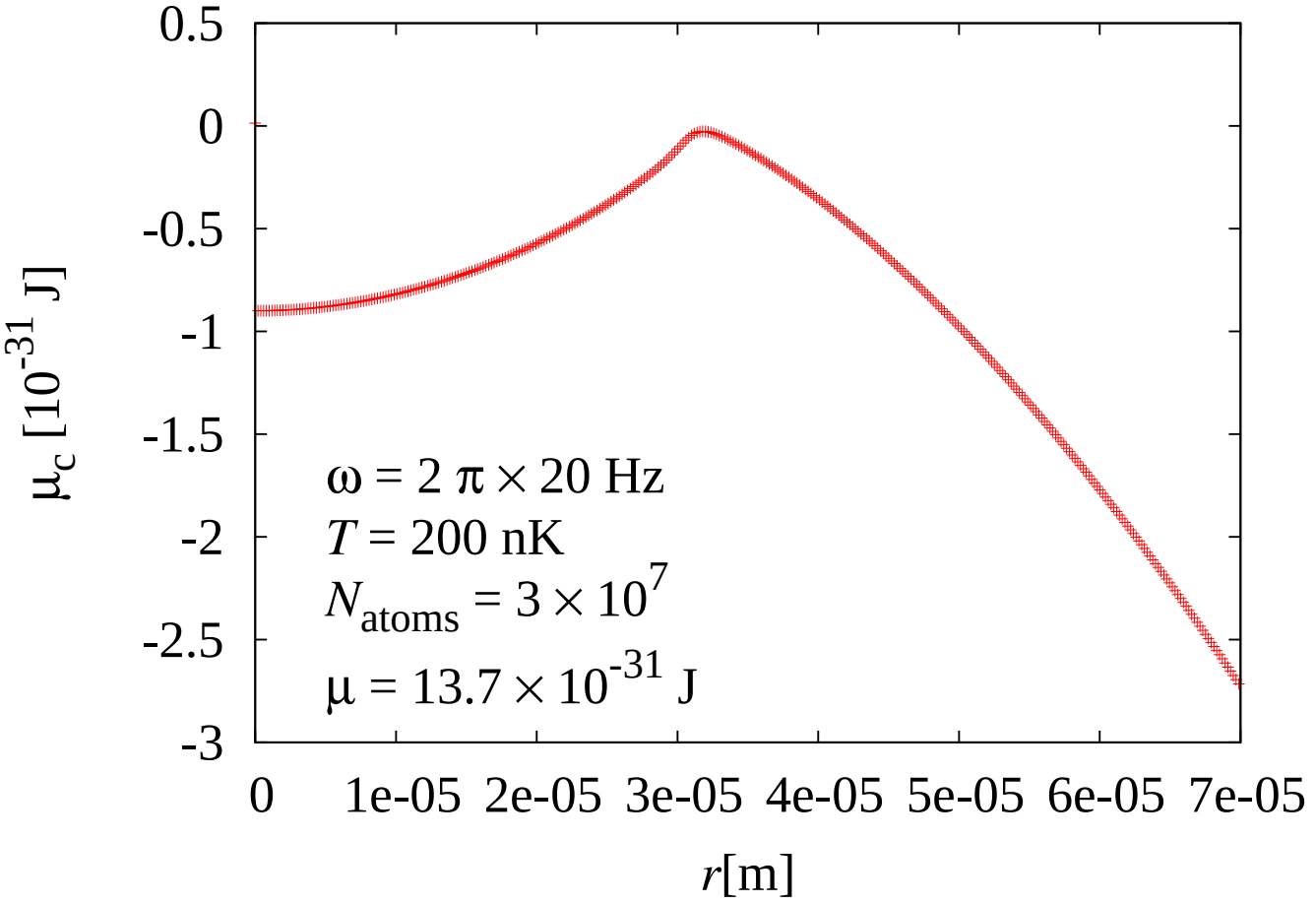
Density distribution of thermally excited atoms for two different trap frequencies and $T = 200nK$, $\mu = 10^{-31}J$, calculated using semiclassical approximation.



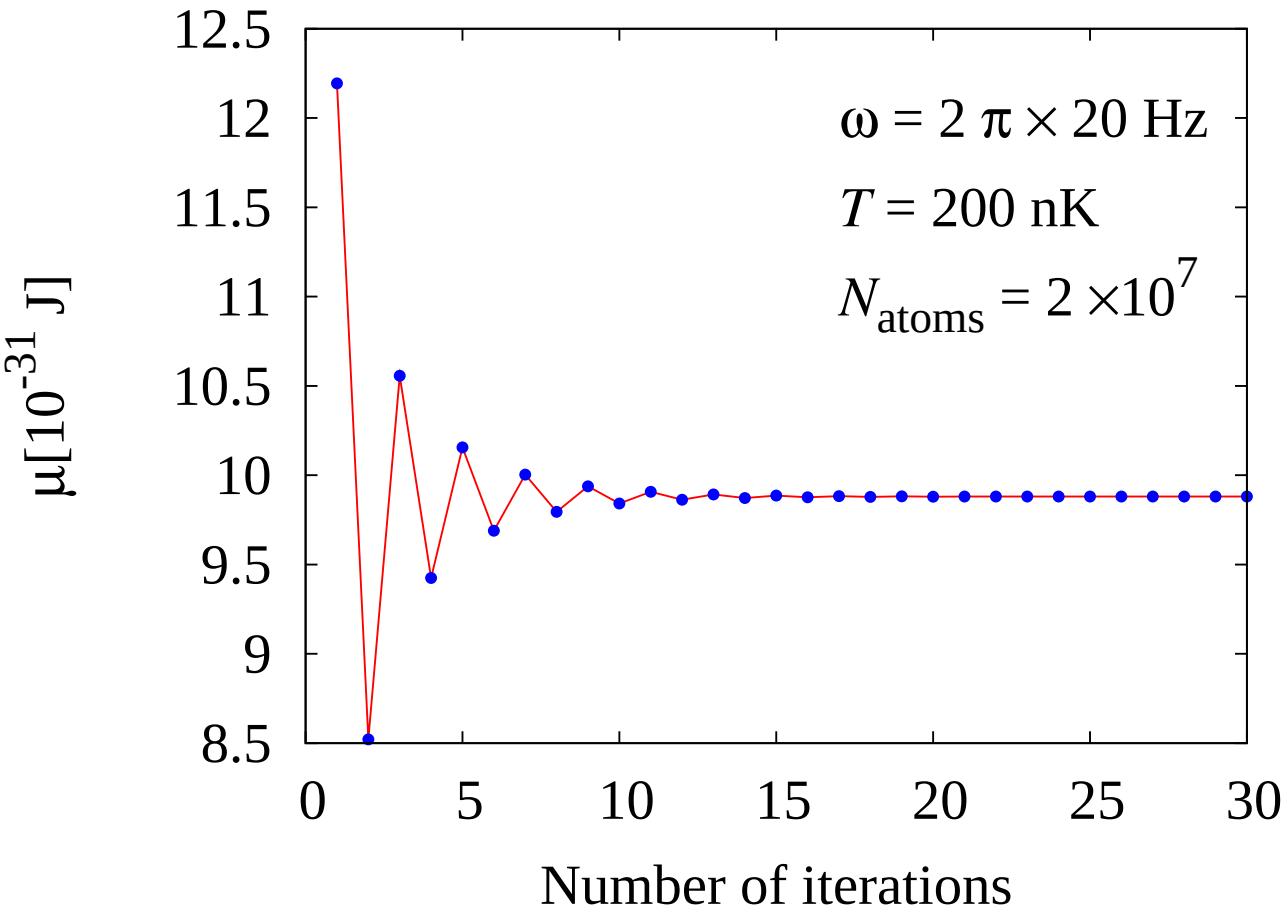
Effective chemical potential μ_g, calculated using semiclassical approximation, $\mu = 10^{-31}J$, $T = 200nK$, $\omega = 2\pi \times 20Hz$. Number of thermally excited atoms $N_{atoms} = 1.090980 \times 10^7$.



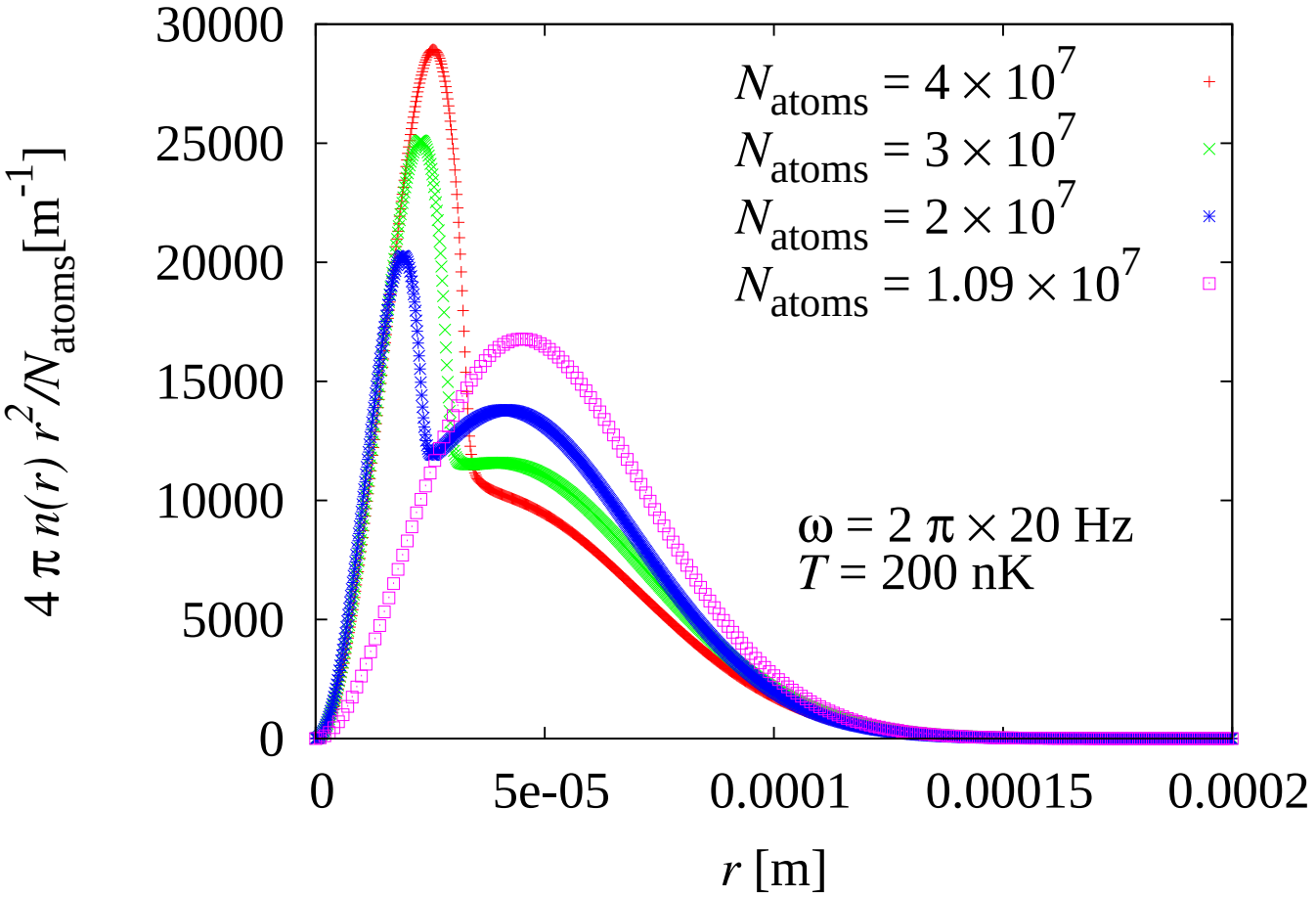
Density of atoms vs. r, calculated by solving the Hartree-Fock equation in conjunction with semiclassical approximation, $N_{atoms} = 2 \times 10^7$, $T = 200nK$, $\omega = 2\pi \times 20Hz$. Obtained chemical potential value is $\mu \approx 9.88 \times 10^{-31}J$.



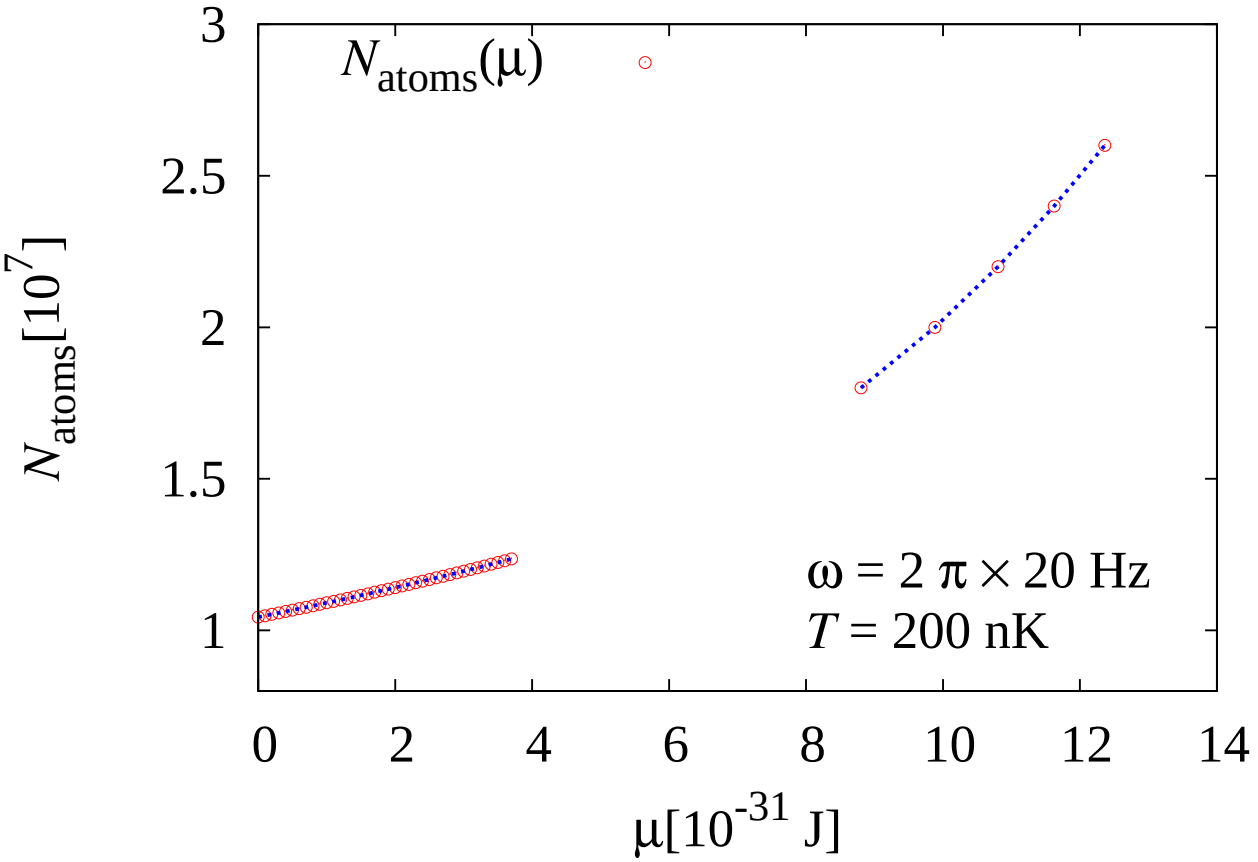
Effective chemical potential μ_c, $\mu = 13.67 \times 10^{-31} J$, $T = 200 nK$, $\omega = 2\pi \times 20 Hz$.
Number of thermally excited atoms $N_{atoms} = 3 \times 10^7$.



Calculated chemical potential μ vs. number of iterating steps of the self-consistent solution of the Hartree-Fock equation and semi-classical approximation. $N_{atoms} = 2 \times 10^7$, $T = 200nK$, $\omega = 2\pi \times 20Hz$.



Plot of $4\pi n(r)r^2/N_{atoms}$ vs. r, $T = 200nK$, $\omega = 2\pi \times 20Hz$.



Number of thermally excited atoms vs. μ, calculated using semiclassical approximation, $T = 200nK$, $\omega = 2\pi \times 20Hz$. Left branch of the diagram is the gas part, while the right one corresponds to the condensate phase.