

Statistical physics II, homework 10

Langevin equation: Calculate the position autocorrelation function of a one-dimensional Brownian particle in a harmonic potential at temperature T .

Hint: Write down the Langevin equation for the velocity with a harmonic force $-\omega_0^2 x$. Together with the trivial $v(t) = dx(t)/dt$ this gives the set of equations to deal with. Assume white noise and for its strength use the second FDT. Take the FT of the equations, calculate the power spectrum of the position and use the Wiener-Khinchin theorem. Evaluate the integral with the method of contours.

Deadline: November 24, 2016