

Abstract

We propose a method to determine the potential from a discrete spectrum in the $D = 1$ dimensional space. The key point is given by approximate relationships between the moments of the ground state density and the excitation energies. These relationships are exact in the case of the harmonic oscillator. Empirical correction factors can be used for other potentials, leading to a useful zero order approximation for the moments. From the approximation to the ground state density moments, a first approximated potential is calculated by inversion of the Schrodinger equation. This potential is used to improve the relationships between ground state moments and excitation energies. Convergence towards the exact potential is obtained by iterating the procedure. Conditions for a unique answer are presented. Solving this problem has implications in higher dimensions for potentials separable or partly separable in Cartesian coordinates. The method is illustrated by a few examples..