Some aspects of approximation techniques applied to quantum systems in multidimensional space

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Abstract:

Approximation methods are of great advantage in finding approximate solutions for quantum systems whose analytic exact solutions are not known. They have been widely used and proved to be useful over the years. In this talk, some approximation methods will be applied to quantum systems in higher space dimensions.
In the first method, the variational principle is applied to helium atom in N dimensions to find an estimate for the ground state energy. In the second, the sudden approximation is applied to the decay of tritium nucleus to find to demonstrate the dependence of the decay probability on the space dimension. In the third, degenerate perturbation theory is applied to a simple, but illustrative, perturbed quantum system. The asymptotic behavior of the outcome of the approximations, in the large N limit is highlighted.