A confined hydrogen atom in higher space dimensions

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Abstract:

The Schrödinger equation for the confined H-atom in N dimensional spherical cavity has been solved. It has been shown that the wave functions are dimension-dependent and having the same form as those of the free hydrogen atom in N- dimensions.
The ground state energies for the confined hydrogen atom in N dimensional impenetrable spherical cavity have been computed.
The obtained results show their dependence on the size of the cavity and the space dimension *N*.

The pressure exerted on the wall of the cavity due to enclosing the H-atom inside a cavity of radius S was discussed.

We found that the pressure depends on N and S, and for a given N, the pressure increases with decreasing the radius of the cavity up to a maximum value P_{max} and then starts to decrease. The value of this P_{max} increases with increasing N, and the value of the radius of the cavity at which the pressure is maximum increases as N increases also.