Universal 1/r^2 potentials at short and long range in quantum physics

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Both angular and radial kinetic energy provide an effective "potential" that depends on 1/r^2, dimensional arguments themselves arguing for this based on the combination (h^2/mr^2) being an energy. As is well known, the stability of an atom and thereby of all matter rests on such a potential at small r that prevents collapse. On the other hand, the well-known Wigner two-body threshold laws may be viewed as probabilities for tunneling through such a potential at large r. Similar potentials in terms of a hyperspherical radius R appear in other dimensions and for N bodies. Short range repulsion, weakly bound Efimov states of large R, and other phenomena in few-body systems will be discussed within this general framework.