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**Quantum Systems at The Brink:
Critical Potentials and dimensionality**

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The existence of eigenfunctions for Schrödinger operators are of utmost importance in quantum mechanics and its applications. It is well known that for eigenvalues below the threshold of the essential spectrum, eigenvectors exist and decay exponentially. However, the situation at the threshold is much more subtle. We present necessary and sufficient condition for the Schrödinger operator to have zero energy ground state. We show that it critically depends on the asymptotic behaviour of the potential. We derive necessary and sufficient conditions for the existence and absence of zero eigenvalue with respect to the dimension d . We show that the leading order term has a strong dependence on the dimension, namely $\frac{d(4-d)}{|x^2|}$ for $|x| \rightarrow \infty$. Furthermore our results are in the mathematical sense sharp.