Nonlinear Sciences > Chaotic Dynamics

Magnetic Field Control of the Quantum Chaotic Dynamics of Hydrogen Analogues in an Anisotropic Crystal Field

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We report magnetic field control of the quantum chaotic dynamics of hydrogen analogues in an anisotropic solid state environment. The chaoticity of the system dynamics was quantified by means of energy level statistics. We analyzed the magnetic field dependence of the statistical distribution of the impurity energy levels and found a smooth transition between the Poisson limit and the Wigner limit, i.e. transition between regular Poisson and fully chaotic Wigner dynamics. Effect of the crystal field anisotropy on the quantum chaotic dynamics, which manifests itself in characteristic transitions between regularity and chaos for different field orientations, was demonstrated.

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