

In this work we study properties of the higher-dimensional generally rotating black hole space-time so-called Kerr–NUT–(A)dS and the related spaces with the same explicit and hidden symmetries as the Kerr–NUT–(A)dS spacetime. First, we search commutativity conditions for classical (charged) observables and their operator analogues, then we investigate a fulfilment of these conditions in the mentioned spaces. We calculate the curvature of these spaces and solve the charged Hamilton–Jacobi and Klein–Gordon equations by the separation of the variables for an electromagnetic field, which preserves integrability of motion of a charged particle and mutual commutativity of the corresponding operators.