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On integrability of spinning particle motion in higher-dimensional rotating black hole spacetimes

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In this talk, I shall review several various approaches for describing a spinning particle in curved rotating black hole background and discuss their 'integrability properties'. In particular, I will concentrate on a semiclassical theory, where the spin degrees of freedom are described by a vector of Grassmann variables. I will show that for rotating black hole spacetimes in any dimension n there exist n bosonic functionally independent integrals of spinning particle motion, corresponding to explicit and hidden symmetries generated from the principal Killing-Yano tensor. Moreover, in 4, 5, 6, and 7 dimensions such integrals are in involution, making the bosonic part of the motion integrable. This is conjectured to be valid in any dimension. The presented construction generalizes the result of Page et. al. [hep-th/0611083] on complete integrability of geodesic motion in these spacetimes.