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Integrable Hamiltonian systems with magnetic field via circular parabolic-type integrals of motion

For integrable Hamiltonian systems, the Hamilton-Jacobi equations can be solved by separation of variables in a suitable coordinate system. In the absence of magnetic field and in low dimension, lists of integrable (and superintegrable) systems together with the coordinate system(s) allowing separation of variables are already well known. However, cases admitting non-zero magnetic fields are less known. Hence, in this presentation, we will consider the integrability and superintegrability of 3D classical Hamiltonian systems. We will focus on natural Hamiltonian systems admitting a static non-zero electromagnetic field mainly via circular parabolic-type integrals of motion. This is a joint work with L. Snobl and A. Marchesiello.