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Superintegrable systems on non Euclidean spaces

A Maximally Superintegrable (M.S.) system is an integrable n -dimensional Hamiltonian system which has $2n-1$ integrals of motion. The (M.S.) systems share nice properties such as periodic trajectories for classical systems and degenerate spectrum for quantum mechanical systems. Aim of the talk is providing a complete classification of classical and quantum M.S. systems characterized by a radial symmetry and defined on n -dimensional non Euclidean manifold. We will achieve this result considering the only systems which are eligible to be M.S. namely all the classical radial systems which admit stable closed orbits and whose classification is given by the non-Euclidean generalization of the well known Bertrand's theorem. As in the Euclidean case the generalized Bertrand theorem still gives us two families of exactly solvable M.S. but, in contrast with the flat case, they exhibit extra integral of motion which have the remarkable property of being of higher order in the momenta.