Superintegrability of Generalized Calogero Models with Oscillator or Coulomb Potential

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ABSTRACT

We deform N-dimensional (Euclidean, spherical and hyperbolic) oscillator and Coulomb systems, replacing their angular degrees of freedom by those of a generalized rational Calogero model. We establish maximal superintegrability of these systems and find explicit expressions of their constants of motion. For the rational Calogero model with Coulomb potential, we present all constants of motion via matrix model reduction. In particular, we construct the analog of the Runge-Lenz vector.