

# Superintegrability with and without separation of variables

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A very brief review of superintegrable systems with scalar potentials and second order integrals of motion related to the separation of variables will be given. The main part of the talk will be devoted to systems in which superintegrability does not imply separability. Systems with velocity dependent potentials, with higher order integrals of motion, and specially systems involving particles with spin. The talk concerns two areas to which Ya.A.Smorodinsky made important and lasting contributions: higher order symmetries in quantum and classical physics and spin phenomena in elementary particle interactions.