Meeting: 1003, Atlanta, Georgia, SS 37A, AMS Special Session on In the Wake of Jacobi and Hamilton 200 Years Later, I

1003-22-835 **Willard Miller*** (miller@ima.umn.edu), School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church St. SE, Minneapolis, MN 55455. *Multiseparability and superintegrability on conformally flat spaces.*

Dating from Jacobi's 1866 publication of generalized elliptic coordinates as an orthogonal separable system in n-dimensional Euclidean space, there have existed important examples of Hamiltonian (and later quantum mechanical) systems with nontrivial potentials that were not only separable, but also multiseparable. The attempt to understand the special nature of these systems has led to the modern theory of supperintegrability. Multiseparable systems provide important examples of superintegrabilty. We outline basic ideas relating to quantum superintegrable potentials. The energy observable is degenerate and the corresponding integrals of motion that arise from the simultaneous separability close quadratically under repeated commutation. Representations of the quadratic algebra can be used to derive spectral information about the Schrödinger operator in a manner analogous to Lie representation theory. We present very recent results giving the general structure of superintegrable systems in all 2D spaces, and in 3D conformally flat spaces, and a complete list of such spaces and potentials in 2D. Results obtained in collaboration with E.G. Kalnins, G.S.Pogosyan and J. Kress. (Received September 30, 2004)