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Willard Miller, Jr.* (miller@ima.umn.edu). *Quadratic algebra contractions, 2nd order superintegrable systems and the Askey scheme.*

Quadratic algebras are generalizations of Lie algebras; they include the symmetry algebras of 2nd order superintegrable systems in 2 dimensions as special cases. The superintegrable systems are exactly solvable physical systems in classical and quantum mechanics. We describe a contraction theory for quadratic algebras and show that for constant curvature superintegrable systems, ordinary Lie algebra contractions induce contractions of the quadratic algebras of the superintegrable systems that correspond to geometrical pointwise limits of the physical systems. One consequence is that by contracting function space realizations of representations of the generic superintegrable quantum system on the 2-sphere (which give the structure equations for Racah/Wilson polynomials) to the other superintegrable systems one obtains the full Askey scheme of orthogonal hypergeometric polynomials. This approach generalizes to multivariable Wilson polynomials. (Received July 11, 2014)