1125-37-714 **Konrad Schöbel*** (konrad.schoebel@gmail.com), Jena, Germany. *An Algebraic Geometric Approach to the Classification of Superintegrable Systems and Hypergeometric Orthogonal Polynomials.*

Special functions are of widespread use virtually everywhere in science and technology. Yet there is no theory which would explain, for a reasonably wide class of special functions, their properties, interrelations, symmetries and other structures behind the façade of seemingly endless formulae in rows, tabulated in thick multi-volume compendiums and huge online databases.

A prolific source of special functions are superintegrable systems. We argue that their classification has always been considered in the wrong category, that of sets, and not in its natural category, that of projective varieties. We substantiate our claim by showing that the set of (2nd order) superintegrable systems in the Euclidean plane carries a natural structure of a projective variety with a linear isometry group action, which simplifies the known classification radically and enriches it with a formerly unknown algebraic and geometric structure.

Based on this proof of concept, we outline an approach to accomplish the classification of (2nd order) superintegrable systems in higher dimensions. In dimension two this leads to a projective variety underlying the Askey scheme of hypergeometric orthogonal polynomials: the basis for a unified treatment of their properties, interrelations and symmetries. (Received September 09, 2016)