实验室年会特邀报告——Uniformization of Certain Subvarieties of Finite-Volume Quotient Spaces of Bounded Symmetric Domains

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嘉宾介绍：

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摘要：By the Uniformization Theorem a compact Riemann surface other than the Riemann Sphere or an elliptic curve is uniformized by the unit disk and equivalently by the upper half plane. The upper half plane is also the universal covering space of the moduli space of elliptic curves equipped with an appropriate level structure. In Several Complex Variables, the Siegel upper half plane is an analogue of the upper half plane, and it is the universal covering space of moduli spaces of polarized Abelian varieties with appropriate level structures. The Siegel upper half plane belongs, up to biholomorphic equivalence, to the set of bounded symmetric domains, on which a great deal of mathematical research is taking place. Especially, finite-volume quotients of bounded symmetric domains, which are naturally quasi-projective varieties, are objects of immense interest to Several Complex Variables, Algebraic Geometry, Arithmetic Geometry and Number Theory, and an important topic is the study of uniformizations of algebraic subsets of such quasi-projective varieties. While a lot has already been achieved from methods of Diophantine Geometry, Model Theory, Hodge Theory and Algebraic Geometry for Shimura varieties, techniques for the general case of not necessarily arithmetic
quotients have just begun to be developed. We will explain a differential-geometric approach to the study of such algebraic subsets revolving around the notion of asymptotic curvature behavior and the use of rescaling arguments, and illustrate how this approach using transcendental techniques leads to various characterization results for totally geodesic subvarieties of finite-volume quotients without the assumption of arithmeticity. Especially, we will explain how the study of holomorphic isometric embeddings of the Poincaré disk and more generally complex unit balls into bounded symmetric domains can be further developed to derive uniformization theorems for bi-algebraic varieties and more generally for the Zariski closure of images of algebraic sets under the universal covering map.