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**UNIVERSITÄT
BERN**

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Departement Mathematik und Statistik
Mathematisches Institut

Mathematical Colloquia

Monday, 14 October 2024

17:15 h, lecture room B6 (ExWi)

Prof. Dr. Peter Feller, ETHZ

Panorama around effective hyperbolization of 3-dimensional manifolds

Abstract : After a brief survey of the study of low-dimensional manifolds -- spaces locally modelled on the topological space \mathbb{R}^n for $n < 5$ -- we will discuss the idea of geometrization. We will motivate geometrization by discussing uniformization of surfaces, and then talk about geometrization of 3-dimensional manifolds as initiated by Thurston: 3-manifolds are modeled on eight geometric model spaces, which include the Euclidean space (\mathbb{R}^3 endowed with the ordinary Euclidean metric) and hyperbolic space H^3 .

As a consequence of Perelman's geometrization theorem it turns out that "most" 3-dimensional manifolds carry a hyperbolic structure, i.e. they are locally modelled on H^3 . We will discuss this and then describe an approach to hyperbolization of most 3-dimensional manifolds that circumvents invoking Perelman's work. As an upshot, with this approach one can control many geometric quantities such as injectivity radius, diameter, and volume of hyperbolic structures.

This talk is meant to be an overview; in particular, no knowledge of low-dimensional topology or hyperbolic geometry will be assumed. Any new research content is based on joint work with A. Sisto and G. Viaggi.