BERGISCHE
UNIVERSITÄT
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Vortrag im Mathematischen Kolloquium am 12. Dezember 2017:

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On Thurston's vision in geometry, topology, and dynamics — and aspects of current research

Abstract: since the 1980's, Bill Thurston has done fundamental work in apparently quite different areas of mathematics: in particular, on the geometry of 3-manifolds, on automorphisms of surfaces, and on holomorphic dynamics. In all three areas, he proved deep and fundamental theorems that turn out to be surprisingly closely connected both in statements and in proofs.

In all three areas, the statements can be expressed that either a topological object has a geometric structure (the manifold is geometric, the surface automorphism has Pseudo-Anosov structure, a branched cover of the sphere respects the complex structure), or there is a well defined topological-combinatorial obstruction consisting of a finite collection of disjoint simple closed curves with specific properties. Moreover, all three theorems are proved by an iteration process in a finite dimensional Teichmüller space (this is a complex space that parametrizes Riemann surfaces of finite type).

I will try to relate these different topics and at least explain the statements and their context. I will also try to outline current work on extensions of this research.