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Singularity Models in 3D Ricci Flow

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The Ricci flow is a natural evolution equation for Riemannian metrics on a given manifold. From a PDE perspective, the Ricci flow is a system of linear parabolic equations, which can be viewed as the heat equation analog of the Einstein equations in general relativity. The central problem in the field is to understand singularity formation. In other words, what does the geometry look like at points where the curvature is large? In his spectacular 2002 breakthrough, Perelman achieved a qualitative understanding of singularity formation in dimension 3; this is sufficient for topological conclusions. In this lecture, we will discuss recent developments which have led to a complete classification of all the singularity models in dimension 3.

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