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## **Ricci flow on 3D Lie groups and their quotients**

The behavior of Ricci flow on left-invariant metrics on three-dimensional unimodular Lie groups was classified by J. Isenberg and M. Jackson in 1992. These are interesting examples since they can be described completely, and also exhibit interesting behavior such as collapsing with bounded curvature. We revisit these Ricci flows, with an aim to get a global picture of the Ricci flow as a dynamical system on the space of Riemannian metrics up to equivalence by diffeomorphism and scaling. I plan to explain two viewpoints: (1) rephrasing the system as a dynamical system on Lie algebras, which gives a way to look at all Ricci flows on left-invariant metrics in the same picture, and (2) considering the groups and their quotients as Riemannian groupoids, which creates nonsingular limits of the metrics and reveals the collapse of quotients of the group as a “fattening” of the fundamental group in the limit. The two viewpoints come together in an analysis of the forward limit of Ricci flow on  $SL(2, \mathbb{R})$ .