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Title: Cotton flow

Abstract: In this talk, I wish to describe our recent work (arXiv:0803.1603) with Ö. Sarıoğlu and B. Tekin concerning a geometric flow on 3-manifolds. Specifically, using the conformally invariant Cotton tensor on a 3-manifold, we define the "Cotton flow", which tends to evolve initial metrics into conformally flat metrics. The behaviour of the flow is in sharp contrast with the Yamabe flow, which preserves conformal classes. The Cotton flow can be written as the gradient flow of an entropy functional, which coincides with the gravitational Chern-Simons action. I will discuss in detail the evolution of homogenous geometries under the Cotton flow, and in particular prove that every homogenous metric on the 3-sphere evolves exponentially to the round sphere metric. A possibly interesting fact for the formation of singularities is that two of the homogenous geometries degenerated by the Ricci flow are fixed by the Cotton flow, whereas the fate of the remaining geometries with respect to the latter are not worse.