Topological quantum gravity of the Ricci flow

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We present a topological quantum gravity associated with the Hamilton-Perelman theory of Ricci flows on Riemannian manifolds. This construction leads to a nonrelativistic quantum gravity of the Lifshitz type, quantized as a topological theory using the BRST formalism. In its most primitive form, the theory reproduces Hamilton's original Ricci flow. When extended into a gauge theory of foliation-preserving diffeomorphisms of nonrelativistic spacetime, the theory leads to Perelman's Ricci flow, with the role of Perelman's dilaton played by the nonprojectable lapse function. Perelman's entropy F- and W-functionals appear as our superpotential. Precise mathematical results in the literature about Ricci flows (especially in 3+1 dimensions) can be imported into this physical theory, and interpreted in terms of topology changing amplitudes and other far-from-equilibrium phenomena in controllable quantum theory of gravity and cosmology. Since there is no spin-statistics theorem in nonrelativistic systems, our theory can be interpreted after continuation to real time as a theory of propagating nonrelativistic supergraviton degrees of freedom on time-dependent backgrounds.