

# Geometry of Gradient Ricci Solitons

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**Abstract.** A gradient Ricci soliton is a Riemannian manifold  $(M^n, g)$  together with a potential function  $f$  on  $M$  such that  $\text{Ric} + \text{Hess}f$ , or the Bakry-Emery Ricci tensor, is proportional to the metric  $g$ . Clearly, gradient Ricci solitons are extensions of Einstein metrics. The concept of Ricci solitons was introduced by Richard Hamilton in the mid 1980s to study singularity formations of the Ricci flow. In fact, Ricci solitons correspond to self-similar solutions to the Ricci flow and often serve as singularity models. Inspired by Perelman's works on the Ricci flow and Ricci solitons in early 2000, Ricci solitons have received a lot of attentions in the past decade. In this talk, we shall describe some recent progress on the geometry and classifications of gradient Ricci solitons.