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Christine Guenther* (guenther@pacificu.edu). *Scaling and Entropy for the RG-2 flow.*

The second order renormalization group flow (RG-2 flow) on a Riemannian manifold (\mathcal{M}, g) is the geometric flow

$$\frac{\partial}{\partial t}g = -\alpha \mathcal{R}ic(g) - \frac{\alpha^2}{2} \mathcal{R}m^2(g),$$

where $\mathcal{R}ic$ is the Ricci curvature tensor, $\mathcal{R}m_{ij}^2 := \mathcal{R}_{irmk} \mathcal{R}_j^{rmk}$ with \mathcal{R}_{irmk} the Riemannian curvature tensor, and $\alpha > 0$ is a parameter. In this talk we develop a (physically motivated) solution to problems resulting from the scaling properties of $\mathcal{R}ic$ and $\mathcal{R}m^2$, through the introduction of a *geometrically defined* coupling constant $\alpha_{g(t)}$.

We further investigate an Entropy for the flow, considering natural extensions of Perelman's entropy for the Ricci flow. This is joint work with Mauro Carfora. (Received September 26, 2017)