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Brian Klatt* (brn.klatt@gmail.com), 1517 RAVENA ST, Bethlehem, PA 18015. *Compact Gradient Shrinking Ricci Solitons, the Hitchin-Thorpe Inequality, and Spin Structures.*

If an Einstein metric exists on a compact topological 4-manifold, there is a topological implication which was discovered by Hitchin and Thorpe and involves the Euler number and signature: $2\chi - 3|\tau| \geq 0$. It has been conjectured by H.D. Cao that this obstruction still holds when the Einstein condition is relaxed to Gradient Ricci Soliton, $Rc(g) + \nabla^2 f = \lambda g$, where f is a function called the potential. I will briefly discuss this problem and some partial progress. Namely, if one assumes that the underlying manifold has a spin structure, I will show that the Hitchin-Thorpe inequality is true for gradient Ricci solitons. The only known examples of compact gradient shrinking Ricci solitons with a non-constant potential function in dimension 4 are, however, not spin manifolds. Is it possible that a compact gradient shrinking Ricci soliton on a spin manifold necessarily has a constant potential function (i.e. the soliton metric is an Einstein metric)? I will discuss this question and directions for future study. (Received September 19, 2016)