

**Meeting:** 1000, Albuquerque, New Mexico, SS 8A, Special Session on Interactions in Riemannian Geometry

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*Superpotentials and the Cohomogeneity One Einstein Equations.* Preliminary report.

We will discuss a classification theorem, under certain hypotheses, for the existence of superpotentials for the cohomogeneity one Einstein equations. A superpotential for a Hamiltonian system is a globally defined function  $u$  on (momentum) phase space satisfying

$$H(du_q, q) = 0,$$

where  $H(p, q)$  is the Hamiltonian. The above superpotential equation may be viewed as a time-independent Hamilton-Jacobi equation or as an eikonal equation associated to the (locally defined) Jacobi metric. For such a first order non-linear PDE, global smooth solutions are generally extremely rare, and this fact gives one hope that a complete classification may be possible. (Received August 13, 2004)