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*How black holes give counter-examples to the convexity of the moment map.*

A symplectic manifold  $(M^{2n}, \omega)$  is toric if it admits a Hamiltonian action of the real torus  $(S^1)^n$ . It then admits a moment map, which identifies the orbit space of the action as a subset of the dual Lie algebra of the torus. It is a standard result that if  $M$  is complete, then the moment map is convex.

In this talk, I will show how the Riemannian analogues of the Kerr family of spacetimes, corresponding to rotating black holes, can be given toric structures. I will explain how the moment map loses convexity in the region corresponding to the ring singularity in the interior of the black hole.