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An infinite class of extremal horizons in higher dimensions

The classification problem of stationary black holes in higher dimensions is a challenging open problem of intrinsic interest, and is furthermore relevant to high-energy physics. It has been established that allowed horizon topologies must be oriented cobordant to a sphere and, at least in the asymptotically flat case, be of positive Yamabe type. These conditions are only necessary; however, by restricting attention to extremal black holes, one can analyze the field equations in detail and impose regularity.

I will present a new class of near-horizon geometries which solve Einstein's vacuum equations, including a negative cosmological constant, in all even dimensions greater than four. Spatial sections of the horizon are inhomogeneous S^2-bundles over any compact Kaehler–Einstein manifold. For a given base, the solutions are parameterised by one continuous parameter (the angular momentum) and an integer which determines the topology of the horizon. In six dimensions the horizon topology is either $S^2 \times S^2$ or $CP^2 \# -CP^2$. In higher dimensions the S^2-bundles are always non-trivial, and for a fixed base, give an infinite number of distinct horizon topologies. All of these horizon geometries are consistent with all known topology and symmetry constraints for the horizons of asymptotically flat or globally anti-de Sitter extremal black holes.