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On the topology of black holes

There are three principal ways to study black hole topology. One can study the topology of (i) event horizon cross-sections using topological censorship, (ii) apparent horizons using the stability operator, or (iii) Killing horizons using the so-called near horizon geometry equations. In 4 space-time dimensions, the first two methods give a rather complete picture, but in higher dimensions they provide very little information. The third method can provide information in all dimensions, but only for extreme or zero-temperature horizons. I will focus on this method, and describe recent efforts in collaboration with M. Khuri and G. J. Galloway to extend the analysis to non-zero temperature 5-dimensional black holes.