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Topological censorship and beyond: black holes and singularities from topological structures

The singularity theorems of the 1960s provided deep insight into the nature of general relativity; spacetimes satisfying a general set of conditions collapse to form a singularity. In particular, spacetimes with nontrivial fundamental group collapse.

Furthermore, the topological censorship theorem implies the existence of eternal black holes for spacetimes with nontrivial fundamental group. However neither it nor the singularity theorems indicate whether or not higher dimensional spacetimes with trivial fundamental group but containing other nontrivial topological structure collapse. Recent work shows that such collapse occurs for certain such structures; spacetimes in 5 or more dimensions with trivial fundamental group but with topological structures with, for example, non-zero A-hat genera must be singular. This talk will discuss this and other work toward this issue and its implications for classical relativity in higher dimensions.