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Vacuum static solutions of the Einstein equations (in dim 3)

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The first uniqueness result for the Schwarzschild solution was established by Israel in 1967. It was later improved by Robinson (1977) and Bunting-Masood-ul Alam (1987) to the extent that now the Schwarzschild solution is known to be unique among the asymptotically flat static solutions with compact (but non necessarily connected horizons). In this talk we will show that the hypothesis of asymptotic flatness can be replaced by a topological condition (that outside a compact set there is a connected component diffeomorphic to R^3 minus a ball). The Korotkin-Nicolai black hole shows that this topological condition cannot be relaxed in any way. This result opens a window to classify all regular static solutions in dimension 3, which could impact in several areas in differential geometry.

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