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Oppenheimer-Snyder type collapse for the Einstein-Vlasov system

Monday 3 June 2024 09:00 (1 hour)

In the seminal work by Oppenheimer and Snyder from 1939 it is shown that a homogeneous ball of dust undergoes gravitational collapse. This work has had an enormous impact on the field since it predicts the existence of black holes. In this talk I will show that the Oppenheimer-Snyder type collapse can be approximated arbitrarily well by solutions to the Einstein-Vlasov system. It is crucial for the argument to work in Painlevé-Gullstrand coordinates rather than in comoving coordinates which is standard in the case of dust. Extensions of this result to the inhomogeneous case will also be discussed. In particular, there exist inhomogeneous data for dust which give rise to naked singularities and it is thus of great importance to understand the relation between the dust solutions and the solutions to the Einstein-Vlasov system in the context of the weak cosmic censorship conjecture. This is a joint work with Gerhard Rein.

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