Potential PhD project in Mathematics Radboud University

Supervisor: Klaas Landsman

Title project: Singularities: From Ricci flow to general relativity

Description
As shown by Hawking and Penrose in the 1960s, Einstein's theory of general relativity almost by necessity gives rise to space-times with singularities (such as black holes or the big bang). Apart from the fact that they occur, these are not well understood (neither mathematically nor physically). In a completely independent development, Perelman proved the Poincare'-conjecture in 2003, based on Hamilton's theory of Ricci flow. Here, the singularities of the flow (which play a crucial part in the proof) are very well understood. There are both analogies and differences between Einstein's theory and Hamilton-Perelman's, some of which have been exploited in the literature. Thus the aim of this project is to see what general relativity can learn from Ricci flow with a specific eye on its singularities.

References:
J. W. Morgan and G. Tian, Ricci Flow and the Poincare Conjecture (AMS, 2007)

Name/Contact of any collaborator(s):