



Applied and Computational Mathematics Seminar

Title: Is the shell-focusing singularity of Szekeres space-time visible?

Speaker: Dr. Brien Nolan (Dublin City University)

Date: Thu 29th November 2007 at 2:15PM

Location: Mathematical Sciences Seminar Room

Abstract: The visibility of the shell-focusing singularity in Szekeres space-time - which represents quasi-spherical dust collapse - has been studied on numerous occasions in the context of the cosmic censorship conjecture. The various results derived have assumed that there exist radial null geodesics in the space-time. We show that such geodesics do not exist in general, and so previous results on the visibility of the singularity are not generally valid. More precisely, we show that the existence of a radial geodesic in Szekeres space-time implies that the space-time is axially symmetric, with the geodesic along the polar direction (i.e. along the axis of symmetry). If there is a second non-parallel radial geodesic, then the space-time is spherically symmetric, and so is a Lemaître - Tolman - Bondi (LTB) space-time. For the case of the polar geodesic in an axially symmetric Szekeres space-time, we give conditions which lead to visibility of the singularity along this direction. Likewise, we give a sufficient condition for radial null geodesics in the axially symmetric case and in the general (non-axially symmetric) case, and

This talk is based on joint work with Ujjal Debnath. See arXiv:0709.3152.

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