



ICTS Seminar (HYBRID)

Title : A Spinor proof of the positivity of the quasi-local energy in (semi-)Riemannian Geometry

Speaker: Puskar Mondal (Harvard University)

Date : Wednesday, 06th March 2024

Time : 04:00 PM (IST)

Abstract : In this talk, I will discuss my very recent work with S-T Yau on a spinor-based proof of the quasi-local energy defined by S-T Yau and M-T Wang for a time-oriented smooth connected Lorentzian manifold verifying appropriate energy condition. In 1982, R. Penrose listed a set of major open problems in mathematical general relativity that contained the following problem: find a quasi-local definition of energy in the context of pure gravity. In 2009, S-T Yau and M-T Wang defined the most consistent notion of quasi-local energy in general relativity (other quasi-local definitions such as Brown-York energy existed but has undesirable properties). One of the fundamental properties of this energy is its positivity. Till very recently the positivity proof of quasi-local energy relied on Bartnik's gluing and asymptotic extension construction and subsequent application of the positive mass theorem. In 2018, Richard Schoen posed the following question: find a quasi-local proof of nonnegativity for the Brown-York and related quasi-local energies. Very recently I together with S-T Yau gave a pure quasi-local proof (arXiv:2401.13909) of the positivity of the most general Wang-Yau energy using spinors which also implies the positivity of other quasi-local energies thereby providing a positive answer to Rick Schoen's question. I will introduce the basic notions, present the proof, and discuss some of the consequences of our theorem not only in the context of mathematical general relativity but also in Riemannian geometry in particular in the theory of minimal surfaces.

Venue : Offline: Emmy Noether Seminar Room

Online: Please click on the below link to join the seminar

<https://icts-res-in.zoom.us/j/92902870678?pwd=dldIR0UvQkVDaDZiY1lpQ3ZOdXN2Zz09>

Meeting ID: 929 0287 0678

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