ICTS Postdoc/Graduate Student Seminar Series

Title : Maximal surfaces, Born-Infeld solitons, and Ramanujan's identities

Speaker : Rahul Kumar Singh, Harish-Chandra Research Institute, Allahabad

Date : Friday, March 31, 2017

Time : 11:15 AM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : We first introduce 3-dimensional Lorentz-Minkowski space and its maximal surfaces. These are surfaces of maximum area, which satisfy the maximal surface equation locally. We then discuss the Weierstrass-Enneper complex representation of these maximal surfaces. We find that the maximal surface equation and the Born-Infeld equation are related by a Wick rotation. (The Born-Infeld equation arises in physics in the context of nonlinear electrodynamics, which was introduced in order to be able to model the electron as a finite-energy point charge.) Using this observation, we present a method to construct a one parameter family of complex Born-Infeld solitons (solutions of the Born-Infeld equation) from a given one parameter family of maximal surfaces, and give the Born-Infeld solitons a geometric interpretation. Finally, we shall illustrate the connection of maximal surfaces to analytic number theory through certain of Ramanujan's identities.

Note: This will be an ongoing biweekly seminar series (Fridays, 11:15 am) by the ICTS postdocs and graduate students