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ICTS Seminar

Title : The Heisenberg commutation relation and operator algebras

Speaker : Soumyashant Nayak, University of Pennsylvania

Date : Wednesday, August 21, 2019

Time : 2:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : The historical development of the study of operator algebras is intimately tied with the quest to develop a mathematical formalism for quantum mechanics. This is what motivated von Neumann to study 'rings of operators' in his seminal series of papers with Murray. He was dissatisfied with his original Hilbert space formalism involving the so-called type I_{∞} algebras and envisaged the type II_1 factors as providing the appropriate description of the logic of quantum systems. In this talk, we will briefly trace the history of the field before turning our attention to the question of representing the Heisenberg commutation relation, $QP - PQ = i\hbar I$, using operators on a Hilbert space. In the type II_1 case, this obstinately leads towards non-selfadjoint operators and non-selfadjoint operator algebras which have so far been second-class citizens in comparison to their self-adjoint counterparts (namely, C^* -algebras, von Neumann algebras). We will conduct some mock drills in the world of matrices before moving our discussion to the algebra of affiliated operators corresponding to a II_1 factor.