



Philosopher in Residence Fellowship Program Focus Group: Quantum Logic and the Second Quantum Revolution



Venue:

Institute for Advanced Study Lichtenbergstraße 2a Room 0.004 (ground floor)

For any question, contact roberto.giuntini@tum.de

Tuesday, May 21st 2024, 14:30-16:00

Quantum logic as a logic

14:30-15:15 Prof. Roberto Giuntini (University of Cagliari, IAS-TUM)

From sharp to unsharp logic (I): a universe without contradiction

15:15 –16:00 Prof. Francesco Paoli (University of Cagliari)

From sharp to unsharp logic (II): the appearance of contradiction in the quantum world

Abstract (Part I and II): In this talk, we survey in broad brushstrokes some concepts and perspectives in guantum logic, contrasting the traditional "sharp" approach à la Birkhoff-von Neumann with some later developments in "unsharp" quantum theory. We will compare the different mathematical counterparts of the notion of an event (or proposition) in these theories: while sharp quantum logic identifies them with projection operators of a complex separable Hilbert space, unsharp quantum logic focusses on the larger class of effects, which can none the less be assigned a probability-value via the Born rule. We will pay particular attention to some algebraic structures that have been suggested as abstractions from these concrete structures of events. In the sharp case, orthomodular posets and lattices have been an object of intensive investigation since the seminal work by Birkhoff and von Neumann. For unsharp quantum logic the situation is more fragmented – however, within the plethora of structures that have been studied in the literature, we will emphasise paraorthomodular Brouwer-Zadeh lattices. Our survey will be conducted against the backdrop of a constant comparison with the mathematical structures enployed for classical physics; we will also hint at the relevance of this research strand for the construction of models of (classical and nonclassical) computation.

The seminar series is funded and sponsored by









