

Seminar Notice

On 11th May, 2022 (Wednesday)

Time: 3:30 PM

Venue: PAMU Seminar Room

Physics and Applied Mathematics Unit
Indian Statistical Institute, Kolkata- 700108

Speaker: Dr. Manabendra Nath Bera

Indian Institute of Science Education and Research, Mohali

Title: Does Quantum Bayes' Rule Affirm Consistency in Measurement Inferences in Quantum Mechanics?

Abstract:

Classical Bayes' rule lays the foundation for the classical causal relation between cause (input) and effect (output). This rule is believed to be universally true for all physical processes. On the contrary, we show that it is inadequate to establish correct correspondence between cause and effect in quantum mechanics. In fact, there are instances where the use of classical Bayes' theorem leads to inconsistencies in quantum measurement inferences, such as Frauchiger-Renner's paradox. As a remedy, we introduce a deterministic causal relation based on quantum Bayes' rule. It applies to general quantum processes even when a cause (or effect) is in a coherent superposition with other causes (or effects) as allowed by quantum mechanics and in the cases where causes belonging to one system induce effects in some other system as it happens in quantum measurement processes. This enables us to resolve Frauchiger-Renner's paradox and reaffirm that quantum mechanics can consistently explain its use. We also revisit Hardy's paradox and bipartite non-locality without a Bell-inequality and propose a possible resolution to the inconsistencies using quantum Bayes' rule. We discuss the consequences of our results.

All are Cordially Invited to Attend

(Head, PAMU)