Special Issue

A Contemporary Triad in Quantum Foundations: Correlational, Compositional, and Causal Structures

Message from the Guest Editors

This Special Issue is dedicated to exploring the new frontiers of quantum foundations through a contemporary triad of interconnected research programmes. The first is the study of correlational phenomena, establishing the empirical departure from the constraints of traditional hidden-variable models. The second is the framework of compositional structures, which investigates process theoretical rules for combining systems and lab procedures, offering a powerful language, e.g., via operational probabilistic theories. The third is the emerging vanguard of higher-order dynamics, which challenges the very notion of a fixed causal background, e.g., by allowing for quantum control over the order of events. We invite contributions that advance any of these three pillars or, crucially, explore their interplay. How do compositional principles constrain quantum correlations? What new physical arenas emerge from higher-order causal structures? Submissions connecting this triad to fundamental concepts are particularly welcome, as we attempt to draw a more profound architectural understanding of our quantum realm.

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Editor-in-Chief

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