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August 5, 3:00pm ET

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Speaker: Prof. Eric Chitambar
**Quantum Information Processing from a
Resource Theory Perspective**



Abstract:

A quantum resource theory is a broad framework for studying some particular features of quantum mechanics under a restricted class of physical operations. A paradigm example is the resource theory of quantum entanglement, which characterizes the behavior of multi-party entanglement under the restriction of local dynamics and classical communication. When viewed through the lens of a quantum resource theory, seemingly different quantum phenomena often emerge as having many formal similarities.

In this talk I will provide a survey of quantum resource theories and some of its applications in quantum information science. We will first motivate the topic by considering some well-known results in thermodynamics and statistical decision problems. We will then discuss some of the basic elements and common structural properties found in most resource theories. To see this formalism in action, we will consider the problem of multiple-access classical communication using a single particle, comparing the performance of classical and quantum particles. Elements of this talk will be taken from [Rev. Mod. Phys 91, 25001 (2019)]; [Phys. Rev. Lett. 124, 120401 (2020)]; [Phys. Rev. Res. 2, 23298 (2020)] [arXiv:2006.12475].

About the Speaker:

Eric Chitambar received his B.S. degree in physics from the University of Notre Dame in 2005 and his Ph.D. degree in physics from the University of Michigan in 2010 under the direction of Prof. Yaoyun Shi. He served as a post-doctoral researcher at the University of Toronto and later at the Perimeter Institute for Theoretical Physics in Waterloo, Canada. In 2012, Dr. Chitambar became a member of the physics department at Southern Illinois University Carbondale, and in 2018 he joined the department of Electrical and Computer Engineering at the University of Illinois Urbana-Champaign as an Associate Professor. His research interests include quantum communication, entanglement theory, and general quantum resource theories. Outside of science, some of his interests include rock music, tropical fish keeping, and philosophy.