

Data Science and Analysis Seminar

PEIXUE WU
Syracuse University

WHEN DOES QUANTUM ENTANGLEMENT HELP SEND CLASSICAL INFORMATION THROUGH QUANTUM CHANNELS?

Tuesday, October 20, 2026
3:00 P.M. in Massry B008

ABSTRACT. A fundamental question in quantum information theory is whether entangling the inputs across multiple uses of a quantum channel can increase the rate at which it transmits classical information. An old conjecture dating back nearly three decades ago asserted that it cannot. In 2009, Hastings disproved this conjecture by proving that there exist channels for which entangled inputs strictly increase the communication rate. His argument, however, is probabilistic: it shows that suitably chosen random channels exhibit this effect, but it does not identify any specific one. In this talk, I will discuss how to construct an explicit construction of a channel with such an entanglement advantage. I will also discuss OpenAI's recent work which goes in the opposite direction: for generalized amplitude damping channels, entanglement offers no advantage.