**Idaho State University
Physics Colloquium**
***Phase Transitions in the Dynamics of Quantum Entanglement***

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Quantum mechanics is our most accurate theory of matter, but it is also a

 theory of information. Quantum descriptions of matter predict the

existence of phase transitions, in which matter abruptly transforms from

 one form to another. So do these predictions also imply the existence

of phase transitions in the behavior of information? Here I discuss a

recently discovered phase transition in the behavior of quantum

information, known as the measurement-induced entanglement phase

transition. I explain how a many-body quantum system can exist in one of

 two qualitatively different phases: an "entangling" phase, in which its

 various components tend to develop more quantum entanglement with each other over time; and a "disentangling" phase, in which entanglement is

blocked from growing by measurements made by an external observer. I

will discuss how we anticipated such a transition to exist by a mapping

the problem to classical percolation, as well as more recent efforts to

find exact solutions for its properties and to realize the transition

experimentally.

 **Monday, August 25 2025
4:00 – 4:50 pm**