



LABORATORY FOR ELEMENTARY-PARTICLE  
PHYSICS (LEPP)

# Theory Seminar



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Berkeley

**Energy is Entanglement**

We compute the local second variation of the von Neumann entropy of a region in theories with a gravity dual. For null variations our formula says that the diagonal part of the Quantum Null Energy Condition is saturated in every state, thus providing an equivalence between energy and entropy. We conjecture that the QNEC is saturated in all interacting theories and discuss aspects of the proof of this statement in general interacting CFTs. We also discuss the special case of free theories, and the implications of our formula for the Averaged Null Energy Condition, Quantum Focusing Conjecture, and gravitational equations of motion.

**Friday, Nov. 16, 2018**

**12:30pm**

**401 Physical Sciences Building**