JOINT TUFTS/MIT COSMOLOGY SEMINAR

From AdS to dS Through the Quantum State of the Universe

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If the universe is quantum mechanical system it has a quantum state. A theory of that state is a necessary part of any final theory that predicts probabilities for our observations of the universe. Wave functions specifying a quantum state of the universe must satisfy the constraints of general relativity, in particular the Wheeler-DeWitt equation (WDWE). We show that (for nonzero cosmological constant) solutions of the WDWE exhibit a universal semiclassical asymptotic structure which has two domains in which geometries and fields are asymptotically real. In one the histories are Euclidean asymptotically anti-de Sitter, in the other they are Lorentzian asymptotically de Sitter. This implies that quantum probabilities for classical, asymptotically de Sitter histories are predicted by any wave function whatever the sign of the underlying cosmological constant. These probabilities can be obtained from evaluating an asymptotically AdS action, leading to a promising connection with holography. We illustrate this general framework with the specific example of the no-boundary wave function in its holographic form.

Tuesday, November 13, 2012, 2:30 pm
Robinson Hall, Room 250
Tufts University