

EXTRA DIMENSIONS, DARK ENERGY AND THE COSMOLOGICAL CONSTANT PROBLEM*

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One of the most exciting things to find at the LHC would be extra dimension, but most physicists don't really believe extra dimensions are likely to be large enough to be seen there, even if they exist. I am one of the few true believers, and hope to explain in this talk why the most convincing evidence for this comes from cosmology. The argument relies on the observation that large extra dimensions provide the only known approach for reconciling the small size of the observed curvature of spacetime (as inferred from the cosmological energy density) and the energy of the vacuum (which we believe quantum fluctuations should make large). Better yet, branes in large extra dimensions can modify gravity at energies low enough to be relevant to the observed Dark Energy density, without also ruining well-constrained non-gravitational interactions at these low energies. The talk outlines the issues for nonspecialists, emphasizing how the extra-dimensional proposal is very predictive, with observable consequences for the LHC, for tests of gravity on both large and small scales (and possibly for neutrinos).

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