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The Radion as a Harbinger of Deca-TeV Physics

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Precision data generally require the threshold for physics beyond the Standard Model to be at the deca-TeV (10 TeV) scale or higher. This raises the question of whether there are interesting deca-TeV models for which the LHC may find direct clues. A possible scenario for such physics is a 5D warped model of fermion masses and mixing, with Kaluza-Klein masses m_KK ˜ 10 TeV, allowing it to avoid tension with stringent constraints, especially from flavor data. Discovery of a Standard-Model-like Higgs boson, for which there are some hints at ˜125 GeV at the LHC, would also require the KK masses to be at or above 10 TeV. These warped models generically predict the appearance of a much lighter radion scalar. We find that, in viable warped models of flavor, a radion with a mass of a few hundred GeV and an inverse coupling of order m_KK ˜ 10 TeV could typically be accessible to the LHC experiments – with sqrt(s) = 14 TeV and 100 fbˆ-1 of data. The above statements can be applied, mutatis mutandis, to 4D dual models, where conformal dynamics and a dilaton replace warping and the radion, respectively. Detection of such a light and narrow scalar could thus herald the proximity of a new physical threshold and motivate experiments that would directly probe the deca-TeV mass scale.

Author: MCELMURRY, Thomas (University of Rochester)

Presenter: MCELMURRY, Thomas (University of Rochester)

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