Contribution ID: **83** Type: **not specified**

Brane-Higgs sensitivities

Monday 15 March 2021 18:50 (20 minutes)

The problematic huge hierarchy between the usual 4-dimensional Planck mass scale of gravity and the ElectroWeak symmetry breaking scale can interestingly disappear at some point-like location along extra space-like dimensions where the effective gravity scale is reduced down to the TeV scale. Field theories with point-like particle locations (3-dimensional brane-worlds) or point-like interactions deserve special care. In particular it can be shown that, in contrast with usual literature, brane-scalar fields –like the SM Higgs boson –interacting with fermions in the whole space (bulk) do not need to be regularized if rigorous 4- or 5-dimensional treatments are applied: standard regularization introduces a finite width wave function for scalar fields localized along extra dimensions. The variational calculus of least action principle must also be applied strictly to derivate the fermion (Kaluza-Klein) masses and couplings, in particular by distinguishing the natural and essential boundary conditions: the higher-dimensional model –based in particular on extra compact spaces of type interval or circle (orbifold) –must be defined either completely through the action expression [necessity then for new specific brane terms bilinear in the fermion fields] or partially from additional so-called essential boundary conditions. Besides, the correct action integrand definition requires to introduce improper integrals in order to remain compatible with the fermion wave function discontinuities induced by point-like Higgs interactions. Phenomenologically, the correct treatment of the brane-localised Higgs boson could be tested via the precise measurements of the Higgs coupling to di-photon or (flavour-changing) Yukawa interactions at a linear collider.

Time Zone

Europe/Africa/Middle East

Primary author: MOREAU, Grégory (Université Paris-Saclay)

Co-authors: Mr ANGELESCU, Andrei (Johannes Gutenberg-Universität Mainz); Mr NORTIER, Florian (Université Paris-Saclay); Mr LENG, Ruifeng (Université Paris-Saclay)

Presenter: MOREAU, Grégory (Université Paris-Saclay)

Session Classification: PD1: Theoretical Developments

Track Classification: Physics and Detectors Tracks: PD1: Theoretical Developments