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The Gravitino and the extra dimensions

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We investigate the relation between the existence of extra dimensions and the scale at which supersymmetry is expected to break down, linking it to the threshold at which the Effective Field Theory description becomes invalid. We use the Gravitino Conjecture(GC) to make predictions on the number and the size of extra dimensions based on the value of the gravitino mass, ensuring our results align with most recent constraints on extra dimensions. For doing so, we generalize the GC by introducing a dependence on the number of mesoscopic extra dimensions considered in supergravity theory, using results of string compactification. We draw scenarios connecting the values of the gravitino mass and of the scale of supersymmetry break down to the phenomenology of the extra dimensions. In detail, we explore the experimentally viable case where the size of the extra dimensions is comparable to the distance at which deviations from Newtonian gravity have not yet been detected. Finally, we draw scenarios also where the mass of the gravitino is enough high for allowing to gravity mediation for the breaking of supersymmetry.

Presenter: BERSIGOTTI, Leonardo

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