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Asymptotic Safety and Conformal Standard Model

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There are many proposals to extend the Standard Model designed to deal with its fundamental inconsistencies. Since no new particles have been detected experimentally so far, the models which add only one more scalar particle and possibly right-chiral neutrinos are favored. One of them is the Conformal Standard Model, which proposes a coherent solution to the Standard Model drawbacks including the hierarchy problem and a dark matter candidate. On the other hand there are signs that gravity is asymptotically safe. If there are no intermediate scales between electroweak and Planck scale then the Conformal Standard Model supplemented with asymptotically safe gravity can be valid up to arbitrarily high energies and give a complete description of particle physics phenomena. Moreover asymptotic safety hypothesis restricts the mass of the second scalar particle to 300 ± 28 GeV, for a_{\lambda_3} <0. The masses of heavy neutrinos can also be estimated as 683 ± 83 GeV so these predictions can be explicitly tested in the nearby future.

Presenter: KWAPISZ, Jan