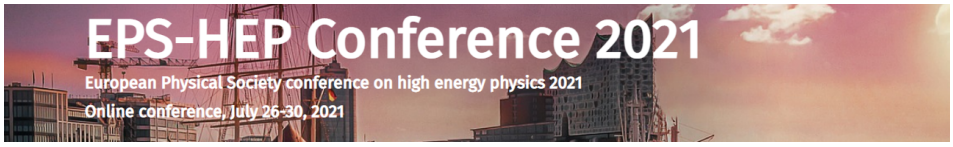

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Probing Unified Theories with Reduced Couplings at Future Colliders

Thursday 29 July 2021 10:50 (20 minutes)

The search for renormalization group invariant relations among parameters to all orders in perturbation theory constitutes the basis of the reduction of couplings concept. Reduction of couplings can be achieved in certain N=1 supersymmetric grand unified theories and few of them can even become finite at all loops. The resulting theories in which successful reduction of couplings has been achieved so far include: (i) a reduced version of the minimal N=1 SU(5) model, (ii) an all-loop finite N=1 SU(5) model, (iii) a two-loop finite N=1 SU(3)^3 model and finally (vi) a reduced version of the Minimal Supersymmetric Standard Model. We present a number of benchmark scenarios for each model and investigate their observability at existing and future hadron colliders. The heavy supersymmetric spectra featured by each of the above models are found to be beyond the reach of the 14 TeV HL-LHC. It is also found that the reduced version of the MSSM is already ruled out by the LHC searches for heavy neutral MSSM Higgs bosons. In turn, the discovery potential of the 100 TeV FCC-hh is investigated and found that large parts of the predicted spectrum of these models can be tested. In this talk we will present results and updates from our recent work (Eur.Phys.J.C 81 (2021) 2,185: arXiv:2011.07900 [hep-ph]).

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