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Perturbativity constraints on gauge couplings in U(1) extended SM and Left-Right models

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To accommodate new physics like the tiny neutrino masses and dark matter, the standard model gauge group can be extended by an extra U(1) or by constructing left-right symmetric models at higher energies. However, the gauge couplings in these beyond the standard model gauge groups can not be arbitrarily large and/or small. Assuming the new physics emerges at the few-TeV scale and requiring the couplings to be perturbative up to the GUT/Planck scale, we examine the lower and upper bounds on the beyond standard model gauge couplings in the U(1) and left-right models, and the implications for the searches of corresponding gauge bosons at current and future high-energy colliders.

Author: CHAUHAN, Garv (Washington University in St. Louis)

Co-authors: ZHANG, Yongchao; DEV, Bhupal (Washington University in St. Louis)

Presenter: CHAUHAN, Garv (Washington University in St. Louis)

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