



## Poster session 4 - Friday 8 July

### P4.035 QCD running in neutrinoless double beta decay: Short-range mechanisms

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The decay rate of neutrinoless double beta ( $0\nu\beta\beta$ ) decay contains terms from heavy particle exchange, which lead to dimension-9 ( $d = 9$ ) six fermion operators at low energies. Limits on the coefficients of these operators have been derived previously neglecting the running of the operators between the high-scale, where they are generated, and the energy scale of  $0\nu\beta\beta$ -decay, where they are measured. Here we calculate the leading order QCD corrections to all possible  $d = 9$  operators contributing to the  $0\nu\beta\beta$  amplitude and use RGE running to calculate 1-loop improved limits. Numerically, QCD running dramatically changes some limits by factors of the order of or larger than typical uncertainties in nuclear matrix element calculations. For some specific cases, operator mixing in the running changes limits even by up to three orders of magnitude. Our results can be straightforwardly combined with new experimental limits or improved nuclear matrix element calculations to re-derive updated limits on all short-range contributions to  $0\nu\beta\beta$  decay.