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Mapping the SMEFT at High-Energy Colliders: from LEP and the (HL-)LHC to the FCC-ee

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We present SMEFT3.0, an updated global SMEFT analysis of Higgs, top quark, and diboson data from the LHC complemented by electroweak precision observables (EWPOs) from LEP and SLD. We estimate the impact on the SMEFT parameter space of HL-LHC measurements when added on top of SMEFT3.0 by means of dedicated projections that extrapolate Run II data. Subsequently, we quantify the unprecedented impact that measurements from future electron-positron colliders would have on both the SMEFT parameter space and on UV-complete models. We present projections for the FCC-ee and the CEPC based on the most recent running scenarios and include Z-pole EWPOs, fermion-pair, Higgs, diboson, and top quark production, using optimal observables for both W^+W^- and $t\bar{t}$. Finally, we quantify the effect of renormalization group running on the sensitivity to the SMEFT parameter space and UV-complete models.

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