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Improved prediction for the mass of the W boson in the SM, the MSSM and the NMSSM

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The relation between the mass of the W boson, the Z boson, the fine structure constant and the Fermi constant is one of the most important precision observables, which provides access to the quantum structure of the underlying theory and has a high sensitivity for discriminating between different models. Updated predictions for the W-boson mass in the Standard Model (SM) as well as its minimal and next-to-minimal supersymmetric extensions (MSSM, NMSSM) are presented. In the SM the incorporation of the latest higher-order corrections and the remaining theoretical uncertainties are discussed. In the supersymmetric extensions all available higher-order corrections from SM- and SUSY-type are taken into account. The predictions in the three models are obtained in a coherent framework, so that differences in the prediction for the W-boson mass can directly be related to the different structure and particle content of the three models. The phenomenological consequences of confronting the predictions in the three models with the present experimental result are discussed, and the impact of possible future improvements is investigated.

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