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Including theoretical uncertainties in Higgs fits

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We review and develop consistent treatments of theoretical uncertainty (TU) in Higgs couplings fits, going beyond the current approximation of uncorrelated Gaussian TU. We emphasize two different conceptual lines in the treatment of TU either as a nuisance or as a bias. These two treatments are considered within both frequentist and Bayesian frameworks. We develop the bias approach in the Bayesian framework, which consistently supports and generalizes the already existing frequentist view. Examples of Higgs fits based on latest data available are given. We provide analytic expressions of the likelihood fully taking into account correlations, whose evaluation cost the same CPU power as for the uncorrelated Gaussian approximation.

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