LoI EF04:
EWPO in concrete BSM Models

S. Heinemeyer[1,2,3*]

[1]*Instituto de Física Teórica (UAM/CSIC), Universidad Autónoma de Madrid, Cantoblanco, 28049, Madrid, Spain*

[2]*Campus of International Excellence UAM+CSIC, Cantoblanco, 28049, Madrid, Spain*

[3]*Instituto de Física de Cantabria (CSIC-UC), 39005, Santander, Spain*

Concerning EF04 I find the following ideas interesting/relevant:

Future e^+e^- colliders will measure several Electroweak Precision Observables (EWPOs) to very high precision. Prime examples are the mass of the W boson, m_W, the effective weak leptonic mixing angle, $\sin^2\theta_{\rm eff}^{\rm lept}$, or Z boson partial and total widths. The high precision measurements of the EWPOs have to be compared to theoretical predictions (at best) at the same level of accuracy. This requires high-precision theoretical predictions of the EWPOs and an accompanying theory uncertainty estimate.

So far the calculations and uncertainty evaluations have mostly focused on the SM. This makes sense since the main idea of the EWPOs is to find deviations from the SM. However, as soon as BSM physics (which necessarily exists) will be discovered, the EWPO calculations and uncertainty estimates will have to be redone in any favored BSM model. Similarly, if one wants to constrain BSM models and/or distinguish BSM models from the SM via EWPOs, corresponding BSM calculations and uncertainty estimates are required.

I think it will be of high interest to evaluated (systematically) the most relevant EWPOs in concrete BSM models, including their respective uncertainty estimates. Partial work in this respect has been done in the (N)MSSM and possibly in Higgs singlet extensions.

Relying only on EFT calculations is not sufficient. From any observed deviation an EFT calculation alone cannot reveal the underlying new physics model. To this end calculations in concrete models are indispensable.

*email: Sven.Heinemeyer@cern.ch