EFT discussion

What we have and what we want

Have:

- "κ"-Framework (see YR3, arXiv:1307.1347)
- Can only deal with overall rate deviations from the SM
- However, expect also deviations in angular distributions that we want to include consistently in Higgs measurements (e.g. CP)
- No strict "measurement" interpretation for κ_i!=1, as definition is only by analogy to the LO Higgs couplings

Want:

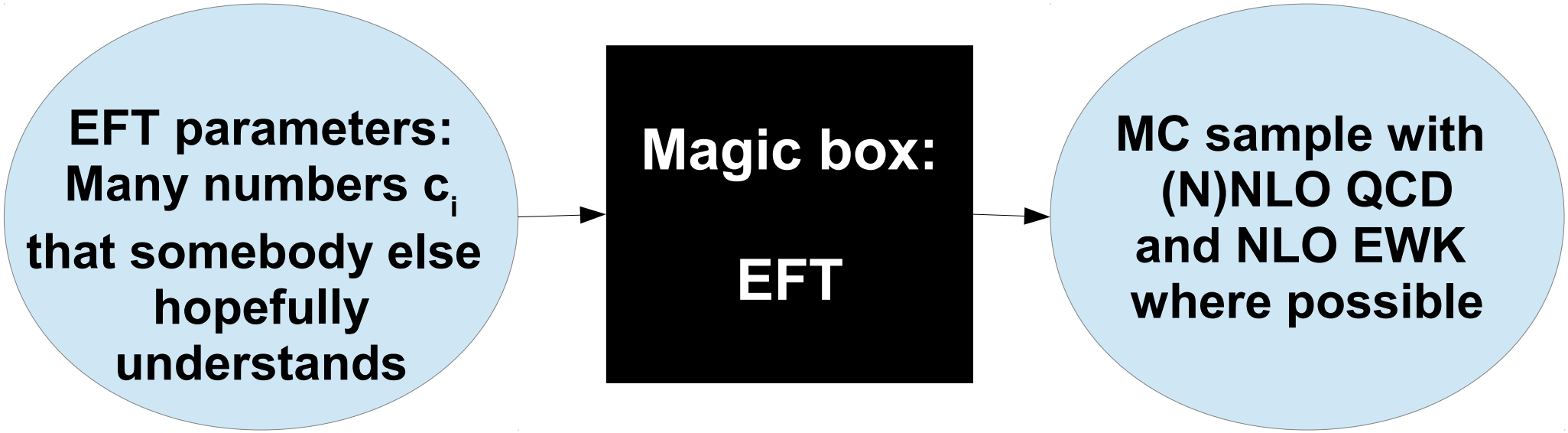
- EFT based measurement that takes all possible leading (dim6) deviations from heavy new physics into account

$$\mathcal{L}_{eff} = \mathcal{L}^{(4)}_{\mathrm{SM}} + \sum_i \frac{1}{\Lambda^{d_i-4}} c_i \mathcal{O}_i$$

where c_i is the Wilson coefficient and Λ is the cutoff scale.

- Can combine Higgs and non-Higgs measurement
- Can combine with EWPD, aTGC
- Valid beyond LO and at least containing all known SM higher order corrections (also EWK)

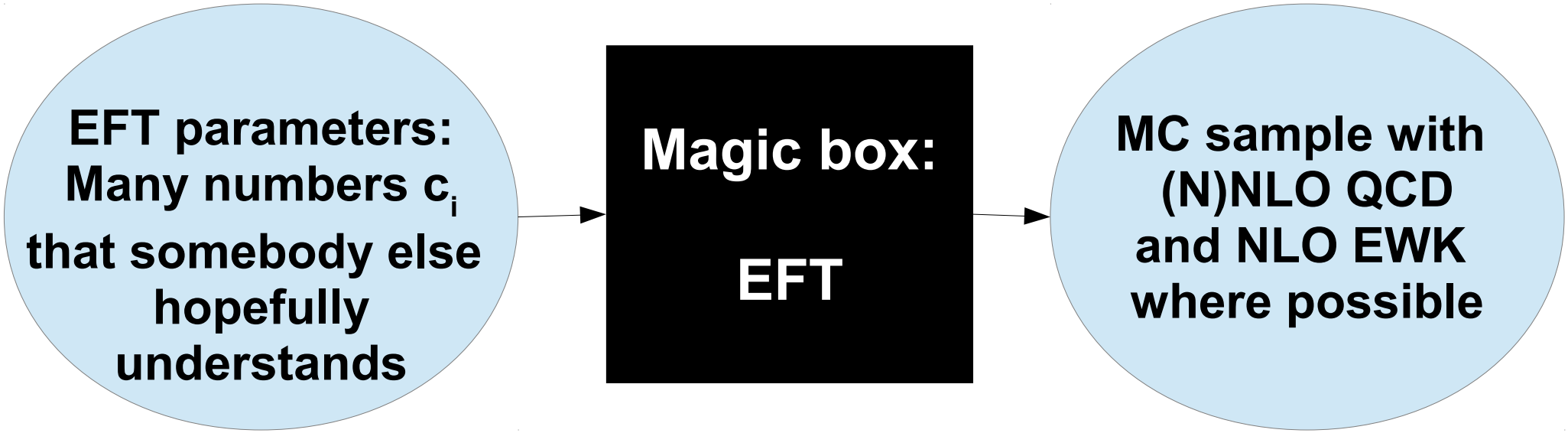
EFT as black box



What do we need for the black box:

- Tools using the same c_i or some translation tool between basis
- QCD and EWK higher order calculations: need to recover best SM predictions
- Experiments need MC samples to cover the full parameter space. Luckily the c_i appear at most as 2^{nd} order polynomial. Hence at most $O(n^2/2)$ MC samples are sufficient to cover the full parameter space if n c_i coefficients contribute to some process.
- Validity range: EFT is not valid in the full phase space. Analysis might need to be adjusted in some cases (e.g. VBF)

EFT as black box



What experiments could attempt to do with the black box

- Essential fit MC templates to data in all Higgs channels and extract n-dim parameter space of c_i compatible with data
- Background treatment would stay similar to current coupling measurements
- As dimensionality of c_i could be too large for meaningful results, some sensible approach of reducing the number of parameters c_i would be needed again ↔ iterate with theory community