HEPfit: INTRODUCTION

Basic ideas behind HEPfit:

- combine state-of-the-art theoretical calculations and current experimental data to
  - perform a Bayesian fit of model parameters, i.e. obtain a numerical representation of the (joint) p.d.f of model parameters (and observables) given priors for parameters and exp. data
  - predict observables
  - compare models using e.g. information criteria

for any model $\supseteq$ Standard Model

Likelihoods in HEPfit: inputs

- Experimental likelihoods can currently be implemented as:
  - Individual measurements with "exact" likelihood (Gaussian, …)
  - 1D or 2D measurements with "numeric" likelihood (1D or 2D Histograms)
  - Binned measurements with "exact" likelihood, including correlations
  - Multi-dimensional measurements with "exact" likelihood, including correlations
- Work in progress to implement full likelihoods using the DNNLikelihood.

Likelihoods in HEPfit: outputs

- The output of a successful MCMC run is a numerical approximation of the joint p.d.f. for model parameters and observables, represented as:
  - Averages and correlations for all parameters;
  - Averages (and correlations) for all (correlated) observables;
  - 1D and 2D histograms and highest probability regions corresponding to 1σ, 2σ, 3σ, ...;
  - Optionally, the full MCMC chains, useful for combination with more data;
  - In progress: the corresponding DNNLikelihood ←

EXAMPLE

- Global fit of $b \to s\, ll$ data:
  - 79 nuisance parameters (20 hadronic power corrections + 12 SM/hadronic parameters + 47 correlated form factors)
  - 159 experimental observables (28 1-dimensional + 10 8-dimensional correlated + 3 6-dimensional correlated + 4 2-dimensional correlated + 3 3-dimensional correlated + 1 4-dimensional correlated + 3 4-dimensional correlated)
  - Several Parameters of Interest