Hi-COLA/Duncan Quick Start Guide

1 How to run the model sampler

After performing the same initial setup as for the frontend, two .ini parameter files, one of which is shared between the model sampler and the frontend and can both be found in `<install_dir>/HiCOLA/Parameter_files/Frontend_parameter_files`. The first should follow the format of `horndeski_parameters.ini`, and the second, which is shared with the frontend, should follow the format of `numerical_parameters.ini`. The former specifies the initial conditions for the solver. The latter specifies integration settings, just as it does for the frontend with the addition of the `forwards_flag`, which tells the solver to solve forwards in time starting from high redshift.

The default parameter files are ready to run using a WMAP cosmology. However, these files can also be customised as detailed in the following subsections.

1.1 Customising `horndeski_generic.ini`

`horndeski_generic.ini` is where the dummy forms of the reduced Horndeski equations are fed into `model_sampler.py` and are replaced by the Horndeski functions for the current model being evaluated by the sampler. This can be modified in the same manner as `horndeski_parameters.ini`, however, specific Horndeski functions or parameters never need to be specified. See the general quick start guide for customising `numerical_parameters.ini`.

1.2 Running the model sampler

The run command is then:
`python3 -m HiCOLA.Utilities.ModelEvaluation.model_sampler A B C D`
Where A is the path to `horndeski_generic.ini`, B is the path to `numerical_parameters.ini`, C is the number of walkers to be used and D is the number of iterations to be performed. An optional argument, `--no_burn_in`, can also be added which removes the burn in from the MCMC.

This will generate a sample file (`samples.txt`) containing the parameters for every model evaluated, a probability file (`probabilities.txt`) containing the log-likelihood value for each model, a posterior plot input file (`posterior-input.txt`) containing columns of data in the format [z, E LCDM, best fit E, med model, spread] corresponding to the highest likelihood model and a best models file (`best-models.txt`) containing the values of E and ω_ϕ for the 25 highest likelihood models. These all can be loaded by the ' `model_sampler_plot`' file to produce relevant plots.