

Report of Recent Progress

Summary

- **Period:** Dec 23, 2020 to Jan 1, 2021
- **Task Finished:** Test LCDM+curvature model, and dark energy fluid model, plot the C_l^{TT} and matter power spectrum.
- **Questions Meet:**
 - I am not sure whether I use right parameters to run the *classy* code.
 - I don't know what kind of new model we need to use to solve the Hubble tension problem
 - I am not sure what kinds of observables we need to use. Do we need to use the fitting Hubble parameter directly as a comparison of different model?
 - Sometimes I am not clearly understand the physical meaning of some *classy* parameters
- **Plans for next 7 days:**
 - Discuss with Mauro about the problem above to understand how to use *classy* to solve the Hubble tension problem.
 - Read various model papers and use proper new model to solve problem.
 - Review basic cosmology knowledge to understand *classy* parameters well.

Progress in Details

In this part, I will write a bit more about the progress for the past days. Rather than running *classy* in command line or with *Cobaya*, I do the cosmological model fitting and plotting with the Python tools of *classy* in Jupyter Notebook (see the other link for the notebook).

I learned how to use the Jupyter Notebook to run new models and plot relevant data. I defined `Class` (a class of cosmological parameters) and set parameters with `myClass.set()` method, then I ran the model with `myClass.compute()` and plot CMB and matter power spectrum.

I ran three models for the first test: LCDM model (as comparison), LCDM+curvature ($\Omega_K = 0.1$), dark energy fluid model (set $\Omega_{\text{fld}} = 0.3$ and $\Omega_{\text{scf}} = 0$). The LCDM model and LCDM +curvature model are quite different (the C_l^{TT} and $P(k)$ are different), while the difference between LCDM and dark energy fluid model is small. I do a plotting of LCDM-DEfluid C_l^{TT} and $P(k)$ in the 3rd and 4th plotting, respectively, as illustration.

Note that this is only a simple test of running and plotting *classy* with Python. Further discussion and modification are required to get the meaningful result.