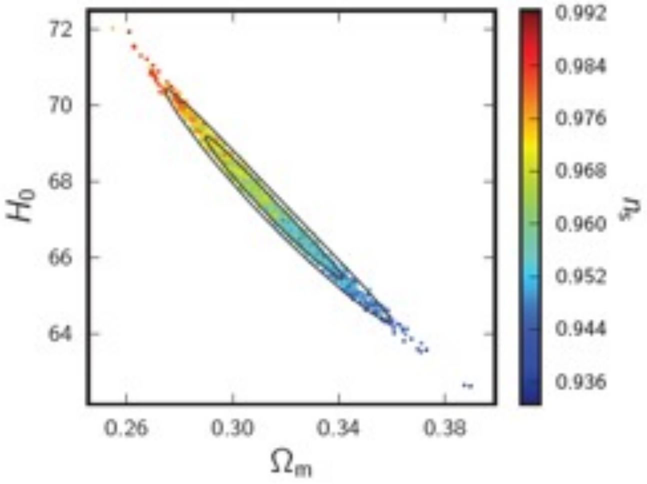
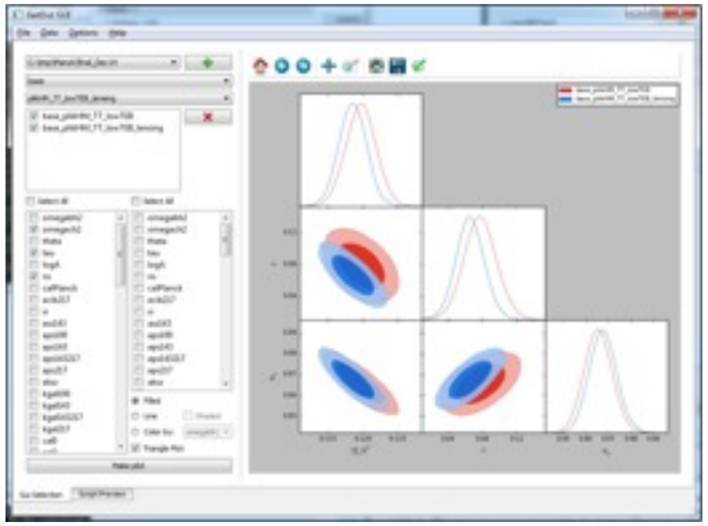




Introduction to CosmoMC

Part III: Analysis - GetDist & GetDist GUI

Antonio J. Cuesta
Institut de Ciències del Cosmos - Universitat de Barcelona

Dept. de Física Teórica y del Cosmos, Universidad de Granada, 1-3 Marzo 2016

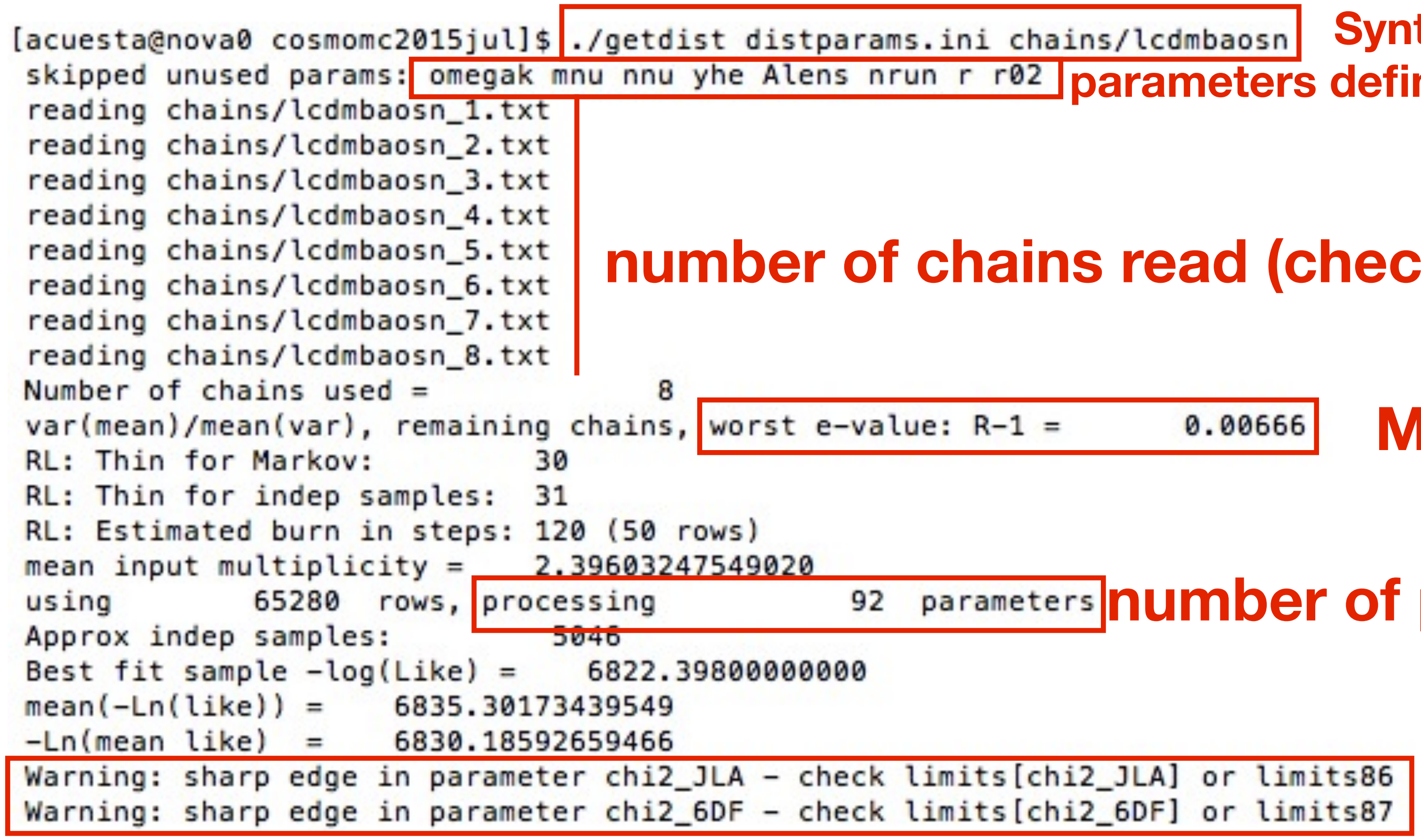
Outline of Part III

- The analysis code GetDist
- GetDist products: Margestats vs likestats
- How to generate plots with GetDist
- Using Planck public chains
- Interactive plots with GetDist GUI

GetDist: Analysis of MCMC chains

- When your chains are **mostly converged**, you can now retrieve your cosmological **bounds** (there is no need to wait until the code stops running)

- A typical execution of **GetDist** will look like this:



```
[acuesta@nova0 cosmomc2015jul]$ ./getdist distparams.ini chains/lcdmbaosn
 skipped unused params: omegak mnu nnu yhe Alens nrun r r02
 reading chains/lcdmbaosn_1.txt
 reading chains/lcdmbaosn_2.txt
 reading chains/lcdmbaosn_3.txt
 reading chains/lcdmbaosn_4.txt
 reading chains/lcdmbaosn_5.txt
 reading chains/lcdmbaosn_6.txt
 reading chains/lcdmbaosn_7.txt
 reading chains/lcdmbaosn_8.txt
 Number of chains used =            8
 var(mean)/mean(var), remaining chains, worst e-value: R-1 =       0.00666
 RL: Thin for Markov:          30
 RL: Thin for indep samples:   31
 RL: Estimated burn in steps: 120 (50 rows)
 mean input multiplicity =    2.39603247549020
 using        65280  rows, processing          92  parameters
 Approx indep samples:          5046
 Best fit sample -log(Like) =    6822.39800000000
 mean(-Ln(like)) =    6835.30173439549
 -Ln(mean like)  =    6830.18592659466
 Warning: sharp edge in parameter chi2_JLA - check limits[chi2_JLA] or limits86
 Warning: sharp edge in parameter chi2_6DF - check limits[chi2_6DF] or limits87
```

Syntax: ./getdist distparams.ini chains/root

parameters defined in distparams.ini but not in the chains

number of chains read (check that these are all your chains)

MCMC Convergence status

number of parameters (cosmo+nuisance+der)

warnings about non-converged parameters

GetDist products

- The following files are generated when you run GetDist (the first time you need to create the folder **plot_data**, not created by default !!)

- **root.likestats** and **root.margestats**: parameter constraints (see next slide)

- **root.corr** and **root.covmat**: these are the correlation matrix R_{ij} and the covariance matrix C_{ij} of the chain parameters, where $R_{ij}=C_{ij}/\mathrm{sqrt}(C_{ii}C_{jj})$. Note the file root.covmat can be used in params.ini to help in faster convergence

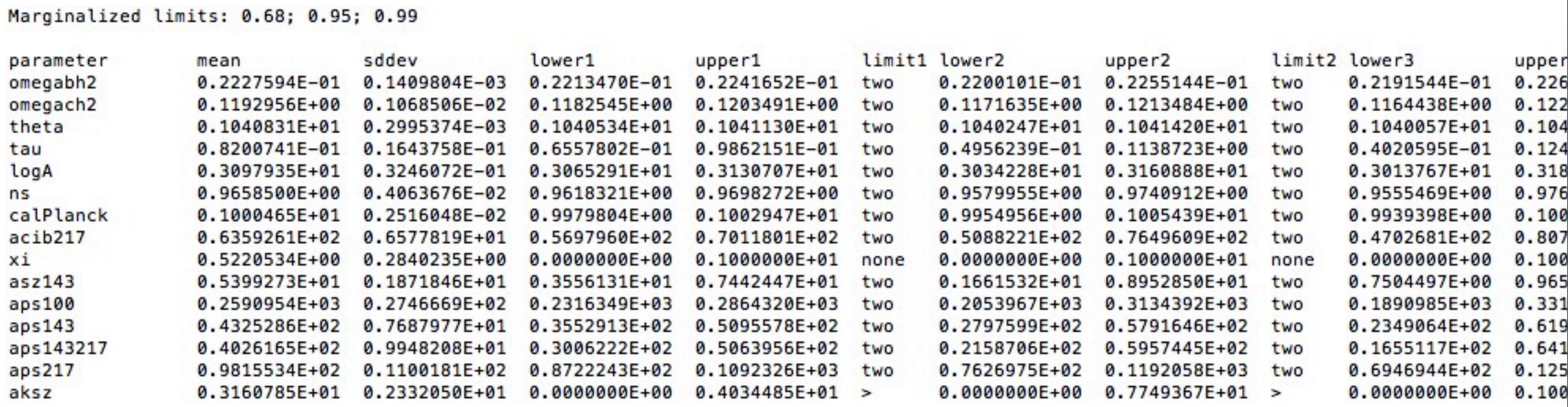
- **root.converge**: contains information on the convergence of your chains (e.g. R-1 for each parameter, chain auto-correlations, etc)

- all the information to make 1D, 2D, 3D, and triangle plots will be there. Also **root.py** and **root_2D.py** will be created to make matplotlib plots (cf.later)

Margestats

- This is probably the **most valuable** product of your chain. It contains the **mean** value of each parameter (cosmological, nuisance, and derived ‘*’), its **standard deviation**, its **lower and upper limits** for the **68%, 95%, 99%** confidence levels Also if limits are **1-tail** (‘<‘, ‘>’) or **2-tail**, and even **chi2** from each likelihood

- It is useful to write a **script** to parse this file to make a **LaTeX table** automatically



```
Marginalized limits: 0.68; 0.95; 0.99

parameter       mean           sddev          lower1         upper1         limit1 lower2         upper2         limit2 lower3         upper
omegabh2        0.2227594E-01  0.1409804E-03  0.2213470E-01  0.2241652E-01  two    0.2200101E-01  0.2255144E-01  two    0.2191544E-01  0.226
omegach2        0.1192956E+00  0.1068506E-02  0.1182545E+00  0.1203491E+00  two    0.1171635E+00  0.1213484E+00  two    0.1164438E+00  0.122
theta           0.1040831E+01  0.2995374E-03  0.1040534E+01  0.1041130E+01  two    0.1040247E+01  0.1041420E+01  two    0.1040057E+01  0.104
tau             0.8200741E-01  0.1643758E-01  0.6557802E-01  0.9862151E-01  two    0.4956239E-01  0.1138723E+00  two    0.4020595E-01  0.124
logA            0.3097935E+01  0.3246072E-01  0.3065291E+01  0.3130707E+01  two    0.3034228E+01  0.3160888E+01  two    0.3013767E+01  0.318
ns              0.9658500E+00  0.4063676E-02  0.9618321E+00  0.9698272E+00  two    0.9579955E+00  0.9740912E+00  two    0.9555469E+00  0.976
calPlanck       0.1000465E+01  0.2516048E-02  0.9979804E+00  0.1002947E+01  two    0.9954956E+00  0.1005439E+01  two    0.9939398E+00  0.100
acib217         0.6359261E+02  0.6577819E+01  0.5697960E+02  0.7011801E+02  two    0.5088221E+02  0.7649609E+02  two    0.4702681E+02  0.807
xi              0.5220534E+00  0.2840235E+00  0.0000000E+00  0.1000000E+01  none   0.0000000E+00  0.1000000E+01  none   0.0000000E+00  0.100
asz143          0.5399273E+01  0.1871846E+01  0.3556131E+01  0.7442447E+01  two    0.1661532E+01  0.8952850E+01  two    0.7504497E+00  0.965
aps100          0.2590954E+03  0.2746669E+02  0.2316349E+03  0.2864320E+03  two    0.2053967E+03  0.3134392E+03  two    0.1890985E+03  0.331
aps143          0.4325286E+02  0.7687977E+01  0.3552913E+02  0.5095578E+02  two    0.2797599E+02  0.5791646E+02  two    0.2349064E+02  0.619
aps143217       0.4026165E+02  0.9948208E+01  0.3006222E+02  0.5063956E+02  two    0.2158706E+02  0.5957445E+02  two    0.1655117E+02  0.641
aps217          0.9815534E+02  0.1100181E+02  0.8722243E+02  0.1092326E+03  two    0.7626975E+02  0.1192058E+03  two    0.6946944E+02  0.125
aksz            0.3160785E+01  0.2332050E+01  0.0000000E+00  0.4034485E+01  >      0.0000000E+00  0.7749367E+01  >      0.0000000E+00  0.100
```

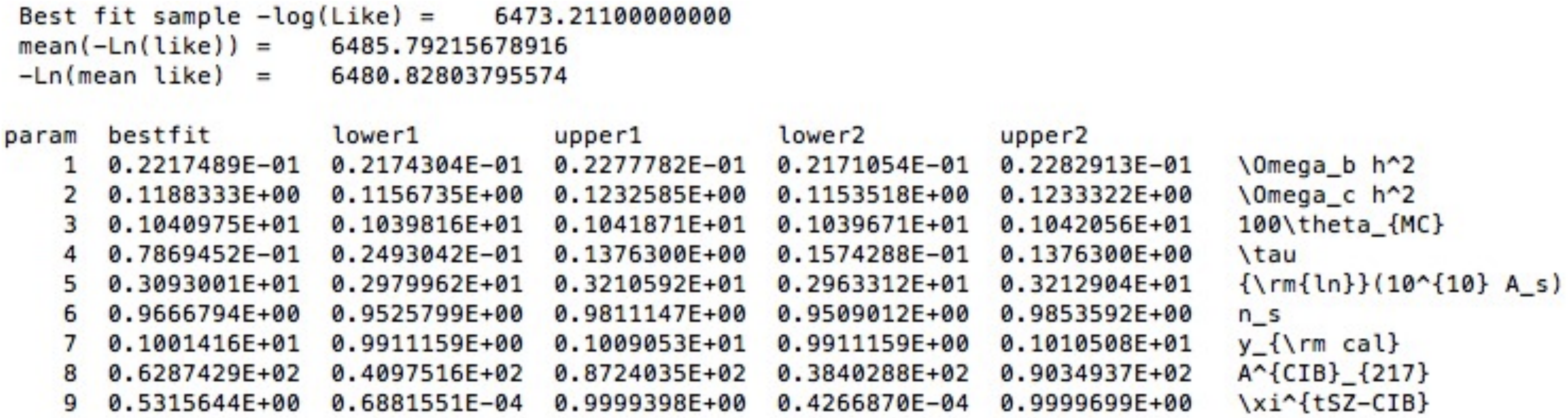
Remember that the difference between the likelihood and the marginalized likelihood is an integral over all the other parameters

Likestats

- This contains less relevant, but still sometimes useful, information.
  It is NOT what you usually would quote in a paper

- As opposed to the margestats file, which contains the mean and marginalized bounds for each parameter, this contains the **bestfit** value and the **bounds** of the **mean likelihood** distribution (not the posterior!) for each parameter

- Remember the bestfit value is better computed by **action=2** anyway



```
 Best fit sample -log(Like) =    6473.21100000000
 mean(-Ln(like)) =    6485.79215678916
 -Ln(mean like)  =    6480.82803795574

param  bestfit        lower1         upper1         lower2         upper2
    1  0.2217489E-01  0.2174304E-01  0.2277782E-01  0.2171054E-01  0.2282913E-01   \Omega_b h^2
    2  0.1188333E+00  0.1156735E+00  0.1232585E+00  0.1153518E+00  0.1233322E+00   \Omega_c h^2
    3  0.1040975E+01  0.1039816E+01  0.1041871E+01  0.1039671E+01  0.1042056E+01   100\theta_{MC}
    4  0.7869452E-01  0.2493042E-01  0.1376300E+00  0.1574288E-01  0.1376300E+00   \tau
    5  0.3093001E+01  0.2979962E+01  0.3210592E+01  0.2963312E+01  0.3212904E+01   {\rm{ln}}(10^{10} A_s)
    6  0.9666794E+00  0.9525799E+00  0.9811147E+00  0.9509012E+00  0.9853592E+00   n_s
    7  0.1001416E+01  0.9911159E+00  0.1009053E+01  0.9911159E+00  0.1010508E+01   y_{\rm cal}
    8  0.6287429E+02  0.4097516E+02  0.8724035E+02  0.3840288E+02  0.9034937E+02   A^{CIB}_{217}
    9  0.5315644E+00  0.6881551E-04  0.9999398E+00  0.4266870E-04  0.9999699E+00   \xi^{tSZ-CIB}
```

Covariance matrices

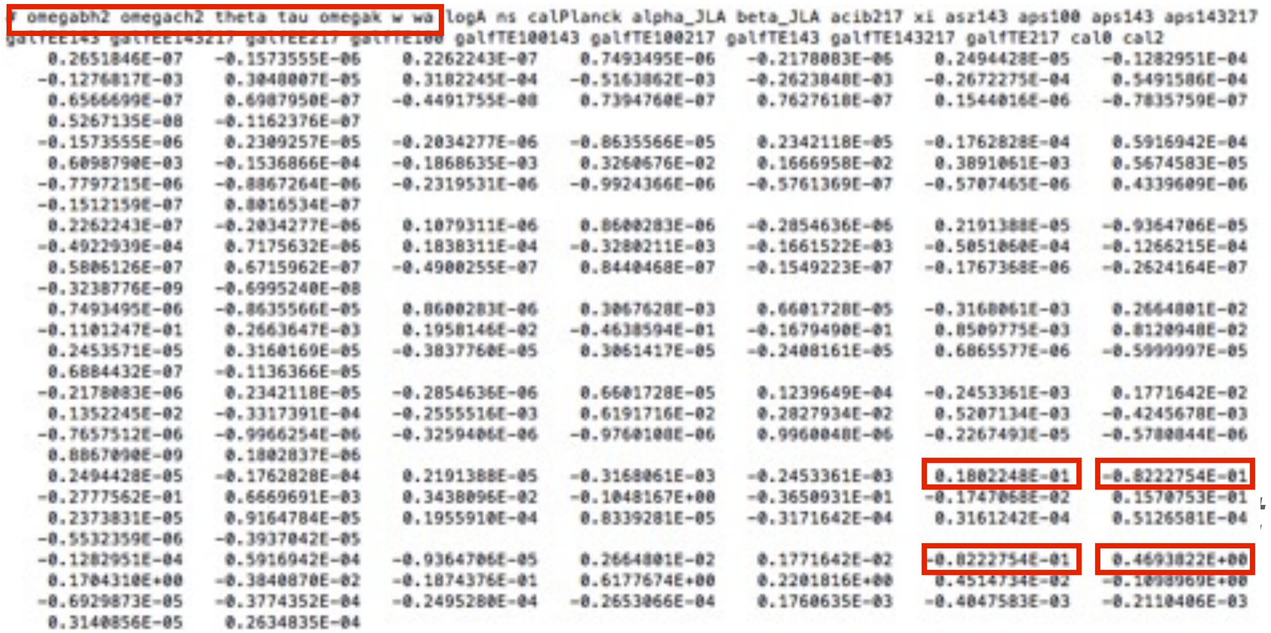
- These are important for two reasons:

- First, because they contain the **variances and covariances** of all parameters,

- and second, because they can be **included** in your **params.ini** file in future runs, especially if you think they are a **good proposal** for the expected covariance in that run. In that case it will help the code converge **much faster**

- Also they allow for computation involving covariances, e.g.

$$\mathrm{FoM}=1/\mathrm{sqrt}(\mathrm{Det}(w_0,w_a))$$



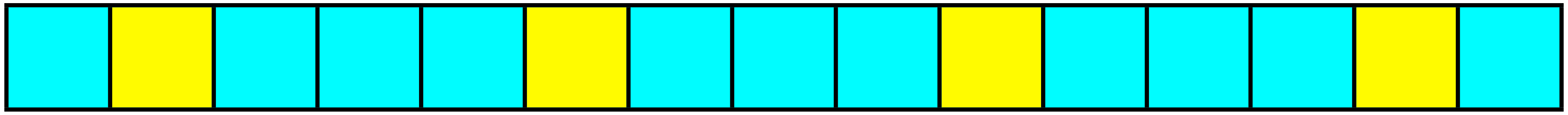
```
# omegabh2 omegach2 theta tau omegak w wa logA ns calPlanck alpha_JLA beta_JLA acib217 xi asz143 aps100 aps143 aps143217
galfEE143 galfEE143217 galfEE217 galfTE100 galfTE100143 galfTE100217 galfTE143 galfTE143217 galfTE217 cal0 cal2
    0.2651846E-07  -0.1573555E-06   0.2262243E-07   0.7493495E-06  -0.2178083E-06   0.2494428E-05  -0.1282951E-04
   -0.1276817E-03   0.3048007E-05   0.3182245E-04  -0.5163862E-03  -0.2623848E-03  -0.2672275E-04   0.5491586E-04
    0.6566699E-07   0.6987950E-07  -0.4491755E-08   0.7394760E-07   0.7627618E-07   0.1544016E-06  -0.7835759E-07
    0.5267135E-08  -0.1162376E-07
   -0.1573555E-06   0.2309257E-05  -0.2034277E-06  -0.8635566E-05   0.2342118E-05  -0.1762828E-04   0.5916942E-04
    0.6098790E-03  -0.1536866E-04  -0.1868635E-03   0.3260676E-02   0.1666958E-02   0.3891061E-03   0.5674583E-05
   -0.7797215E-06  -0.8867264E-06  -0.2319531E-06  -0.9924366E-06  -0.5761369E-07  -0.5707465E-06   0.4339609E-06
   -0.1512159E-07   0.8016534E-07
    0.2262243E-07  -0.2034277E-06   0.1079311E-06   0.8600283E-06  -0.2854636E-06   0.2191388E-05  -0.9364706E-05
   -0.4922939E-04   0.7175632E-06   0.1838311E-04  -0.3280211E-03  -0.1661522E-03  -0.5051060E-04  -0.1266215E-04
    0.5806126E-07   0.6715962E-07  -0.4900255E-07   0.8440468E-07  -0.1549223E-07  -0.1767368E-06  -0.2624164E-07
   -0.3238776E-09  -0.6995240E-08
    0.7493495E-06  -0.8635566E-05   0.8600283E-06   0.3067628E-03   0.6601728E-05  -0.3168061E-03   0.2664801E-02
   -0.1101247E-01   0.2663647E-03   0.1958146E-02  -0.4638594E-01  -0.1679490E-01   0.8509775E-03   0.8120948E-02
    0.2453571E-05   0.3160169E-05  -0.3837760E-05   0.3061417E-05  -0.2408161E-05   0.6865577E-06  -0.5999997E-05
    0.6884432E-07  -0.1136366E-05
   -0.2178083E-06   0.2342118E-05  -0.2854636E-06   0.6601728E-05   0.1239649E-04  -0.2453361E-03   0.1771642E-02
    0.1352245E-02  -0.3317391E-04  -0.2555516E-03   0.6191716E-02   0.2827934E-02   0.5207134E-03  -0.4245678E-03
   -0.7657512E-06  -0.9966254E-06  -0.3259406E-06  -0.9760108E-06   0.9960048E-06  -0.2267493E-05  -0.5780044E-06
    0.8867090E-09   0.1802837E-06
    0.2494428E-05  -0.1762828E-04   0.2191388E-05  -0.3168061E-03  -0.2453361E-03   0.1802248E-01  -0.8222754E-01
   -0.2777562E-01   0.6669691E-03   0.3438096E-02  -0.1048167E+00  -0.3650931E-01  -0.1747068E-02   0.1570753E-01
    0.2373831E-05   0.9164784E-05   0.1955910E-04   0.8339281E-05  -0.3171642E-04   0.3161242E-04   0.5126581E-04
   -0.5532359E-06  -0.3937042E-05
   -0.1282951E-04   0.5916942E-04  -0.9364706E-05   0.2664801E-02   0.1771642E-02  -0.8222754E-01   0.4693822E+00
    0.1704310E+00  -0.3840870E-02  -0.1874376E-01   0.6177674E+00   0.2201816E+00   0.4514734E-02  -0.1098969E+00
   -0.6929873E-05  -0.3774352E-04  -0.2495280E-04  -0.2653066E-04   0.1760635E-03  -0.4047583E-03  -0.2110406E-03
    0.3140856E-05   0.2634835E-04
```

Thinning chains

- Sometimes you need to share your chains with a collaborator but they occupy **too much space** (especially when convergence criterion is set to a strict value), but you want to "**compress**" your chains in a quasi-loseless way

- Or you want that the points in your chain have **very little correlation** between step *N* and *N+1*, e.g. to compute weighted means $\langle x\rangle=\int xP(x)dx=(1/N_{mcmc})\sum x_i$

- If that is the case, you can create it automatically by setting in **params.ini** file the option **`indep_sample`** to some large number (e.g. 100). This also creates **.data** files with all the information (C_ℓ, P(k)) for importance sampling
Or just do it with **GetDist** with a non-zero value in the **`thin_factor`** option



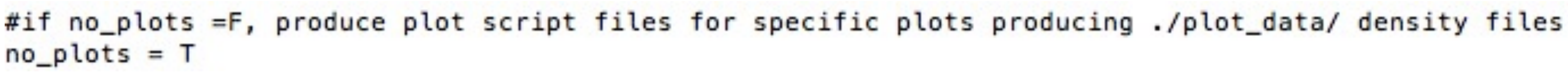
The file Distparams.ini

- **Distparams.ini** is the parameter file for **GetDist**. The syntax is:

```
./getdist distparams.ini chains/root
```

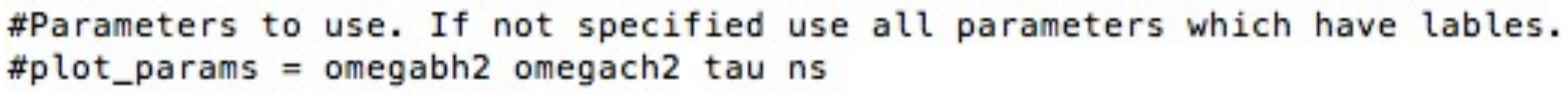
(note that you don’t need to specify root_1.txt, this will **automatically** detect how many chains you have) and the most useful settings are:

- To create (or not) python scripts for **plotting** just set `no_plots` = (T or F)

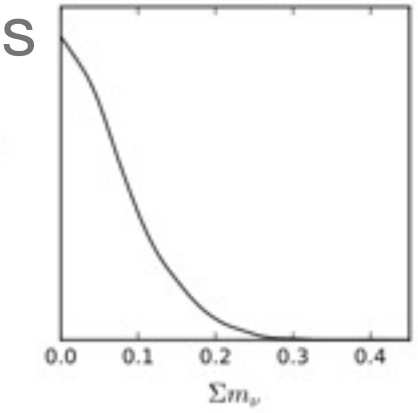


```
#if no_plots =F, produce plot script files for specific plots producing ./plot_data/ density files
no_plots = T
```

- **1D plots** (marginalized probability distribution functions): automatically these will be generated for all parameters, but you can **choose** which ones

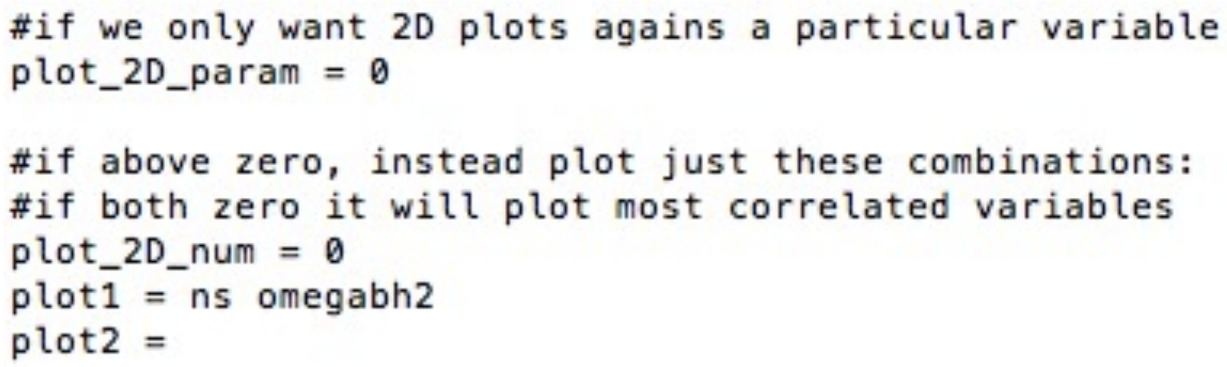


```
#Parameters to use. If not specified use all parameters which have lables.
#plot_params = omegabh2 omegach2 tau ns
```

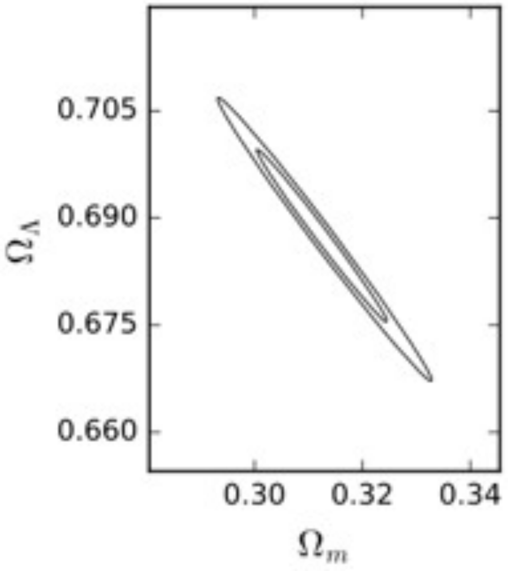


The file Distparams.ini

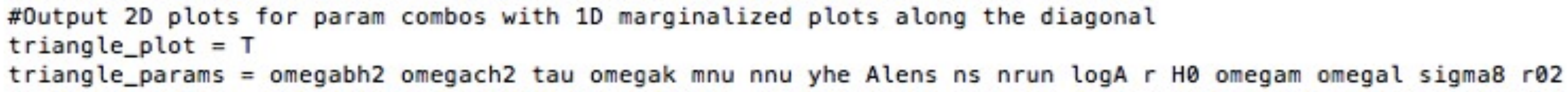
- for **2D plots** (contour plots):



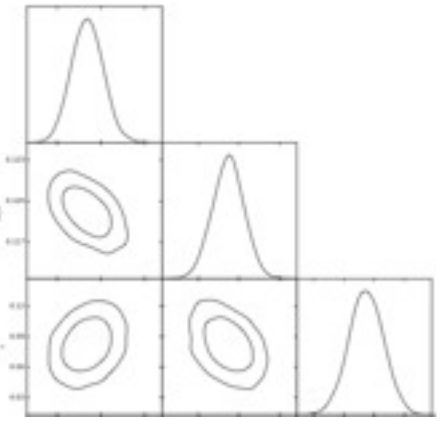
```
#if we only want 2D plots agains a particular variable
plot_2D_param = 0

#if above zero, instead plot just these combinations:
#if both zero it will plot most correlated variables
plot_2D_num = 0
plot1 = ns omegabh2
plot2 =
```



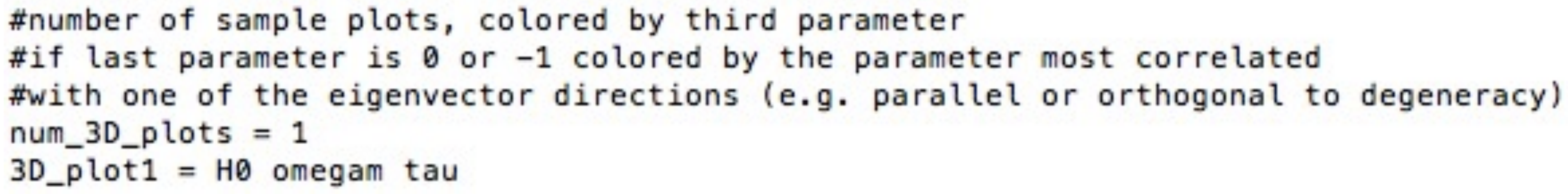
- for **triangle plots** (combination of 2D plots):



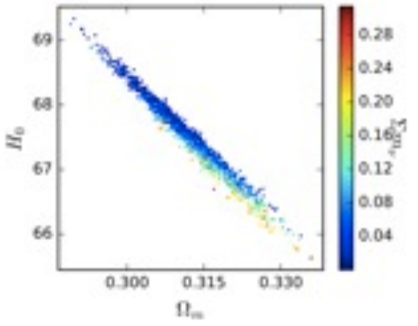
```
#Output 2D plots for param combos with 1D marginalized plots along the diagonal
triangle_plot = T
triangle_params = omegabh2 omegach2 tau omegak mnu nnu yhe Alens ns nrun logA r H0 omegam omegal sigma8 r02
```



- for **3D plots** (2D plots color-coded using a 3rd parameter):



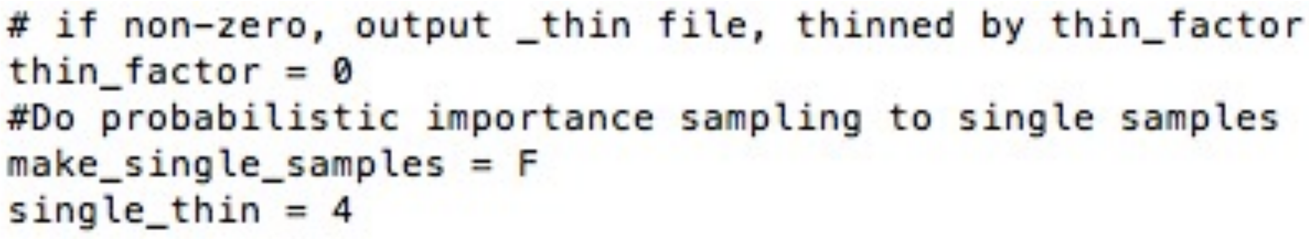
```
#number of sample plots, colored by third parameter
#if last parameter is 0 or -1 colored by the parameter most correlated
#with one of the eigenvector directions (e.g. parallel or orthogonal to degeneracy)
num_3D_plots = 1
3D_plot1 = H0 omegam tau
```



The file Distparams.ini

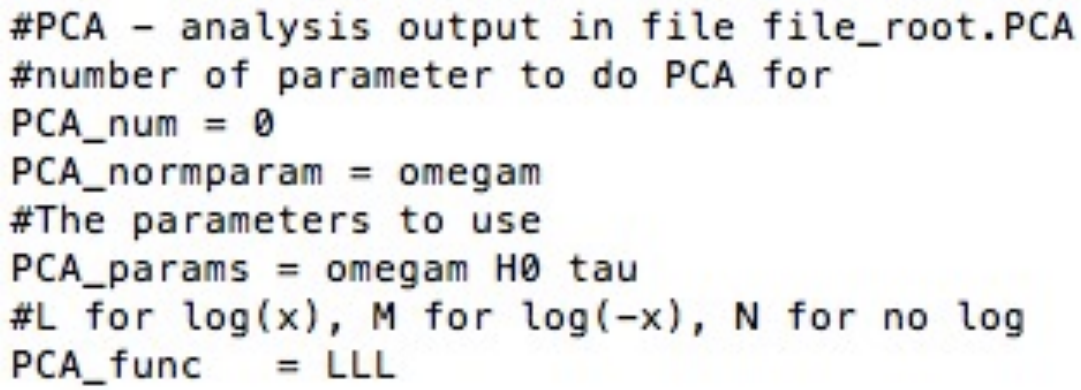
- Distparams.ini is more than just about plotting:

- **Thinning** of existing chains



```
# if non-zero, output _thin file, thinned by thin_factor
thin_factor = 0
#Do probabilistic importance sampling to single samples
make_single_samples = F
single_thin = 4
```

- **Principal Component Analysis** of chain parameters



```
#PCA - analysis output in file file_root.PCA
#number of parameter to do PCA for
PCA_num = 0
PCA_normparam = omegam
#The parameters to use
PCA_params = omegam H0 tau
#L for log(x), M for log(-x), N for no log
PCA_func   = LLL
```

The file Distparams.ini

- Note that this configuration file also supports `INCLUDE` and `DEFAULT`
  The most technical details of distparams.ini are actually set here:
  python/getdist/analysis_defaults.ini
  (or alternatively **batch2/getdist_common.ini** if you use disttest.ini)

- Set a different **confidence level** of your contours (default 68% 95% 99%), or change the **binning** and **smoothing** of your 1D or 2D plots.

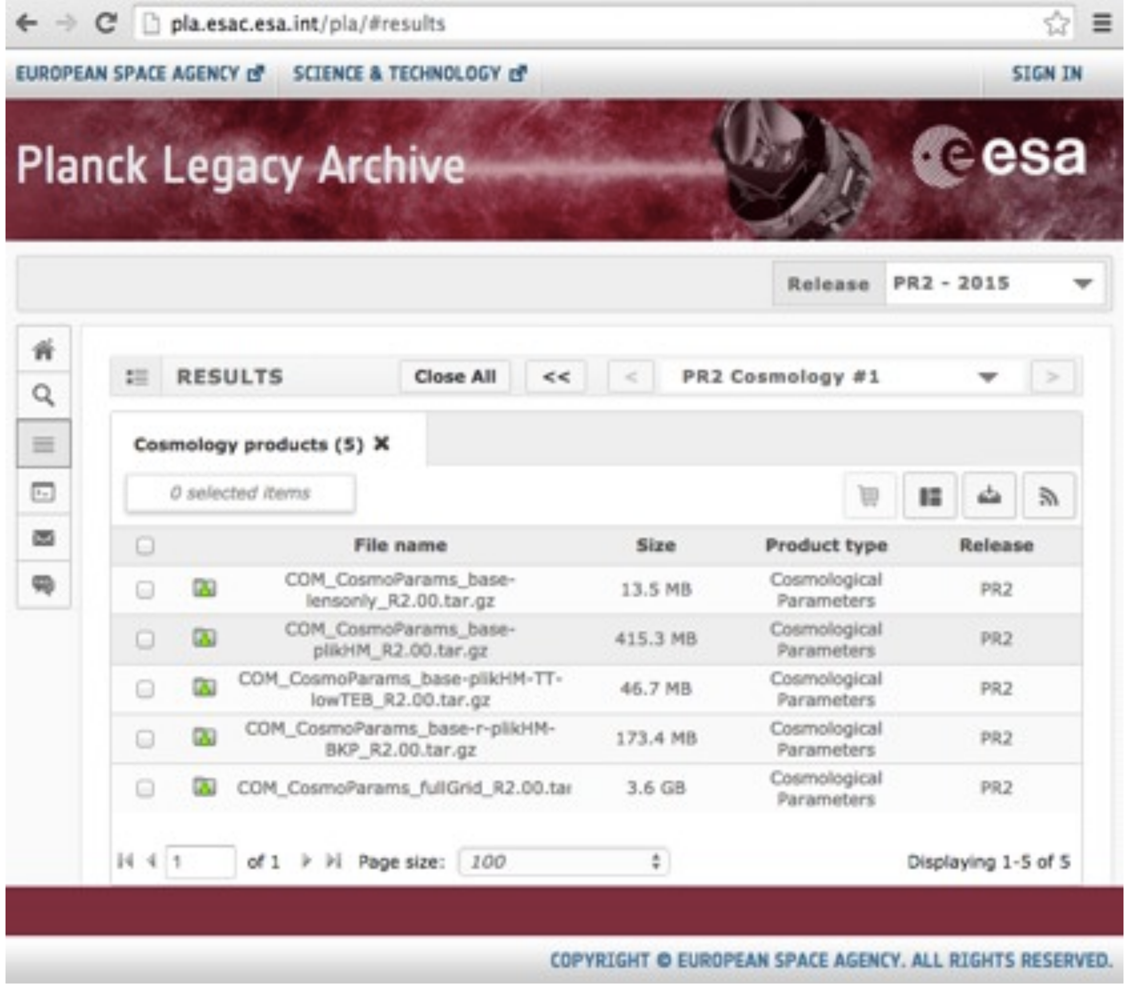
- Due to a **bug** in the current version, **you need to modify** the parameter file **python/getdist/analysis_defaults.ini** and set **`smooth_scale_2D`** to **2.0** (otherwise if you leave it set to -1 all contour plots will be empty)

Planck public chains

- The **Planck collaboration** has made their CosmoMC chains **publicly** available (used in Paper XIII, “Cosmological Parameters”)

- The chains can be **downloaded** from the ESA/Planck webpage: *http://pla.esac.esa.int/pla*

- Go to “**Cosmology**” and then click on “**Cosmological Parameters**”



□	File name	Size	Product type	Release
□	COM_CosmoParams_base-lensonly_R2.00.tar.gz	13.5 MB	Cosmological Parameters	PR2
□	COM_CosmoParams_base-plikHM_R2.00.tar.gz	415.3 MB	Cosmological Parameters	PR2
□	COM_CosmoParams_base-plikHM-TT-lowTEB_R2.00.tar.gz	46.7 MB	Cosmological Parameters	PR2
□	COM_CosmoParams_base-r-plikHM-BKP_R2.00.tar.gz	173.4 MB	Cosmological Parameters	PR2
□	COM_CosmoParams_fullGrid_R2.00.tar	3.6 GB	Cosmological Parameters	PR2

Planck public chains

- The **full grid** is `COM_CosmoParams_base-plikHM_R2.00.tar.gz` (3.6GB) Remember to read the wiki for details! e.g. "*Note that the baseline model includes one massive neutrino (0.06eV). Grid outputs include WMAP 9 results for consistent assumptions*." These contain a large number of cosmological **models** and **dataset** combinations (all combinations are Planck+others)

- If you are interested in constraints on inflation, you might want this file too (constraints on primordial B-mode polarization by **Bicep-Keck-Planck**) `COM_CosmoParams_base-r-plikHM-BKP_R2.00.tar.gz`

- The **Documentation** can be found on the ESA/Planck wiki: *http://wiki.cosmos.esa.int/planckpla2015/index.php/Cosmological_Parameters*

Using GetDist GUI

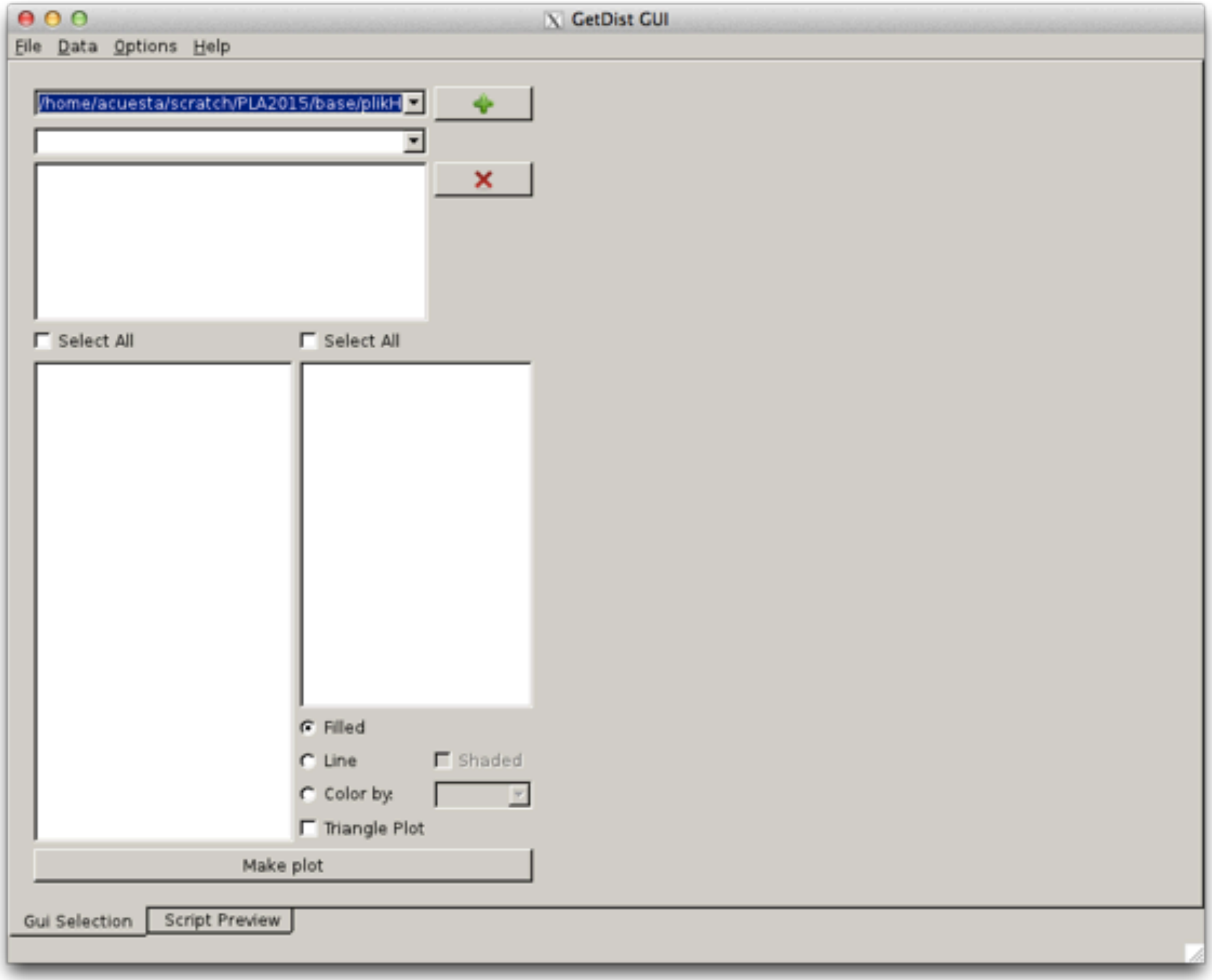
- **GetDist** has also a python version with a **graphical** user interface (GUI), which makes really easy to **generate plots** similar to those in Planck papers

- To **start the GUI** (remember you <u>need</u> to access the remote computer with graphical mode, i.e. `ssh -X user@ftaecluster.ugr.es`):
  ```
  python python/GetDistGUI.py
  ```

- Make sure you have the **python environment variables** set up so that you can use the code from any directory:
  ```
  export PYTHONPATH=/home/ajcuesta/cosmomc/python:$PYTHONPATH
  ```

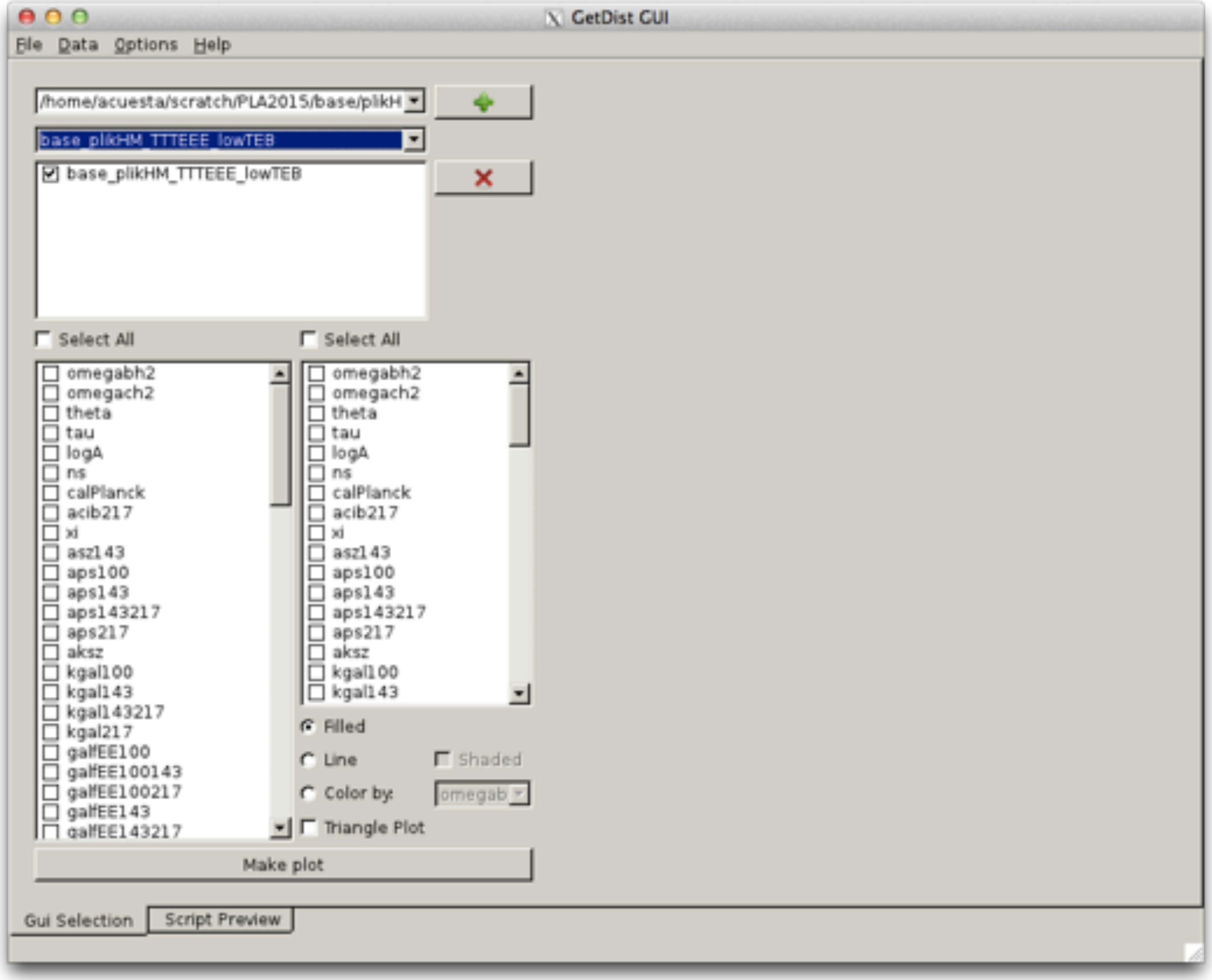
- The **Planck2015 public chains** are already installed in ftaecluster here:
  ```
  /home/ajcuesta/PLA2015/
  ```

GetDist GUI



First select your **model+data**

GetDist GUI



/home/acuesta/scratch/PLA2015/base/plikH

base_plikHM_TTTEEE_lowTEB

☑ base_plikHM_TTTEEE_lowTEB

□ Select All

□ omegabh2
□ omegach2
□ theta
□ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143
□ kgal143217
□ kgal217
□ galfEE100
□ galfEE100143
□ galfEE100217
□ galfEE143
□ galfEE143217

□ Select All

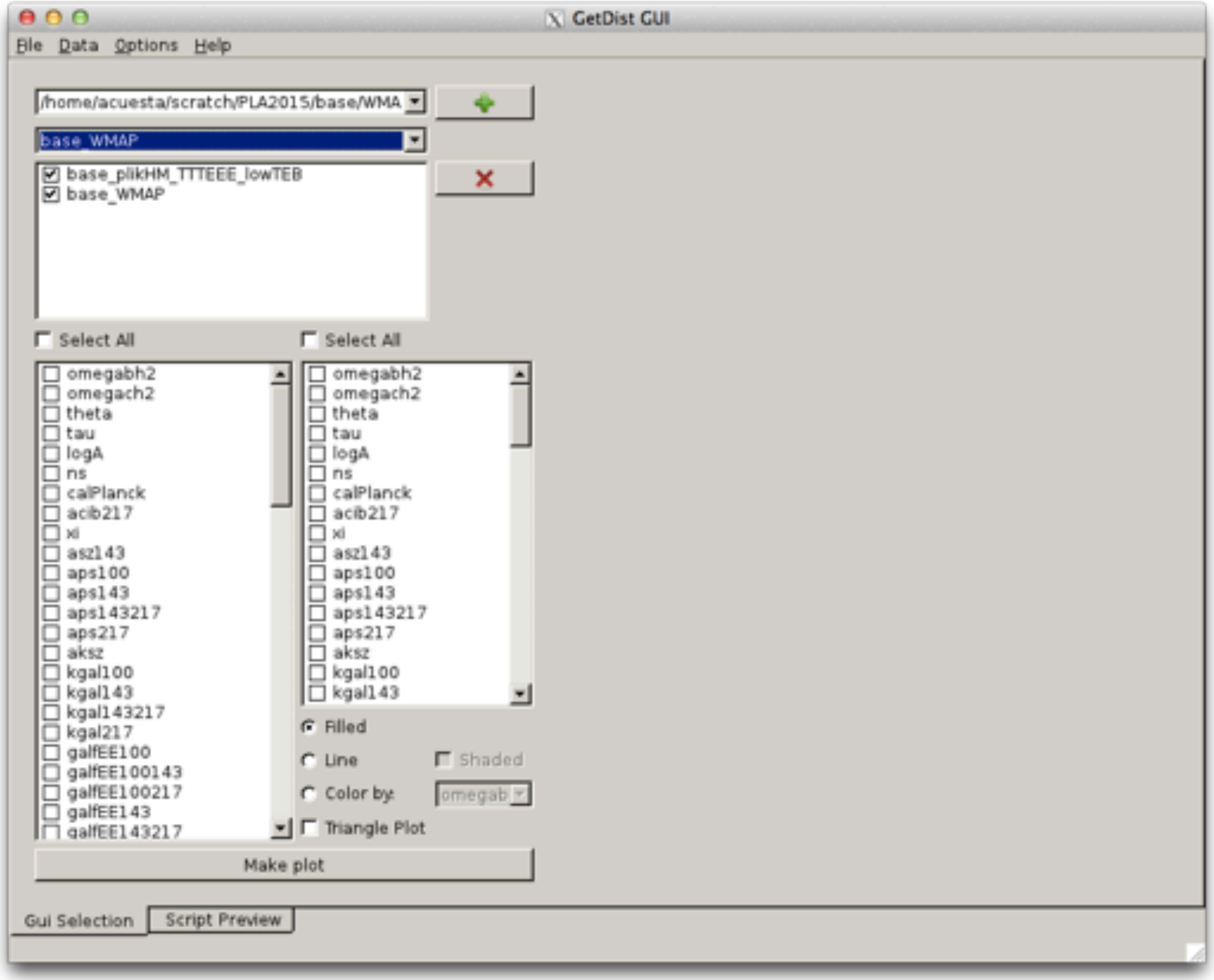
□ omegabh2
□ omegach2
□ theta
□ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143

● Filled
○ Line □ Shaded
○ Color by: omegab
□ Triangle Plot

Then select the **plain** version or a **post-processed** version (e.g. with BAO)

If you don't want any plots you can instead click on the **Data** menu and check the **margestats**, the **likestats**, and even create a **LaTeX table** of your parameters

GetDist GUI



/home/acuesta/scratch/PLA2015/base/WMA

base_WMAP

☑ base_plikHM_TTTEEE_lowTEB
☑ base_WMAP

□ Select All

□ omegabh2
□ omegach2
□ theta
□ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143
□ kgal143217
□ kgal217
□ galfEE100
□ galfEE100143
□ galfEE100217
□ galfEE143
□ galfEE143217

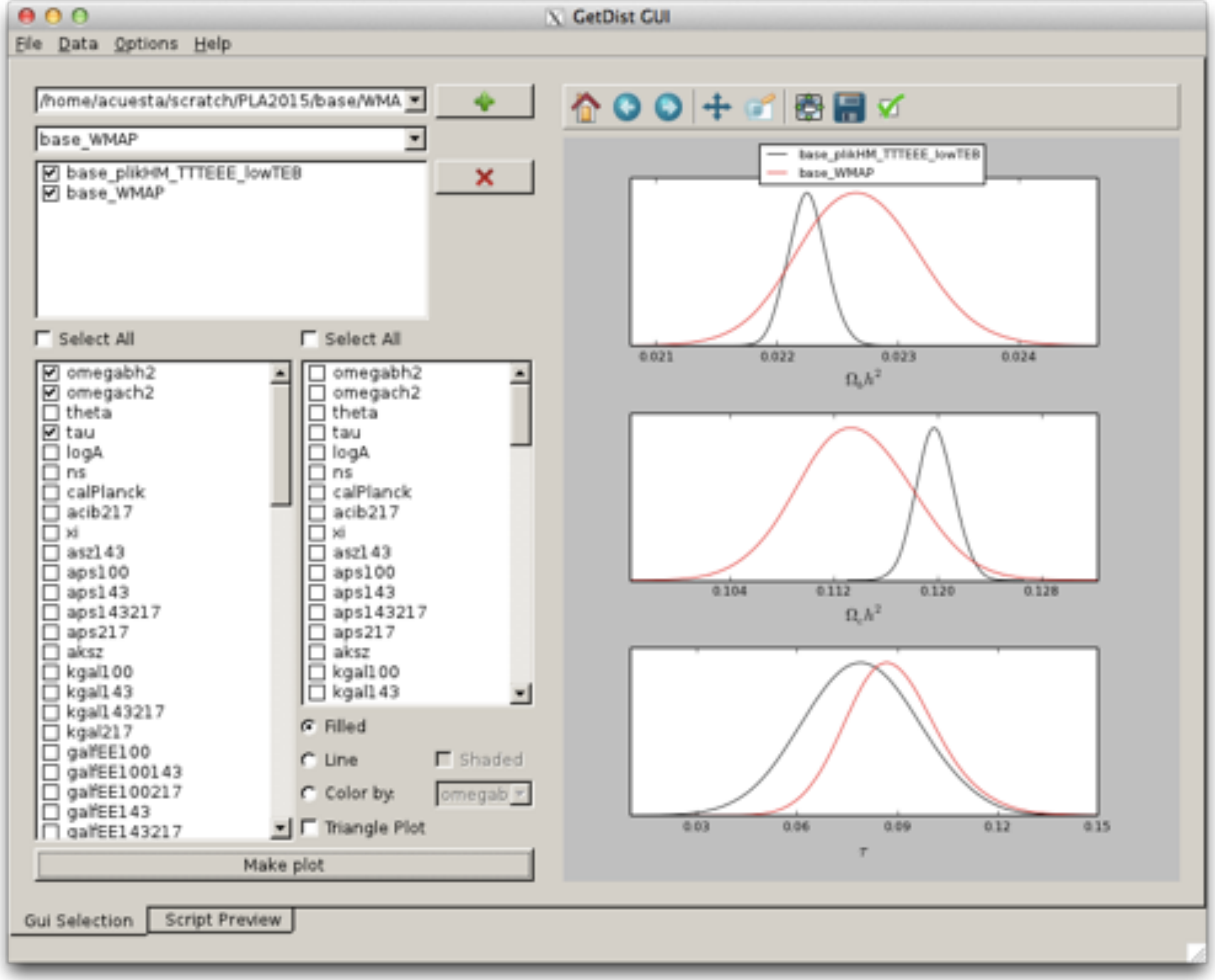
□ Select All

□ omegabh2
□ omegach2
□ theta
□ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143

● Filled
○ Line □ Shaded
○ Color by: omegab
□ Triangle Plot

If you want to **compare** different models and/or dataset combinations click the **green +** button and **add** them

GetDist GUI



/home/acuesta/scratch/PLA2015/base/WMA

base_WMAP

☑ base_plikHM_TTTEEE_lowTEB
☑ base_WMAP

□ Select All

☑ omegabh2
☑ omegach2
□ theta
☑ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
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□ kgal100
□ kgal143
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□ kgal217
□ galfEE100
□ galfEE100143
□ galfEE100217
□ galfEE143
□ galfEE143217

□ Select All

□ omegabh2
□ omegach2
□ theta
□ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143

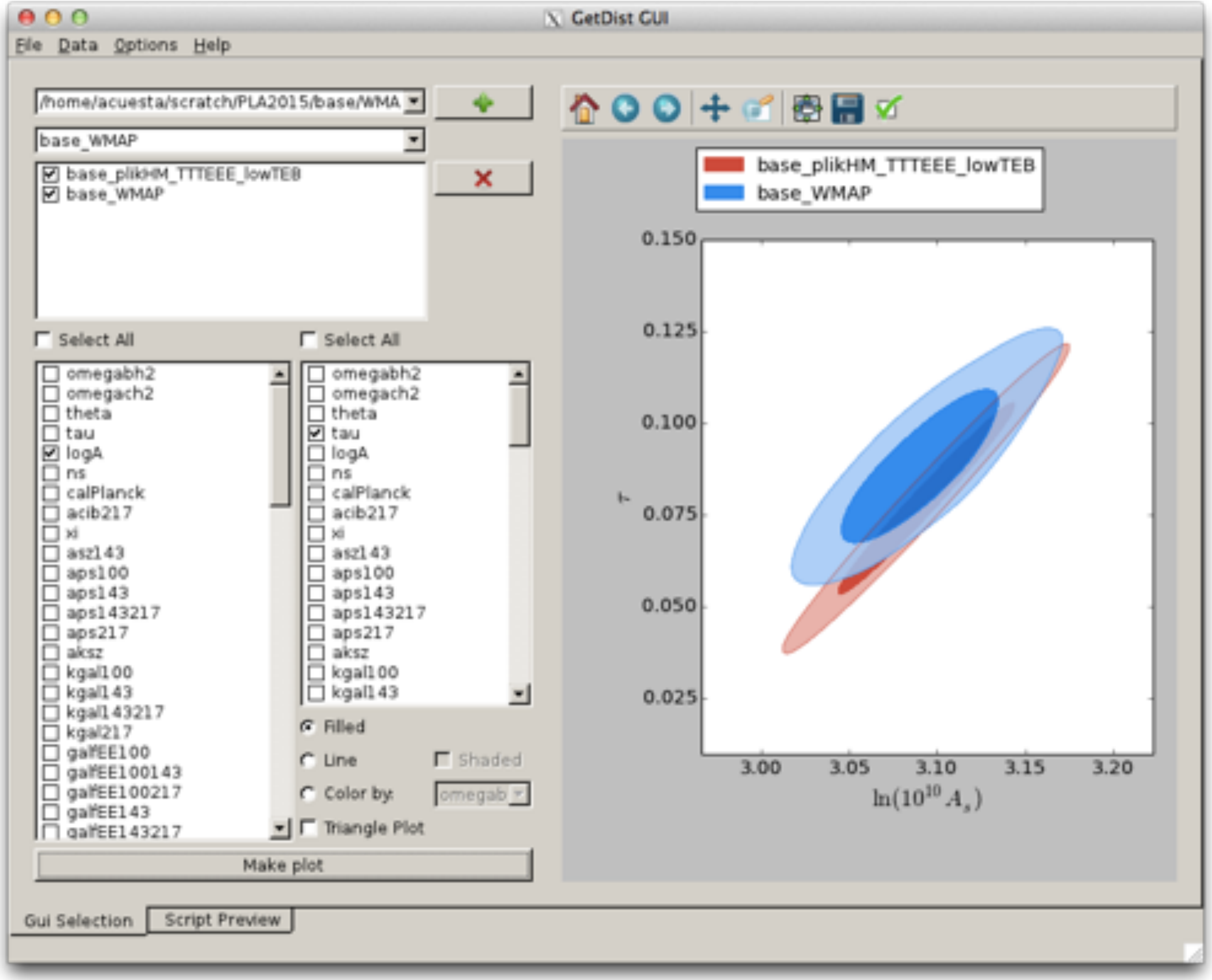
● Filled
○ Line □ Shaded
○ Color by: omegab
□ Triangle Plot

For **1D plots**, select the parameters you want from the **left column** and click **“Make plot”**

You can **configure** the plot (colors, shading, etc - matplotlib style) using the “**Options**” menu, then “**Plot settings**”

Save the figure by clicking on the **floppy disk** icon (many formats available: png, pdf...)

GetDist GUI



/home/acuesta/scratch/PLA2015/base/WMA

base_WMAP

☑ base_plikHM_TTTEEE_lowTEB
☑ base_WMAP

□ Select All
□ omegabh2
□ omegach2
□ theta
□ tau
☑ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143
□ kgal143217
□ kgal217
□ galfEE100
□ galfEE100143
□ galfEE100217
□ galfEE143
□ galfEE143217

□ Select All
□ omegabh2
□ omegach2
□ theta
☑ tau
□ logA
□ ns
□ calPlanck
□ acib217
□ xi
□ asz143
□ aps100
□ aps143
□ aps143217
□ aps217
□ aksz
□ kgal100
□ kgal143

● Filled
○ Line □ Shaded
○ Color by: omegab
□ Triangle Plot

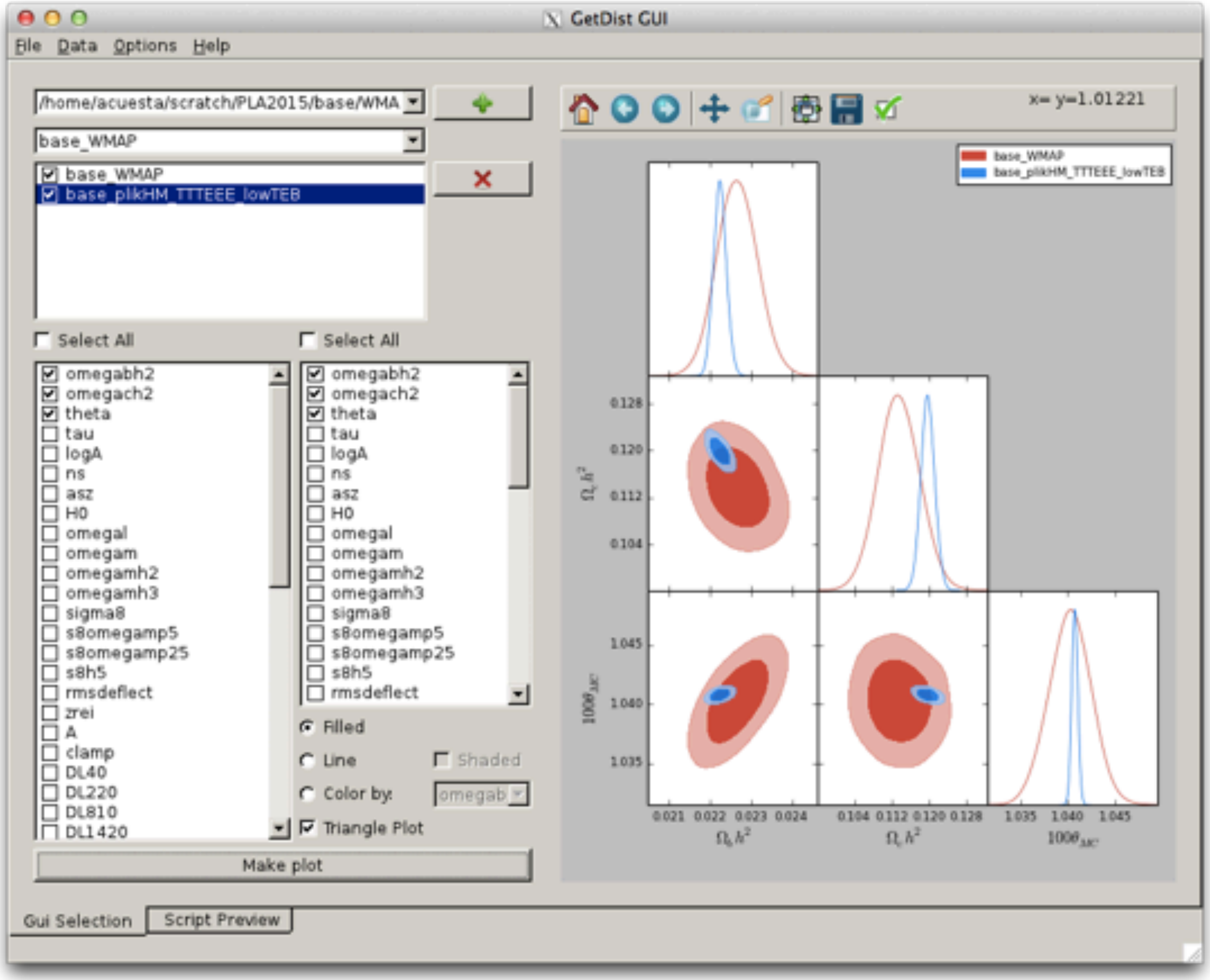
Make plot

For **2D plots**, select one parameter from the **left** column and another from the **right** column and click "**Make plot**"

You can plot only **empty contours** if you click on "**Line**", or **filled contours** if you click on "**Filled**"

If the plot looks very noisy change **smooth_scale_2D** to **2.0** or play with that value

GetDist GUI



/home/acuesta/scratch/PLA2015/base/WMA

base_WMAP

☑ base_WMAP
☑ base_plikHM_TTTEEE_lowTEB

☐ Select All
☑ omegabh2
☑ omegach2
☑ theta
☐ tau
☐ logA
☐ ns
☐ asz
☐ H0
☐ omegal
☐ omegam
☐ omegamh2
☐ omegamh3
☐ sigma8
☐ s8omegamp5
☐ s8omegamp25
☐ s8h5
☐ rmsdeflect
☐ zrei
☐ A
☐ clamp
☐ DL40
☐ DL220
☐ DL810
☐ DL1420

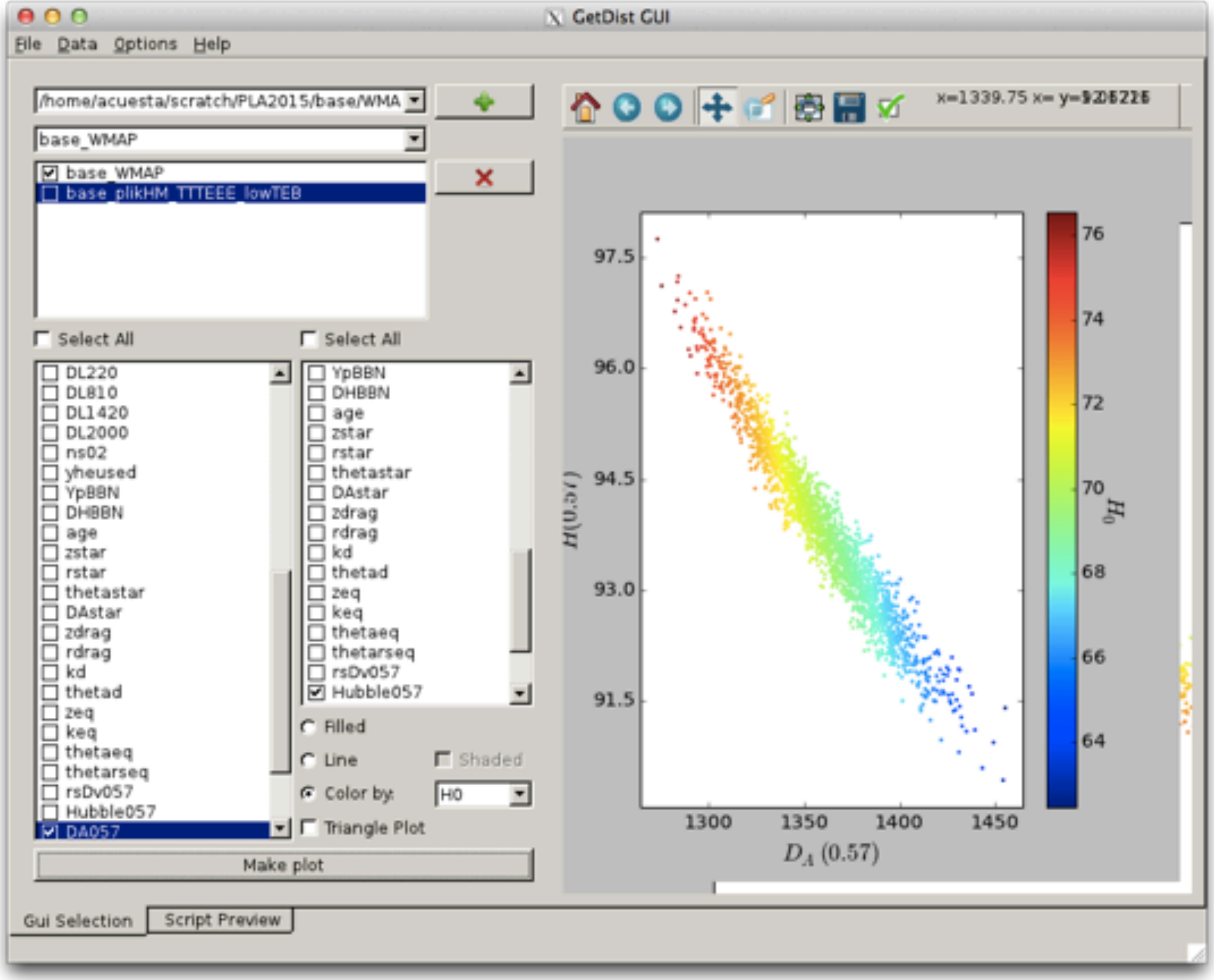
☐ Select All
☑ omegabh2
☑ omegach2
☑ theta
☐ tau
☐ logA
☐ ns
☐ asz
☐ H0
☐ omegal
☐ omegam
☐ omegamh2
☐ omegamh3
☐ sigma8
☐ s8omegamp5
☐ s8omegamp25
☐ s8h5
☐ rmsdeflect

● Filled
○ Line ☐ Shaded
○ Color by: omegab
☑ Triangle Plot

If you select **N** parameters from the **left** column and **M** parameters from the **right** column, you will get an **array of N*M plots**

In that case, if the parameters are **identical** in **both** columns, you can also make it a "**Triangle Plot**" by clicking on that option

GetDist GUI



/home/acuesta/scratch/PLA2015/base/WMA

base_WMAP

☑ base_WMAP
□ base_plikHM_TTTEEE_lowTEB

□ Select All
□ DL220
□ DL810
□ DL1420
□ DL2000
□ ns02
□ yheused
□ YpBBN
□ DHBBN
□ age
□ zstar
□ rstar
□ thetastar
□ DAstar
□ zdrag
□ rdrag
□ kd
□ thetad
□ zeq
□ keq
□ thetaeq
□ thetarseq
□ rsDv057
□ Hubble057
☑ DA057

□ Select All
□ YpBBN
□ DHBBN
□ age
□ zstar
□ rstar
□ thetastar
□ DAstar
□ zdrag
□ rdrag
□ kd
□ thetad
□ zeq
□ keq
□ thetaeq
□ thetarseq
□ rsDv057
☑ Hubble057

○ Filled
○ Line □ Shaded
● Color by: H0
□ Triangle Plot

Finally you can do also **3D plots**.
In that case it makes sense only
to select **1 single model+dataset**.

These plots are useful to get some **intuition** of **degeneracies** and parameter **ranges** in each model or dataset combination!

more examples at http://getdist.readthedocs.org/en/latest/plot_gallery.html

More questions?

- **Help resources**:
  http://cosmologist.info/cosmomc/readme.html (CosmoMC Readme)
  http://cosmologist.info/cosmomc/readme_planck.html (Planck Readme)
  http://cosmologist.info/cosmomc/readme_python.html (Python Readme)
  http://cosmologist.info/cosmomc/readme_gui.html (GetDist GUI Readme)
  http://cosmologist.info/cosmomc/readme_grids.html (Grids Readme)

- **Support** (CosmoCoffee wiki):
  http://cosmocoffee.info/

- **Mail** me!
  ajcuesta@icc.ub.edu

Thank you

ajcuesta@icc.ub.edu