

Add New Data Sets

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More than one way..

A. Run new chains

1. No extra parameter (HST.f90)
2. With extra parameters which do not pass through CAMB (supernovae_SLNS.f90)
3. Calclike.f90
4. Add new parameters for CAMB

B. Important sampling (modify old chains)

1. cosmomc
2. getdist

Use HST.f90

module HST

contains

subroutine HSTLikelihood_Add(LikeList, Ini)

... initialization for new data

end subroutine HSTLikelihood_Add

real(mcp) function HST_LnLike(like, CMB)

...

HST_LnLike = (theoryval - angdistinvzefh0)**2/
(2*angdistinvzefh0errsqr)

HST_LnLike = HST_LnLike + new_LnLike

end function HST_LnLike

end module HST

params.ini :

INCLUDE(batch1/HST.ini)

Use supernovae_SNLS.f90 (1/2)

```
MODULE SNLS
```

```
CONTAINS
```

```
subroutine SNLSLikelihood_Add(LikeList, Ini)
```

```
... initialization for new data
```

```
end subroutine SNLSLikelihood_Add
```

```
FUNCTION snls_LnLike(like, CMB, Theory, DataParams)
```

```
...
```

```
alpha=DataParams(1)
```

```
beta=DataParams(2)
```

```
snls_LnLike=SNLS_alpha_beta_like(alpha, beta,
```

```
lumdists)
```

```
snls_LnLike = snls_LnLike + new_LnLike
```

```
END FUNCTION snls_LnLike
```

Use supernovae_SNLS.f90 (2/2)

params.ini :

```
INCLUDE(batch1/SNLS.ini)
```

Batch1/SNLS.ini :

```
use_SN = T
```

```
use_SNLS = T
```

```
param[alpha_SNLS]=1.442 0.6 2.6 0.11 0.11
```

```
param[beta_SNLS]=3.262 0.9 4.6 0.11 0.11
```

data/SNLS.paramnames :

```
alpha_SNLS    \alpha_{SNLS}
```

```
beta_SNLS     \beta_{SNLS}
```

Calclike.f90

module CalcLike

contains

...

```
function GenericLikelihoodFunction(Params)
```

```
  if (test_likelihoood) then
```

```
    GenericLikelihoodFunction= chi_square/2
```

```
  else
```

!Used when you want to plug in your own CMB-independent likelihood function:

!set generic_mcmc=.true. in settings.f90, then write function here returning -Ln(Likelihood)

!Parameter array is Params%P

```
GenericLikelihoodFunction = LogZero
```

```
end if
```

```
end function GenericLikelihoodFunction
```

params.ini :

test_likelihoood = T

Important sampling (cosmomc)

1. Pre-processing

Params.ini:

```
file_root = chains/test
```

```
#set indep_sample a positive integer to produce .data file
```

```
Indep_sample = 5
```

2. Post-processing the .data file

Params.ini :

```
INCLUDE(batch1/HST.ini) (want to add HST to chains)
```

```
INCLUDE(batch1/importance_sampling.ini)
```

```
file_root = chains/test
```

```
action = 1
```

```
redo_outroot = chains/test_add_HST
```

Important sampling (getdist)

`distparams.ini` :

```
file_root=chains/original_chains  
out_root=name_new_output  
map_params = T
```

`Getdist.f90`:

```
subroutine MapParameters(invars)  
  real(gp) invars(1:ncols)  
  real :: chi2  
  chi2 = chi2_from_new_data()  
  invars(1) = invars(1)*exp(-chi2/2)  
  invars(2) = invars(2) + chi2/2  
end subroutine MapParameters
```


Add new parameters

[cmbtype.f90](#):

```
Type, extends(TTheoryParams) :: CMBParams
  real(mcp) InitPower(max_inipower_params)
  !These are fast paramters for the initial power spectrum
  !Now remaining (non-independent) parameters
  real(mcp) omb, omc, omv, omnu, omk, omdm
  real(mcp) ombh2, omch2, omnuh2, omdmh2
  real(mcp) zre, zre_delta, nufrac
  real(mcp) h, H0, tau
  real(mcp) w, wa, new_param
  real(mcp) YHe, nnu, iso_cdm_correlated, ALens, fdm !fdm is dark
matter annihilation, eg,. 0910.3663
  real(mcp) :: omnuh2_sterile = 0._mcp !note omnhu2 is the sum of
this + standard neutrinos
  real(mcp) reserved(5)
end Type CMBParams
```

Add new parameters

```
params_CMB.paramnames :
```

```
...
```

```
fdm      \epsilon_0 f_d  #CosmoRec dark matter annihilation  
parameter, 0910.3663
```

```
new_param new_p # new parameter
```

```
ns      n_s      #beware that pivot scale can change in .ini file
```

```
...
```

```
params_CMB.f90:
```

```
call SetTheoryParameterNumbers(16,6) !! it was 15
```

```
call this%Init(Ini,Names, 'params_CMB.paramnames')
```

```
...
```

```
subroutine SetForH
```

```
...
```

```
CMB%fdm = Params(15)
```

```
CMB%new_param = Params(16)
```

```
end subroutine SetForH
```

```
param.ini :
```

```
...
```

```
param[new_param] = 7 7 7 0 0
```

```
...
```

Test adding param with HST.f90

```
module HST
  real(mcp) function HST_LnLike(like, CMB)
...
  HST_LnLike = (theoryval - angdistinvzefh0)**2/
(2*angdistinvzefh0errsqr)
  write(*,*) "new parameter =", CMB%new_params
  stop
end function HST_LnLike
end module HST
```

```
params.ini :
INCLUDE(batch1/HST.ini)
```

```
Stdout:
new parameter = 7
```

Pass to CAMB:
Modify CMB_Cls_Simple.f90