# AWESOME documentation
# metal enrichment setup 2011ff

Harald Höller, Markus Haider *

April 18, 2012

**FOR INTERNAL AWESOME USE**

## 1 Initial Conditions

### 1.1 Using Cosmics 1.04 (Standard)

The (constrained) initial conditions generator `Cosmics 1.04` can be downloaded from `http://web.mit.edu/edbert/cosmics-1.04.tar.gz`. The acually used version is to be gotten as git repository `git@github.com:harre/cosmics-initial-conditions.git`.

**Step 1: Make** For making, one has to specify the system and adapt the corresponding Makefile accordingly. In the folder `Make_files` one has to adapt `Make.LINUX` to

```
F77 = ifort
F77FLAGS = -O2 -parallel -par-report1 -openmp
FFT_OBJ = fft3r.o
CC = icc
CFLAGS = -O2 -parallel -par-report1 -openmp
```

and load the intel compiler `module load intel/64/12.1`. The intel compiler is used since for $512^3$ particle initial conditions there is a problem with memory allocation with `gcc` (can be dealt with flags however). When one uses the version from the git repo, changing the Makefile should not be necessary anyhow.

**Step 2: Linear Extrapolation:** `linger` In the folder `linger_syn` the program with the same name is to be executed. This program generates a file called `linger.dat` which is then used by the actual IC generator `grafic`.

When one executes the program from github, the message

*Department of Astro- and Particle Physics, University of Innsbruck, harald.hoeller@uibk.ac.at

```
>>>>>    MAKE SURE YOU START THE PROGRAM WITH
>>>>>    $./linger_syn | tee lingersynIO.out
```

motivates the recording of IO in order to ensure reproducability of simulations. Ideally one would also indicate some physical parameters in the IO file, such as `lingersynIO_h70.out`. This file is consequently copied from further simulation setup scripts (see later items and sections).

**Note:** There are files already in the repo which can be used, namely `linger_h100n216.dat` and `linger_h70n216.dat` for Hubble constants 70.3 and 100. They were generated using matter transfer functions (choice 0)

```
Enter 1 for full Boltzmann equation for CMB (lmax<=10000, linear k)
   or 0 for matter transfer functions only (lmax=100, log k)
```

and the parameters

```
Enter kmin (1/Mpc), kmax (1/Mpc), nk, zend
```

are set to `1E-5`, `50`, `216`, `0`. These numbers are chosen partially arbitrary but have proven robust. The upper limit for the wave number certainly will be too small for larger volumes than 100Mpc (rem.: Nyquist frequency). The number of $k$ to be calculated are chosen in a way that the calculation does not last too long.

The last input is then which kind of IC one wants to generate

```
Initial conditions cases:
    1 for isentropic (adiabatic) fluctuations,
    2 for cdm entropy/isocurvature fluctuations, or
    3 for baryon entropy/isocurvature fluctuations, or
    4 for seed/isocurvature fluctuations
Enter 1, 2, 3, or 4 now
```

where we chose `2`.

**Note:** If one changes the cosmological parameters for `linger_syn` one usually hast to delete the files `linger.dat` and lingerg.dat first.

### 1.2 Using NGenIC

# 2 N-body Simulation

# 3 Halo Finder + Merger Trees

# 4 SAM

## 4.1 Galacticus

### 4.1.1 Compilation

## 4.2 Galacticus v0.9.1

Checkout latest revision:

```
bzr checkout http://bazaar.launchpad.net/~abenson/galacticus/v0.9.1/
```

# 5 Hydro