Simulations Documentation

the AWESOME Project

PART: Notes

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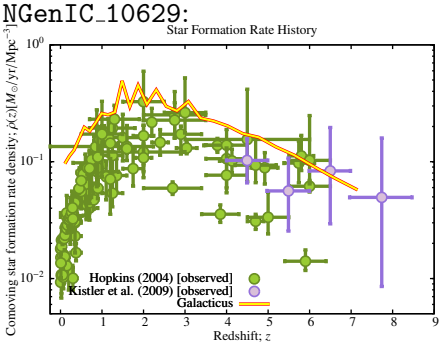
05.06.2012 Test test

21.05.2012 Star formation rate mystery still unsolved - checked the parameter files for problems (including redshift) - but there is no obvious error / difference. One suspicion: it could be that new `linger.dat` files which produce initial conditions with rather late redshifts ($\cong 18$) influence the SFR negatively; reason to believe that is that the NGen-IC runs all have rather high SFR and their initial redshifts are quite high; e.g. `NGenIC_10629`:



In Galacticus revision 821 the latest bug 'I think this was due to a missing limitation on the rate at which metals can be driven out of hot halos' is fixed and the 100h simulations runs again

11.05.2012 Galacticus bug report

```
Fatal error in ODEIV2_Solve():
ODE integration failed with status -1
...
```

Link: `https://bugs.launchpad.net/galacticus/+bug/998007`
- occurs in `stages_12_h_44` with h100.

10.05.2012 Complete reinstallation of system since I had messed up my perl installation severely. Now the plotting scripts run again in revision 809.

08.05.2012 Compiler flags for checking linking

```
-Wl,--verbose
```

gives attempts/success/fail info about opening files.
New Galcticus revisions had problems compilingbut already fixed by Benson in rev 805. For consistency also update on pc122 so perl5 is still under construction

02.05.2012 Had to reinstall `perl5` (download + recompile) cause Galacticus plot routines did not work any more: Moreover I had to:

```
$PERL5LIB=/usr/lib/perl5:/usr/local/lib/perl/5.12.4:
/usr/share/perl5:/usr/local/share/perl/5.12.4
$export PERL5LIB
```

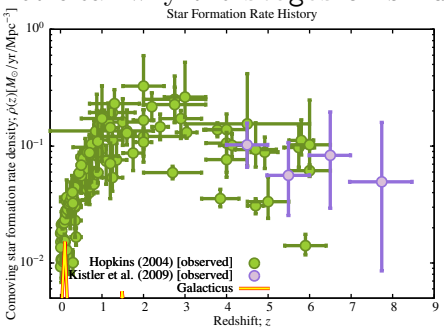
to get Galacticus itself compile again.

25.04.2012 Is low star formation rate in recent galacticus outputs related to missing IC redshift? (99 assumed)

19.04.2012 `stages_52` simulation still shows extremely low star formation rate in history plot (Galacticus rev. 771) although also in Markus' converter-ed input file the box size of 44.8 Mpc is correct

18.04.2012 Comparison runs look principally nice but not equal - may be caused by different `linger.dat`
Comparison runs have to be redone since `grafic_h70` and `grafic_h100` were not recompiled after changing `constr.f` and `grafic.inc`
2DO: check comparison runs, check new galacticus runs and restart rockstar job on MACH

17.04.2012 Started some comparison runs beweteen H=70.3 and H=100 with same `linger_syn` parameters, same constraints and seeds
found nice program with GUI to look at hdf5 files and also to edit them, called `vitables` - big files take very long to load but once loaded it runs smoothly
not clear why the `stages_52` simulation plots show such little star formation rate

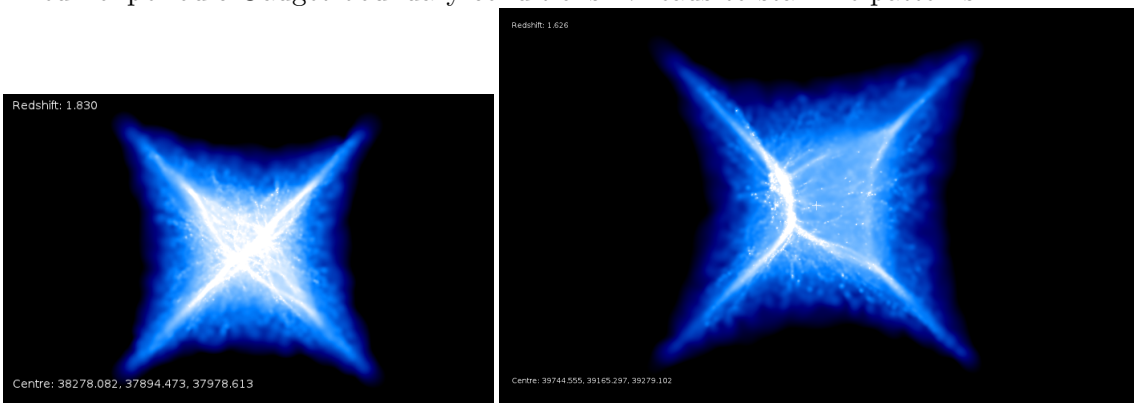


16.04.2012 re-doing the rockstar jobs that did not work on intel queue now on the AMD machines (`stages_54dr5d5`)
512er run is being rockstarred on MACH (128 cores) faster than on our AMDs → quit job on astro-cluster

12.04.2012 Explicitly defining the ports when havin several server processes on the frontend did not seem to work for the intel queue, all three rockstar jobs stopped working after some time

04.04.2012 E-Mail correspondence with Sabine Kreidl to Rockstar on MACH
Recompiled Gadget with `PLACEHIGHRESREGION=1` on and `PMGRID` resolution of 256 for 256er run

03.04.2012 Tried nonperiodic Gadget boundary conditions → leads to star-like patterns



02.04.2012 Correspondence with Peter Behroozi concerning OpenMP parallelization possibilities in Rockstar → tried suggested loops and auto-parallelization. Jobs on intel machines freeze ...

27.03.2012 `512er_major_merger` Rockstar run is very slow even on 24 cores
`consistentree` has parameter `BOX_DIVISIONS` which divides the box in this number cubed parts and makes `tree_X_Y_Z.dat` output and is very very fast this way → have to rewrite reading routine in Markus' converter

26.03.2012 Intel compiler auto-parallelization test runs on LEO3 for converter v0.5
512^3 runs produced Segfaults with Markus' converter v0.4 → fixed

21.03.2012 2DO: change virial radius reading in galaxcicusStart.xml to false and let intern value powmes scripts, plotting scripts (spin, vrms)

20.03.2012 powemes installed

19.03.2012 NGenIC starting redshift test, if corrected initial z leads to lower star formation rate did show, that suspicion was not proven. Other explanation has to be found. Vrms and Spin videos are in the works.

14.03.2012 2DO: new stages simulations in Documentation (at least 46, 50, 51)
Script that makes *.pngs out of halo masses at all time steps is running over all simulations in r256 for comparison beweteen Bertschinger and NGenIC ICs
Rerun some Bertschinger ICs with updated linger.dat and spectral index $\neq 1$ to see how this influences star formation rate (linger runs and runs)

13.03.2012 Unclear why all NGenIC simulations show much higher star formation and plot scripts yield different output files though the same .xml file as always is used

11.03.2012 `NGenIC_15039` produces "unreadable" output, is bein rerockstarred from scratch

```
 +++
 Plot_Star_Formation_History.pl:
 +++
Useless use of private variable in void context at ../../perl//XMP/MetaData.pm line
HDF5-DIAG: Error detected in HDF5 (1.8.4-patch1) thread 0:
  #000: ../../../src/H5D.c line 507 in H5Dget_type(): not a dataset
    major: Invalid arguments to routine
    minor: Inappropriate type
Error Calling PDL::IO::HDF5::Dataset::get: Can't get HDF5 Dataset type.
 at ../../perl//Galacticus/HDF5.pm line 88
HDF5-DIAG: Error detected in HDF5 (1.8.4-patch1) thread 0:
  #000: ../../../src/H5D.c line 507 in H5Dget_type(): not a dataset
    major: Invalid arguments to routine
    minor: Inappropriate type
Error Calling PDL::IO::HDF5::Dataset::get: Can't get HDF5 Dataset type.
 at ../../perl//Galacticus/HDF5.pm line 88
Illegal division by zero at Plot_Star_Formation_History.pl line 58.
```

09.03.2012 strange error in 2 galacticus jobs `stages_12` and `stages_13` → Markus' converter outdated with new consistenttrees?
idea: `drd5_r256_2` shows a major merger in progress → make a set of similar simulations with slightly different parameters
idea: make voids as constraints so that netto gravity is more centered towards overdensities

08.03.2012 add `nohup` to `./rockstar server_ib.cfg` in `qsubrockstar.sh` and rename `rocky_startscript` to something recognizable

```
83973 0.60500 wcon1Gy.st jan     r     11:01:23 astro14.astro-beowulf.      64
83974 0.50500 rocky_star harre   r     13:14:22 astro-x4600-04.astro-beo     1
83976 0.55421 stages_28_ harre   r     13:52:36 astro22.astro-beowulf.      32
83977 0.55421 stages_29_ harre   r     13:56:35 astro25.astro-beowulf.      32
83980 0.55421 stages_30_ harre   r     14:07:12 astro28.astro-beowulf.      32
83984 0.55421 stages_31_ harre   r     14:14:23 astro31.astro-beowulf.      32
83988 0.51611 rocky_star harre   r     14:49:20 astro-x4600-04.astro-beo     8
83989 0.51611 rocky_star harre   r     14:50:54 astro-x4600-03.astro-beo     8
83993 0.51611 rocky_star harre   r     15:12:52 astro-x4600-04.astro-beo     8
83995 0.51611 rocky_star harre   r     15:16:43 astro-x4600-03.astro-beo     8
83992 0.58278 c803_test_ markus  qw    14:54:54                             50
83985 0.55421 stages_32_ harre   qw    14:14:31                             32
83986 0.55421 stages_33_ harre   qw    14:14:41                             32
```

re-galacticussing `NgenIC_15039` again since plotting scripts complain that there is no output for a=0
2DO: test speedup of galacticus with 1,2,4,8 threads
Rockstar works if infiniband is forced with `PARALLEL_IO_SERVER_INTERFACE = "ib0"`, the client IP address is indeed NOT necessary, client process is started with `auto-rockstar.cfg`
Gadget recompiled with newest openmpi version → should use infiniband now

06.03.2012 submitted 4 jobs with same seed but different constraints parameters
Memory agglomeration fix also on cluster + email to develooper

Wrote E-Mails to Rien de Weijgaert and Peter Behroozi
re-rockstarring `stages_21` on my machine pc122 → dumped due to memory

02.03.2012 re-galacticussing `NgenIC_15039` cause 200 output redshifts lead to > 30GB file + added luminosity output redshifts from Markus' .xml file
Peter answered and sent `consistent_trees v0.99`, but problem persists - suspicion: Snapshotnames.dat must be changed (delete corresponding lines) for runs that have < 200 outputs!
rockstar won't start any more ... network problem suspected

01.03.2012 wrote E-Mail to Peter concerning `find_parents_and_cleanup:` `find_parents_and_cleanup.c:130` problem
consistentree: `NgenIC_15039`, galacticussing
restarted: `stages_21` rockstarred auf AMD-04
first 512^3 simulation `NgenIC_7755` finished successfully - lasted 1 day on 64 cores
wrote E-mail to de Weijgaert concerning constrained ICs

29.02.2012 `stages_12` re-rockstarred auf AMD-03
`stages_21` rockstarred auf AMD-04 - crashed
100Mpc 512^3 jobs: 11410, 15725, 27036, 7755
10 100Mpc ICs generated
Note: try bigger volumes with NGen-IC
added output redshifts derived from `gadget_timer.txt` as parameter `outputRedshifts` in .xml file
Random seeds that do not create cluster like structures at 32Mpc box: 589, 12170, 13610, 16604, 16749, 17362, 17433, 29666, 32223, 17595, 22045, 3724, 3183, 4152, 7581, 8502, 10153, 10657, 22946, 14841, 25060, 29468, 32634
Random seeds that look a little interesting: 15039 → rockstarred on AMD-03 (finished), 26214 → rockstarred on AMD-04

28.02.2012 Successfully started some N-GenIC jobs for comparison of IC generation

17.02.2012 Discussion with Asmus about Stages Cluster → try more systematic approach to ICs

15.02.2012 Galacticus revisision 708 - `drd5_r256_2` not fixed → E-Mail to Andrew
check tomorrow: Galacticus jobs `fuenfincr256_1` and `drdx_3_r256`
Note: think about / find a good method for common metadata

14.02.2012 Wrote E-Mail to Bertschinger.

13.02.2012 Deleted some jobs I started yesterday because they had artificial crosses or were practically unconstrained
Third simulation `fuenfincr256_1` ran through - Galacticus restart worked well!
Note: IC with same seed but higher resolution do not yield the same simulation! → started two more test runs from r128 sims to doublecheck
→ Note from April 2012: different `linger.dat` suspected

12.02.2012 Updated Galacticus to revision 707 as suggested by Andrew and added parameter `hotHaloOutflowAngularMomentumAlwaysGrows` to xml file.

Two of four simulations ran through (copied hdf5 to transfer), two crashed → try to continue at saved states!

10.02.2012 wrote E-Mail to Andrew about performance problems and wavelenght computation error in `fuenfincr256_1`
started some runs with higher central delta and broader smoothing lenghts, i.e. 32/dx and 100/dx; all 128 resolution except second last one (same seed!):

```
83492 0.60500 d31c_1_sta harre   r     02/10/2012 15:19:56 astro18  16
83493 0.60500 d31c_2_sta harre   r     02/10/2012 15:20:37 astro29  16
83494 0.60500 d31c_3_sta harre   r     02/10/2012 15:21:17 astro25  16
83495 0.60500 d51c_sl100 harre   r     02/10/2012 15:23:21 astro31  16
83496 0.54786 d3+3c_sl50 harre   r     02/10/2012 15:37:13 astro12  16
83497 0.60500 d3+3c_sl50 harre   r     02/10/2012 15:39:16 astro30  32
83498 0.60500 d15+3c_sl5 harre   r     02/10/2012 15:44:23 astro30  16
```

09.02.2012 `drd5_r256` last written to hdf5 file feb 09, 05:07
`fuenfincr256_2` last written to hdf5 file feb 06, 03:28
`drd5_r256_2` last written to hdf5 file feb 07, 00:50

02.02.2012 `drdx_h100_128_1` run has again severe consistency metric problem
→ not clear why
upper python script does not work, was commented out again
plan: **move to python scripts in general in order to have easier arithmetic calculations**
plan: create new folder structure and remove old simulations → done

31.01.2012 note: h=70.3 in galacticus xml input file is expected, consistent tree obviously implies it
→ fixed: changed in markus parameter file for the converter and in xml file
→ question: why not read out?
→ python updateGalacticusStart.py from Markus

30.01.2012 new consistenttree with vmax=20