Building BLSS

ARES

HADES

BORG

Structure

- ARES3 is actually the instrastructure package. Maybe will be renamed later
- On top of it there is an "extra/" subdirectory that contains extra modules (like foreground handling, HADES, BORG)
- the build system is using CMake (http://cmake.org)
- You will need CMake ≥ 3.6
- New script available since October 25th 2016:
  build.sh

Building

- Go your ares build directory and run "./build.sh -h"
- You will get the help:

```
lavaux@reims:~/PROJECTS/ares$ ./build.sh -h
Ensure the current directory is ARES
This is the build helper. The arguments are the following:

--cmake CMAKE_BINARY    instead of searching for cmake in the path,
  use the indicated binary

--without-openmp        build without openmp support (default with)
--with-mpi              build with MPI support (default without)
--c_compiler COMPILER   specify the C compiler to use (default to cc)
--cxx_compiler COMPILER specify the CXX compiler to use (default to c++)
--build_dir DIRECTORY   specify the build directory (default to "build/" )
--debug                 build for full debugging
--no-debug-log          remove all the debug output to increase speed on parallel
                        filesystem.
--perf                  add timing instructions and report in the log files

--extra_flags FLAGS     extra flags to pass to cmake

After the configuration, you can further tweak the configuration using ccmake (if
available on your system).
```

- Type "./build.sh" for default options, no MPI
- When done, go to the build directory and type "make"

Building... takes quite some time

Built binaries

- Once building is finished you can inspect the "src/" directory in the build directory:

```
lavaux@reims:/home/reims2NS/lavaux/software/ares_mp$ ls src/
CMakeFiles/   ares3*          cmake_install.cmake  hades_option.hpp
Makefile      borg_forward*   hades3*
```

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- You have three self contained binaries:
  - ares3: implements the ares algorithm, mostly as indicated in Jasche & Lavaux, MNRAS, 2015 ("Matrix-free large-scale Bayesian inference in cosmology"), with the addition of the original algorithms in Jasche et al. (2010), Jasche & Wandelt (2013).

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  - hades3: implements HADES and BORG algorithms. No powerspectrum inference or foreground cleaning here.
    - HADES: density log-transform, with gaussian likelihood or poisson likelihood
    - BORG: physical forward model, with gaussian or poisson likelihood, different bias models (see Jens talk)

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    - HADES: density log-transform, with gaussian likelihood or poisson likelihood
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  - borg_forward: possibility to replay borg mcmc to get more defailed informations.

Let's try ares !

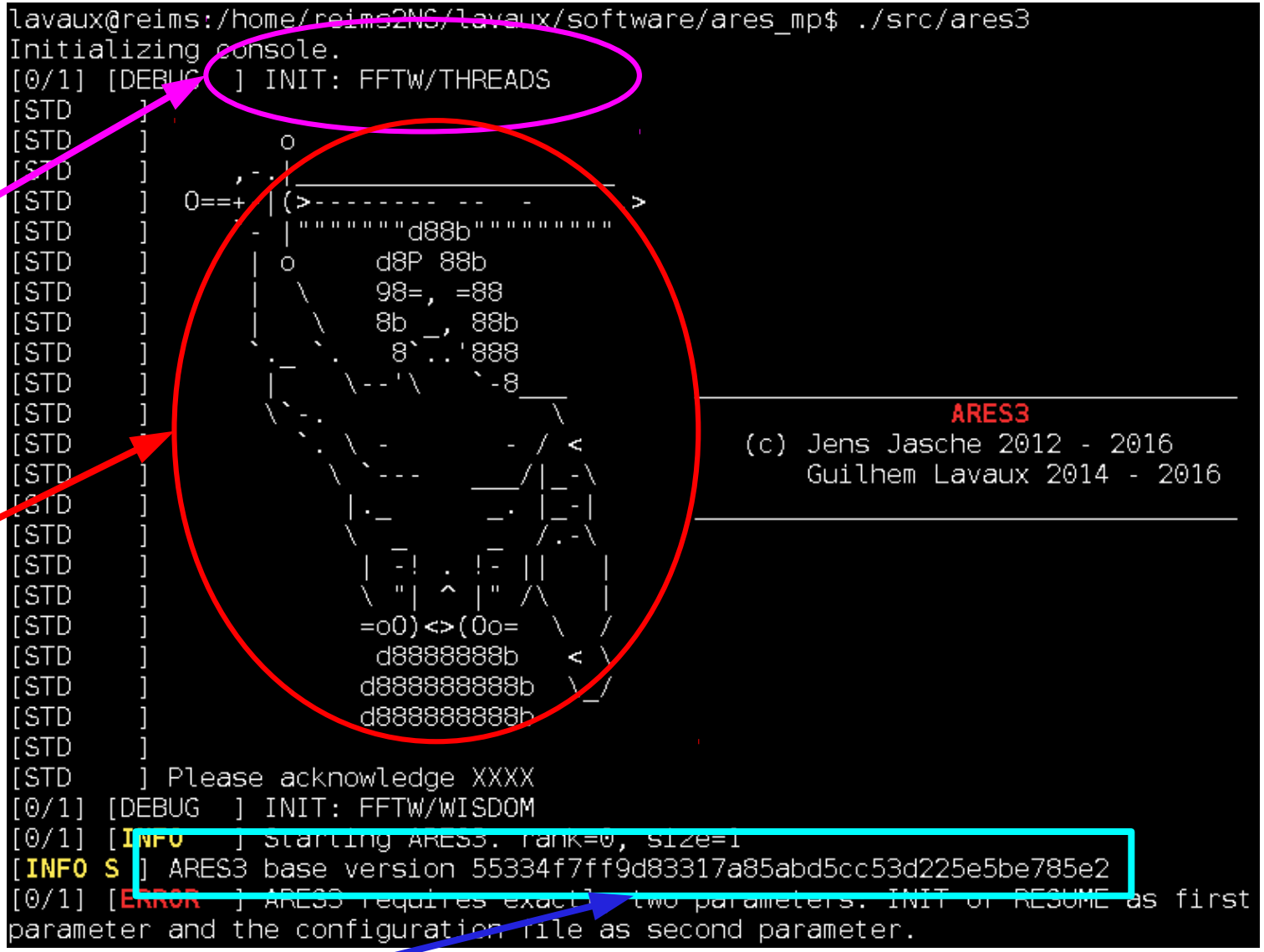
- We run "./src/ares3"

```
lavaux@reims:/home/reims2NS/lavaux/software/ares_mp$ ./src/ares3
Initializing console.
[0/1] [DEBUG  ] INIT: FFTW/THREADS
[STD    ]
[STD    ]         o
[STD    ]      ,-.|_____________________
[STD    ]   O==+-|(>-------- --  -      .>
[STD    ]      `- |""""""""d88b""""""""""
[STD    ]       | o     d8P 88b
[STD    ]       |  \     98=, =88
[STD    ]       |   \    8b _, 88b
[STD    ]       `._  `.    8`..'888
[STD    ]        |    \--'\    `-8___
[STD    ]        \`-.                \
[STD    ]           `. \ -         - / <
[STD    ]             \ `---    ___/|_-\
[STD    ]              |._       _. |_-|
[STD    ]              \  _      _  /.-\
[STD    ]               | -! . !- ||   |
[STD    ]               \ "| ^ |" /\   |
[STD    ]              =o0)<>(0o=  \  /
[STD    ]               d8888888b   < \
[STD    ]              d888888888b  \_/
[STD    ]              d888888888b
[STD    ]
[STD    ] Please acknowledge XXXX
[0/1] [DEBUG  ] INIT: FFTW/WISDOM
[0/1] [INFO   ] Starting ARES3. rank=0, size=1
[INFO S ] ARES3 base version 55334f7ff9d83317a85abd5cc53d225e5be785e2
[0/1] [ERROR  ] ARES3 requires exactly two parameters: INIT or RESUME as first
parameter and the configuration file as second parameter.
```

```
_____________________________________
                ARES3
  (c) Jens Jasche 2012 - 2016
      Guilhem Lavaux 2014 - 2016
_____________________________________
```

Let's try ares !

- We run "./src/ares3"



Multithreaded environment

ARES Logo

ARES git version

Let's try ares !

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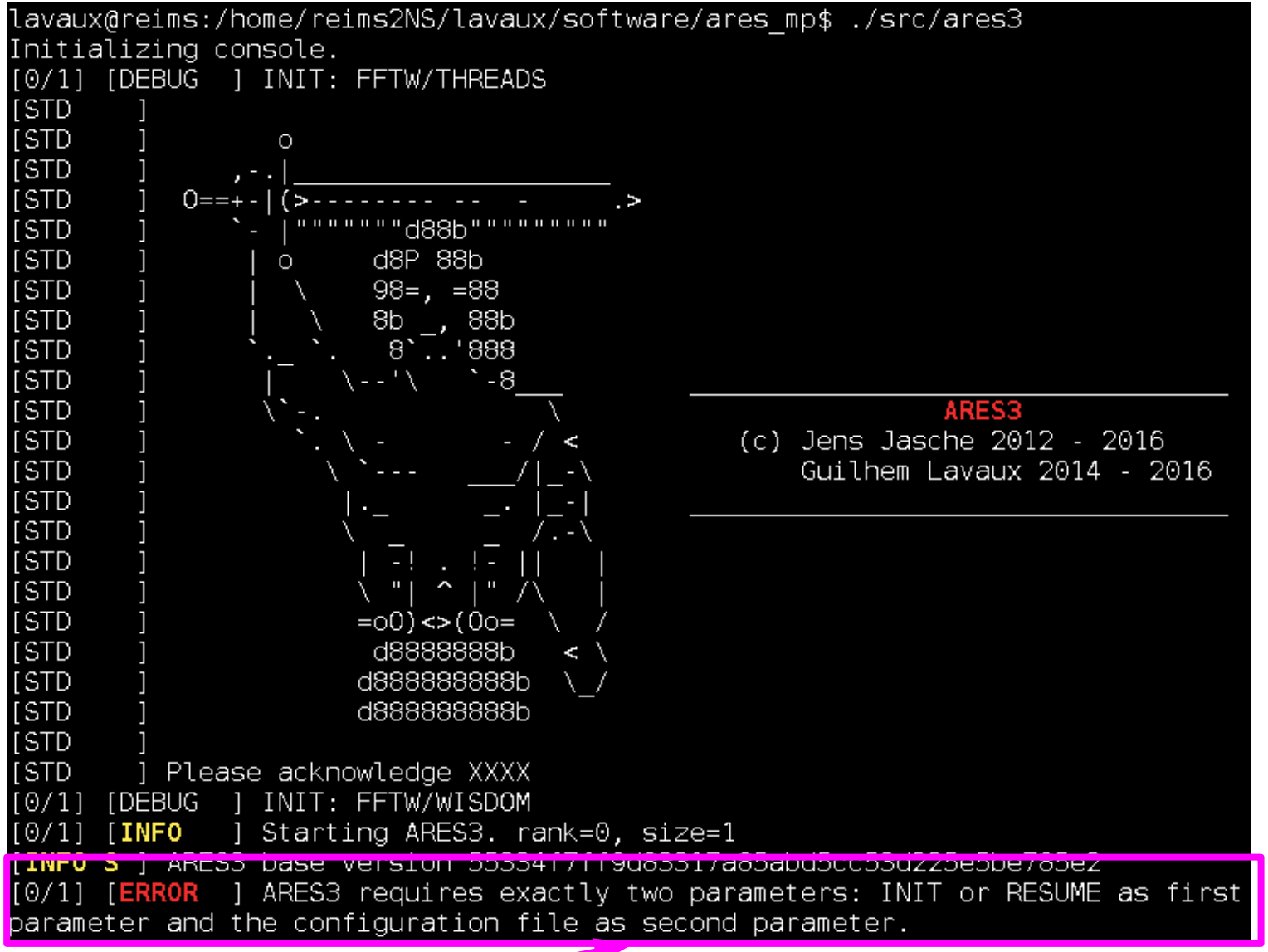

Error message:
command line arguments

ARES command line

- ares3 requires two arguments:
  - first argument is generally:
    - INIT: to initialize a run from scratch
    - RESUME: to resume a previous interrupted run, requires restart files in that case
  - second argument is the configuration file

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  - first argument is generally:
    - INIT: to initialize a run from scratch
    - RESUME: to resume a previous interrupted run, requires restart files in that case
  - second argument is the configuration file
- First argument can also be:
  - SPECIAL_RESUME: this requires a monolithic restart files. This is used for MPI runs that requires a change in the number of nodes (e.g. you changed the supercomputer you are running the chain on). The chain is reseeded from the state of the random number generator.
  - RESUME_RESEED: to reseed a chain. Note! the seed in the configuration file is not used there.

HADES command line

- hades3 requires the same two arguments!

BORG_FORWARD

- borg_forward takes an mcmc element of a BORG chain, a configuration file identical to the one used to produce the chain (except for some options) and recompute the simulation
- Can produce:
  - density field, velocity field
  - particle set (positions and/or velocities)
- It is possible to change the following options:
  - number of time steps
  -