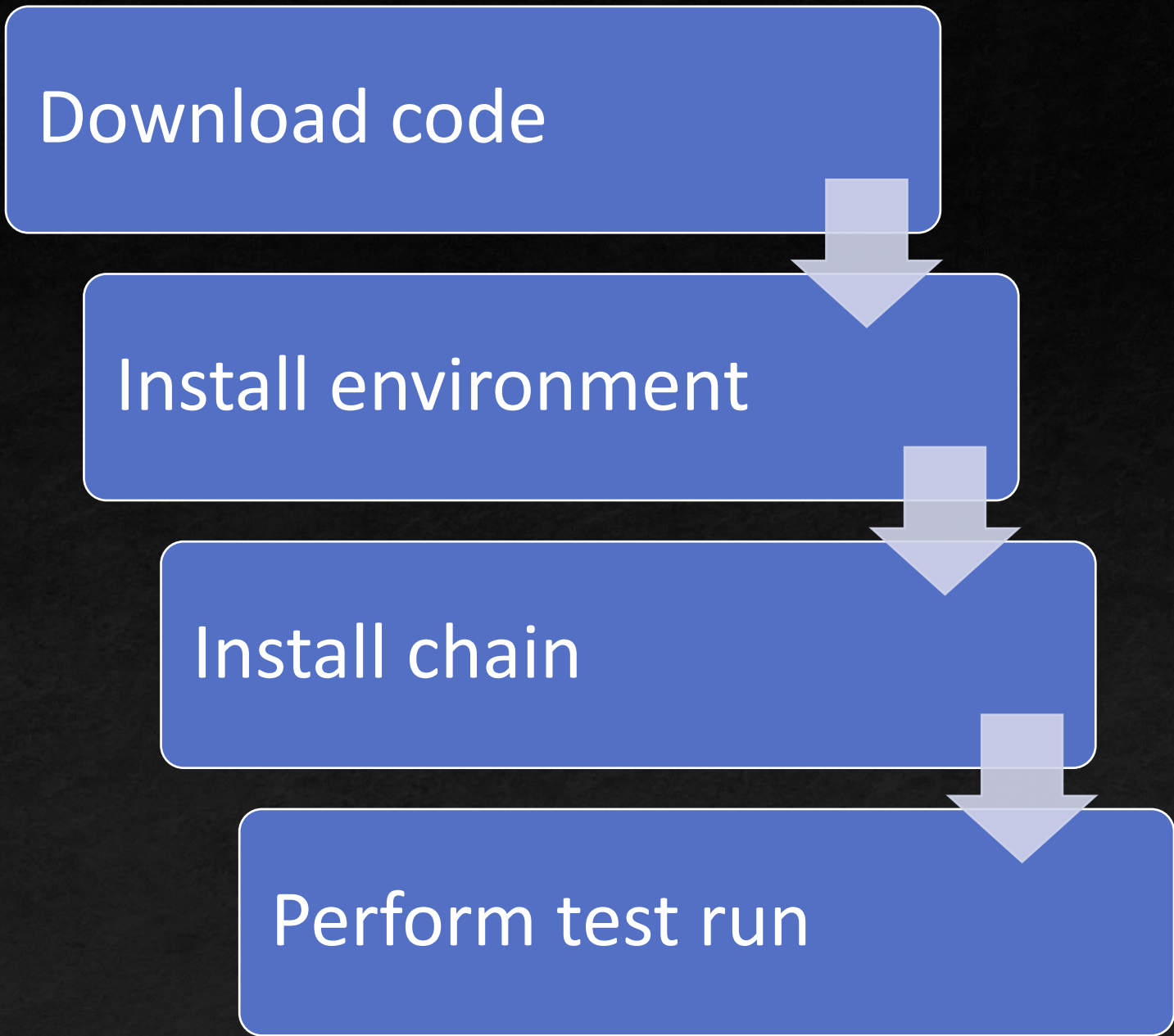


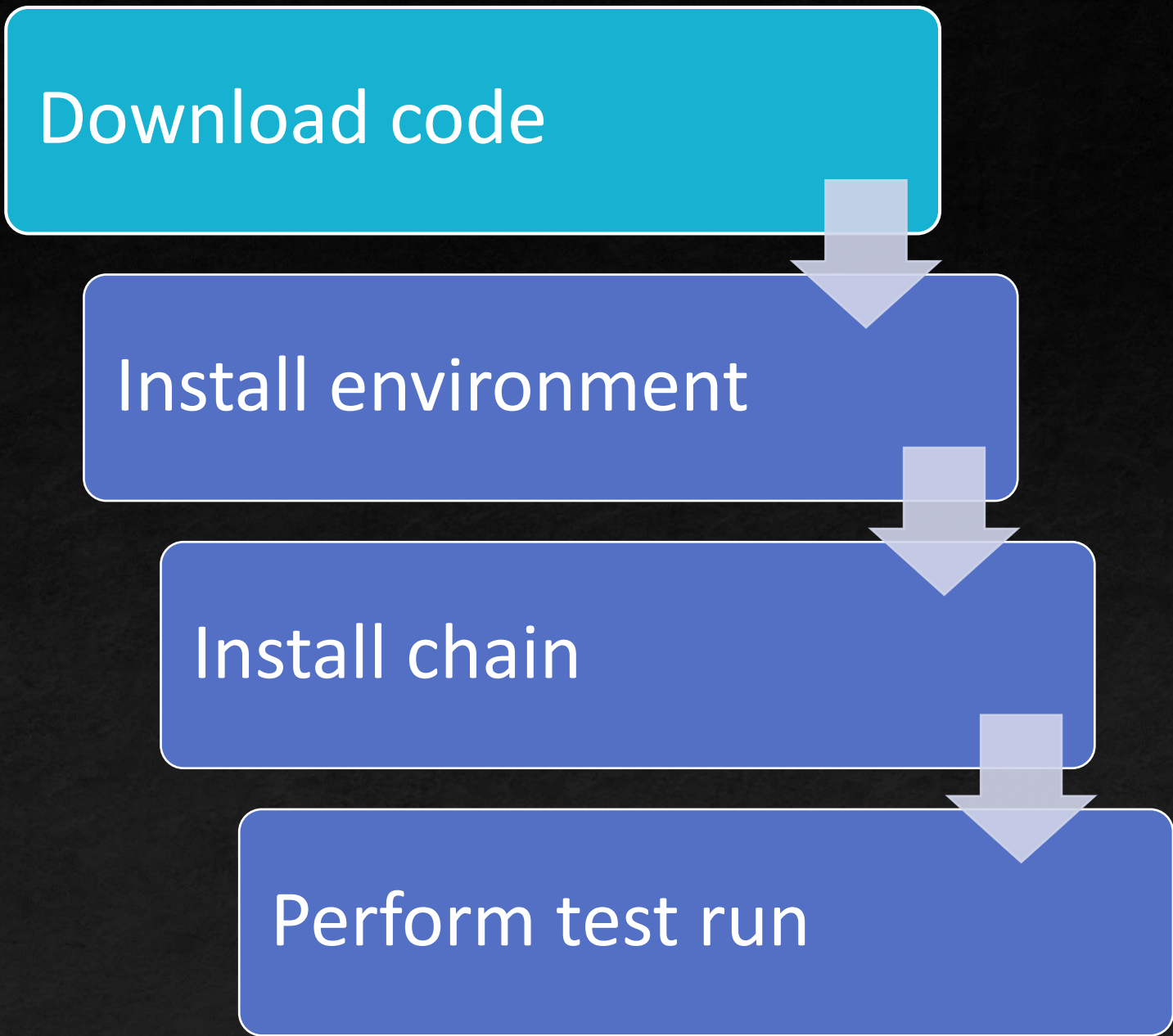
```
mirror_mod = modifier_ob.  
set mirror object to mirror_  
mirror_mod.mirror_object =  
operation == "MIRROR_X":  
mirror_mod.use_x = True  
mirror_mod.use_y = False  
mirror_mod.use_z = False  
operation == "MIRROR_Y":  
mirror_mod.use_x = False  
mirror_mod.use_y = True  
mirror_mod.use_z = False  
operation == "MIRROR_Z":  
mirror_mod.use_x = False  
mirror_mod.use_y = False  
mirror_mod.use_z = True  
  
selection at the end -add  
mirror_ob.select= 1  
modifier_ob.select=1  
context.scene.objects.active  
("Selected" + str(modifier_ob.name))  
mirror_ob.select = 0  
= bpy.context.selected_object  
data.objects[one.name].select  
print("please select exactly  
----- OPERATOR CLASSES -----  
  
types.Operator):  
"X mirror to the selected  
object.mirror_mirror_x"  
"Mirror X"  
  
context):  
context.active_object is not
```

Setting up your environment

Overview



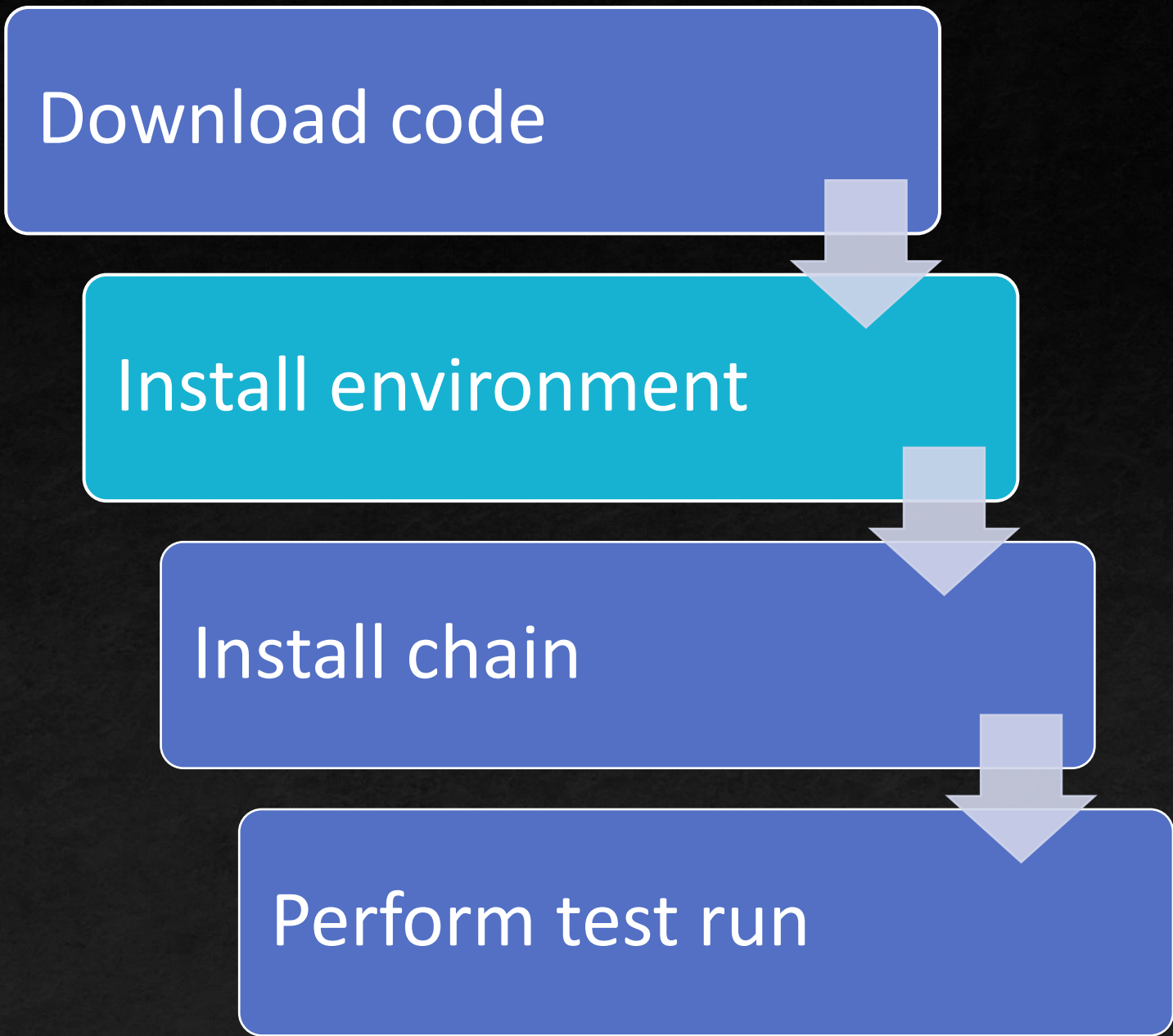
Overview



Download the code

1. Create GitLab account
2. Request access to the repository
3. `git clone https://gitlab.com/hadrex/hadrex-wokshop-2021.git`
4. Code is now in a folder called `hadrex-wokshop-2021`

Overview



Environment

- Environment: set of variables your terminal uses to find things and determine how to show info to you
- Try typing `env` at your terminal

```
# serenone @ jarvis3 in ~ [20:40:47]
$ env
USER=serenone
LOGNAME=serenone
HOME=/home/serenone
PATH=/home/serenone/.texlive/2020/bin/x86_64-linux:/home/serenone/.conda/condabin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/home/serenone/.bin
SHELL=/usr/bin/zsh
TERM=xterm-256color
DISPLAY=localhost:10.0
XDG_SESSION_ID=208
XDG_RUNTIME_DIR=/run/user/1001
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1001/bus
XDG_SESSION_TYPE=tty
XDG_SESSION_CLASS=user
MOTD_SHOWN=pam
LANG=en_US.UTF-8
LC_NUMERIC=pt_BR.UTF-8
LC_TIME=pt_BR.UTF-8
LC_MONETARY=pt_BR.UTF-8
LC_PAPER=pt_BR.UTF-8
LC_NAME=pt_BR.UTF-8
LC_ADDRESS=pt_BR.UTF-8
LC_TELEPHONE=pt_BR.UTF-8
LC_MEASUREMENT=pt_BR.UTF-8
LC_IDENTIFICATION=pt_BR.UTF-8
```

Virtual Environment

- Creates folders in user's home where user-specific programs (and its dependencies) will be installed
- Modifies your environment variables to tell terminal to look at this folder first
- Use cases:
 - Computers not administrated by you (e.g., clusters)
 - Working on different projects, with different requirements.
- Use an environment manager. We choose **conda**
 - Large support to HEP tools, such as ROOT
- Install script should have taken care of everything to you

Diving into the environment install script

What you did when you executed `install_env.sh`

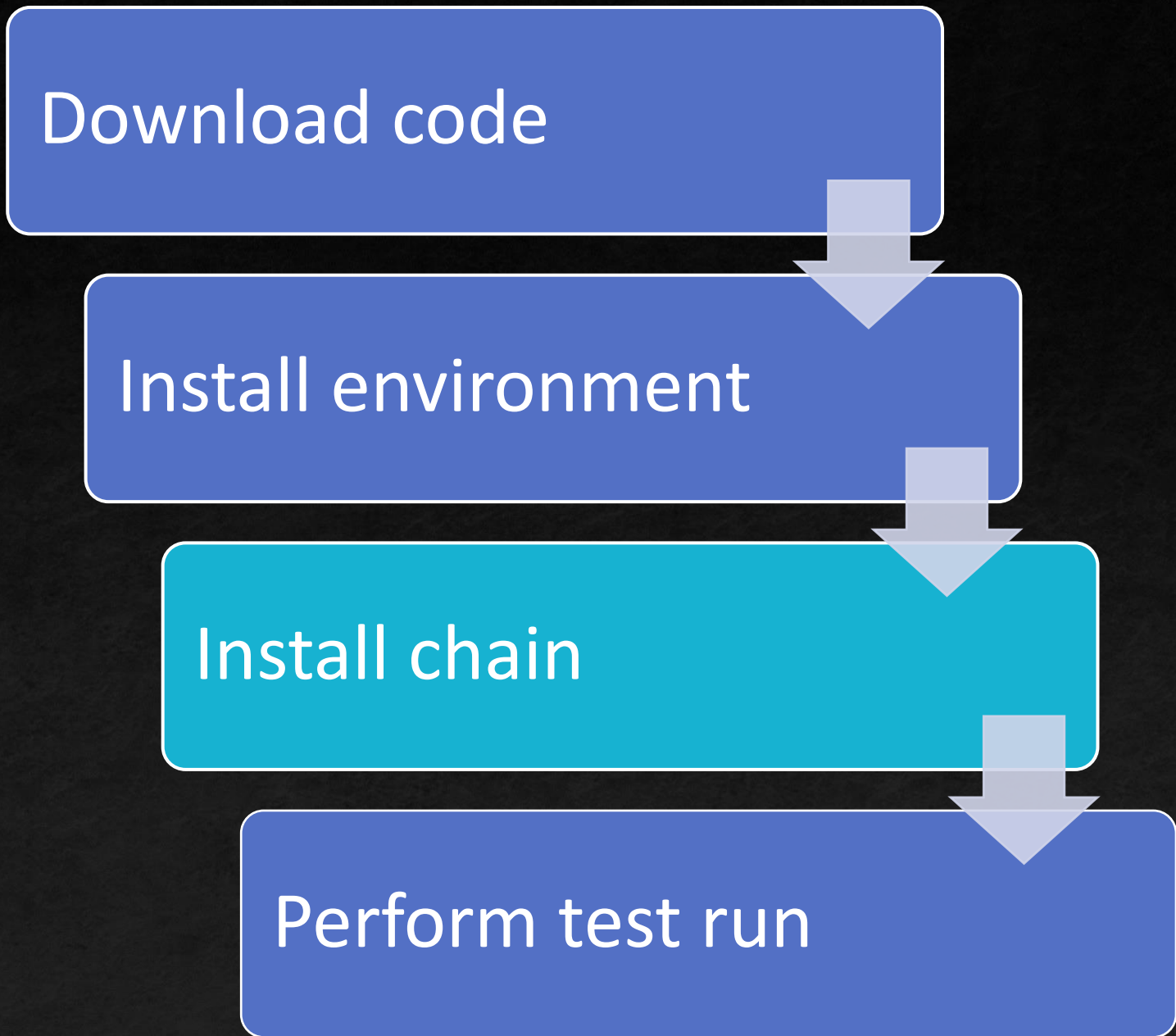
- Backup your .bashrc
 - If your environment gets broken, then use the backup to restore
- Checks if Python3 is present
 - This will be needed for the script to decide which conda version to use
- Downloads the necessary install script

```
7 #First things first: We will touch on users .bashrc, so we backup it
8 cp $HOME/.bashrc $HOME/.bashrc_backup
9
10 BASEDIR=$PWD
11
12 # Check if I will use python3 or python2. Exit if python is not found;
13 PYTHON3=`which python3`
14 PYTHON=`which python`
15 PYTHON_VERSION=`$PYTHON3 --version`
16
17 if [ $PYTHON_VERSION='' ]; then
18     PYTHON_VERSION=`$PYTHON --version`
19     if [ $PYTHON_VERSION='' ]; then
20         echo "Python not found"
21         exit -1
22     fi
23     PYTHON3_FOUND=false
24 else
25     PYTHON3_FOUND=true
26 fi
27
28
29 # If python3 is found, gets the latest Miniconda3. Else, gets Miniconda 2
30 if [ $PYTHON3_FOUND ]; then
31     wget https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh
32     mv Miniconda3-latest-Linux-x86_64.sh Miniconda-latest-Linux-x86_64.sh
33 else
34     wget https://repo.anaconda.com/miniconda/Miniconda2-latest-Linux-x86_64.sh
35     mv Miniconda2-latest-Linux-x86_64.sh Miniconda-latest-Linux-x86_64.sh
36 fi
```

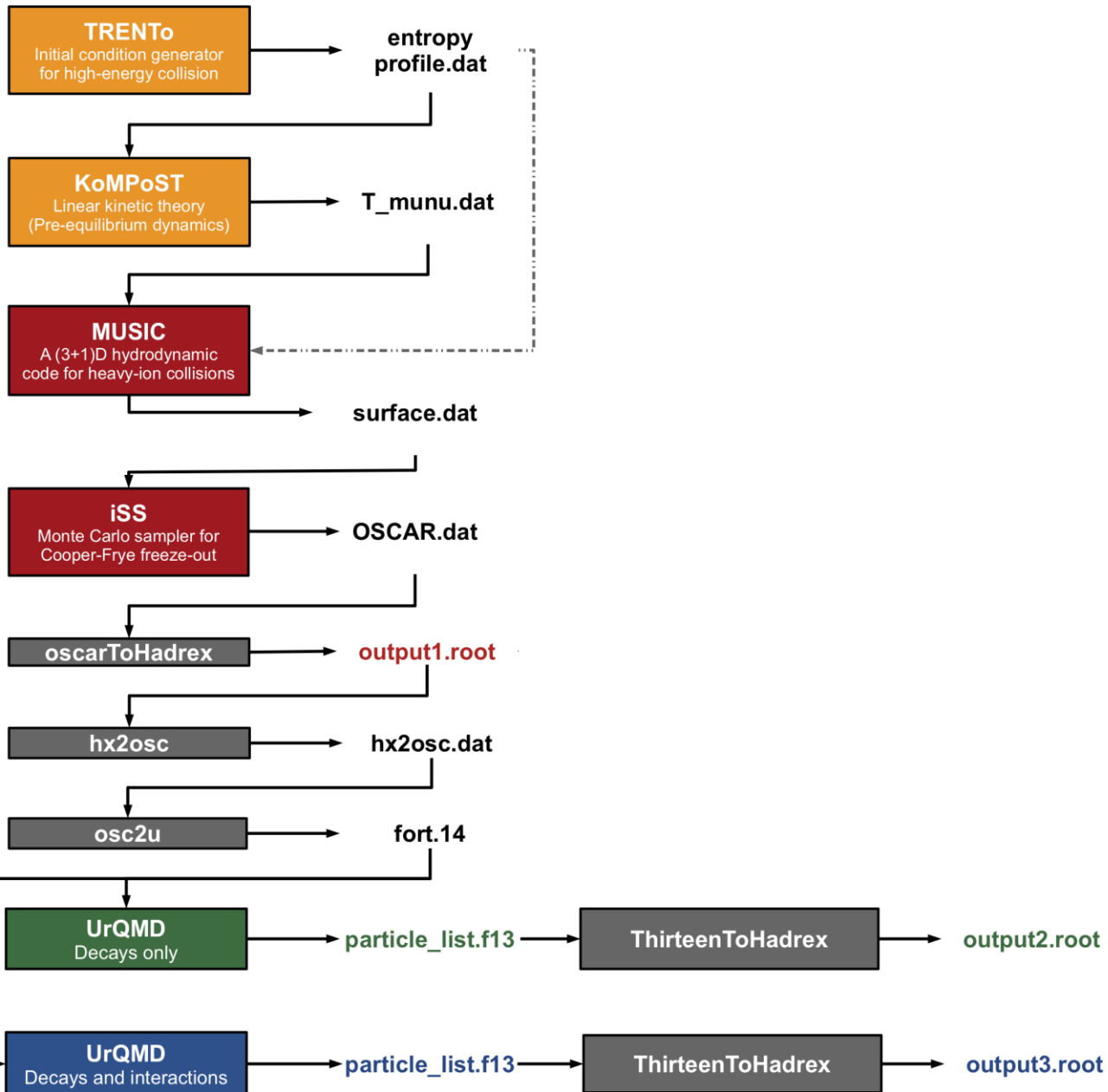
- Execute the install script
 - Files are stored in `~/ .conda`
- Tells the terminal to activate conda at login
- Add conda-forge channel
- Update installation
- Create hadrex environment using the package list in the `hadrex_env.yaml` file
- Updates `~/ .bashrc` to activate hadrex environment at login

```
38 #Install miniconda
39 chmod u+x Miniconda-latest-Linux-x86_64.sh
40 ./Miniconda-latest-Linux-x86_64.sh -p $HOME/.conda -b
41 rm Miniconda-latest-Linux-x86_64.sh #Clean up install file
42
43 #Install environment and setup automatic activation
44 export PATH=$HOME/.conda/bin:$PATH
45 conda init
46 source $HOME/.bashrc
47 conda config --add channels conda-forge #Add conda-forge channel
48 conda update -n base -c defaults conda #Update conda
49 conda env create -f $BASEDIR/install/hadrex-env.yaml
50 echo "conda activate hadrex" >> $HOME/.bashrc
51
```

Overview



EXTREME Hydro Simulation Chain



Extreme Hydrodynamic Simulation Chain

- Complex chain of executables
- Lots of dependencies
- Some executables needs additional files in its working directories
- `install_ehsc.sh` deals with this setup

Diving into the chain install script

What you did when you executed `install_ehsc.sh`

- Makes sure that we are using the virtual environment
- Download trento, kompost and iss from their repositories
- Compile base
 - Used in the converters to store particle information in HadrEx format (ROOT compressed format with serialized C++ class)
- FORTRAN compiler setup

```

7 source $HOME/.conda/etc/profile.d/conda.sh
8 conda activate hadrex
9 BASEDIR=$PWD
10
11 #Load external repositories
12 git submodule init
13 git submodule update
14
15 # Let us build the base and install them on the appropriate places
16 cd $BASEDIR/base
17 make CXX=clang++
18 ln -sf $BASEDIR/base/*.so $CONDA_PREFIX/lib
19 ln -sf $BASEDIR/base/*.pcm $CONDA_PREFIX/lib
20 ln -sf $BASEDIR/base/*.h $CONDA_PREFIX/include
21
22 cd $BASEDIR
23
24 mkdir -p $BASEDIR/.local
25
26 #Choose fortran compiler
27 FC= `which ifort` ;
28 if [ "$FC" == "" ]; then
29     FC=`which gfortran` ;
30 fi
31
32 #Patch issue with libgfortran not found
33 ln -sf $CONDA_PREFIX/lib/libgfortran.so $CONDA_PREFIX/x86_64-conda_cos6-linux-gnu/sysroot/lib/libgfortran.so
34 ln -sf $CONDA_PREFIX/lib/libquadmath.so $CONDA_PREFIX/x86_64-conda_cos6-linux-gnu/sysroot/lib/libquadmath.so
35

```

External tools installation

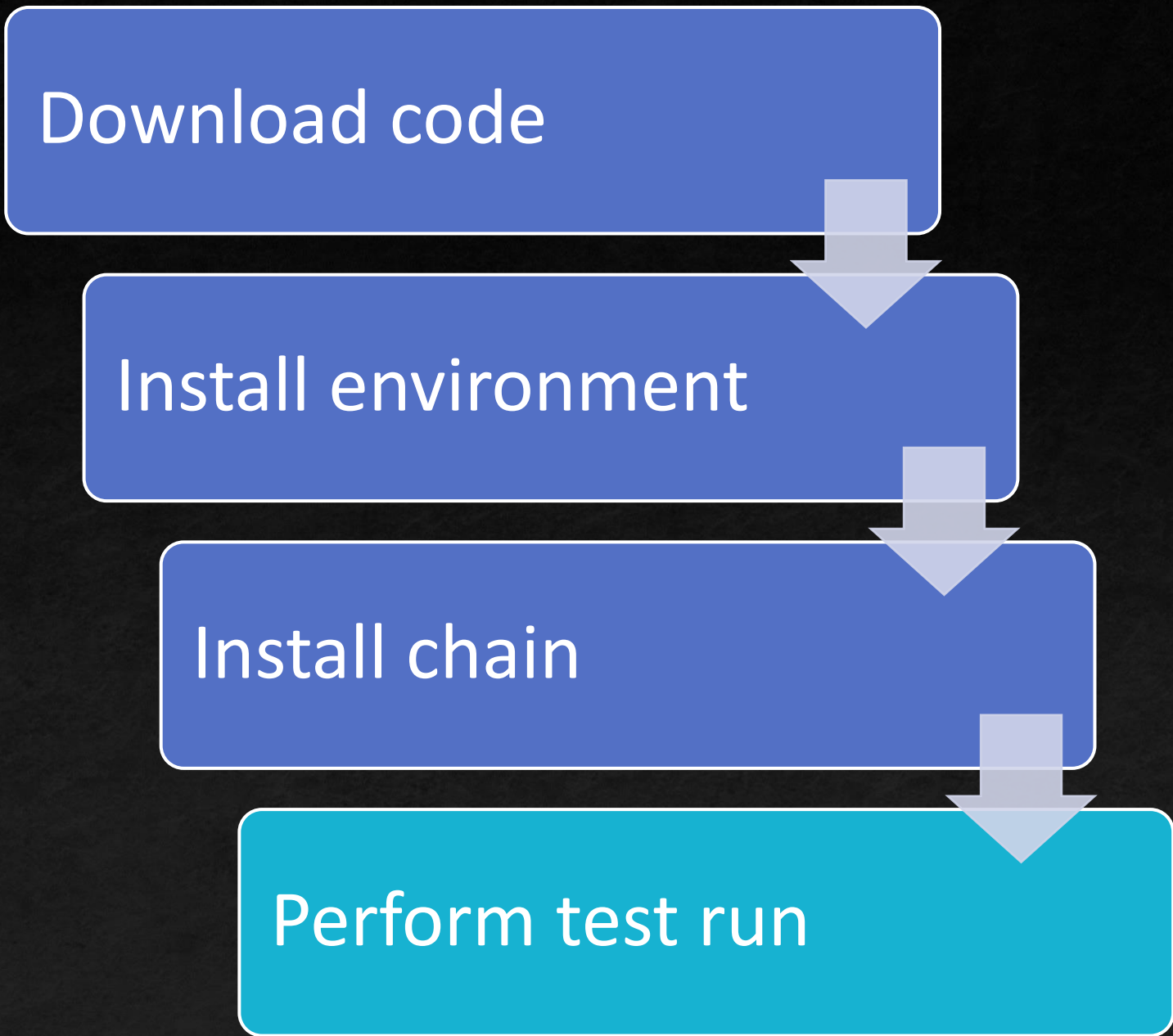
- Trento
- Kompost
- MUSIC
- iSS
- osc2u converter
- UrQMD

```
36 echo "INSTALLING TRENTO=====  
37 date  
38 echo "=====  
39 mkdir -p $BASEDIR/.local/trento  
40 cd $BASEDIR/.local/trento  
41 cmake -DCMAKE_INSTALL_PREFIX=$CONDA_PREFIX $BASEDIR/sources/trento  
42 make -j4  
43 make install  
44  
45 echo "INSTALLING KOMPOST=====  
46 date  
47 echo "=====  
48 cp -r $BASEDIR/sources/KoMPoS $BASEDIR/.local/kompost  
49 cd $BASEDIR/.local/kompost  
50 patch Makefile $BASEDIR/install/kompost.patch  
51 make  
52 ln -sf $BASEDIR/.local/kompost/KoMPoS.exe $CONDA_PREFIX/bin/KoMPoS.exe  
53  
54 echo "INSTALLING MUSIC=====  
55 date  
56 echo "=====  
57 mkdir -p $BASEDIR/.local/music  
58 cd $BASEDIR/.local/music  
59 cmake -DCMAKE_INSTALL_PREFIX=$CONDA_PREFIX $BASEDIR/sources/MUSIC  
60 make -j4  
61 ln -sf $BASEDIR/.local/music/src/mpihydro $CONDA_PREFIX/bin/mpihydro  
62 ln -sf $BASEDIR/.local/music/src/libmusic_lib.so $CONDA_PREFIX/bin/libmusic_lib.so  
63  
64 echo "INSTALLING ISS=====  
65 date  
66 echo "=====  
67 mkdir -p $BASEDIR/.local/iss  
68 cd $BASEDIR/.local/iss  
69 cmake -DCMAKE_INSTALL_PREFIX=$CONDA_PREFIX $BASEDIR/sources/ISS  
70 make -j4  
71 ln -sf $BASEDIR/.local/iss/src/iSS.e $CONDA_PREFIX/bin/iSS.e  
72 ln -sf $BASEDIR/.local/iss/src/libiSS_lib.so $CONDA_PREFIX/lib/libiSS_lib.so  
73  
74 echo "INSTALLING OSC2U=====  
75 date  
76 echo "=====  
77 cp -r $BASEDIR/sources/osc2u $BASEDIR/.local/osc2u  
78 ln -s $BASEDIR/.local/osc2u/crank $BASEDIR/.local/crank  
79 cd $BASEDIR/.local/osc2u  
80 make FC=$FC  
81 make install INSTPATH='$(CONDA_PREFIX)/bin'  
82  
83 echo "INSTALLING URQMD=====  
84 date  
85 echo "=====  
86 cp -r $BASEDIR/sources/urqmd-3.4 $BASEDIR/.local/urqmd  
87 cd $BASEDIR/.local/urqmd  
88 make lhc  
89 make install INSTPATH='$(CONDA_PREFIX)/bin'  
90 ln -s $CONDA_PREFIX/bin/urqmd $CONDA_PREFIX/bin/urqmd.x86_64
```

- Compile and install converters
 - oscarToHadrex, hx2osc and u2hadrex
- Setup template folder for runs
- Update ROOT database of particles with iSS resonances

```
94 #Compile generators
95 cd $BASEDIR/generators/hydro_chain/chain/src
96 make -j4
97 ln -sf $BASEDIR/generators/hydro_chain/chain/src/oscarToHadrex.exec $CONDA_PREFIX/bin/oscarToHadrex
98 ln -sf $BASEDIR/generators/hydro_chain/chain/src/hx2osc.exec $CONDA_PREFIX/bin/hx2osc
99 ln -sf $BASEDIR/generators/hydro_chain/chain/src/u2hadrex.exec $CONDA_PREFIX/bin/u2hadrex
100
101 #Create symbolic links
102 ln -sf $BASEDIR/sources/iSS/iSS_tables $BASEDIR/generators/hydro_chain/clean_run_dir/iSS_tables
103 ln -sf $BASEDIR/sources/KoMPoST/EKT $BASEDIR/generators/hydro_chain/clean_run_dir/EKT
104 ln -sf $BASEDIR/sources/MUSIC/EOS $BASEDIR/generators/hydro_chain/clean_run_dir/EOS
105 ln -sf $BASEDIR/sources/MUSIC/tables $BASEDIR/generators/hydro_chain/clean_run_dir/tables
106 ln -sf $BASEDIR/.local/urqmd/tables.dat $BASEDIR/generators/hydro_chain/clean_run_dir/tables_urqmd
107
108 ln -sf $BASEDIR/generators/hydro_chain/chain/scripts $BASEDIR/generators/hydro_chain/clean_run_dir/scripts
109
110 #Updates ROOT DB
111 echo "Root.DatabasePDG: $BASEDIR/base/pdg_db_iss_extended.dat" >> $HOME/.rootrc
```


Overview



Performing a test run

- `generators/hydro_chain/clean_run_dir` is a template folder
 - Keep it clean
- Make a copy of it to somewhere else
 - Put it outside your repository

Performing a test run

- `generators/hydro_chain/clean_run_dir` is a template folder
 - Keep it clean
- Make a copy of it to somewhere else
 - Put it outside your repository
- Edit `input.xml` to large impact parameter
 - Chain will finish faster
- Run the chain with `./scripts/run_chain.sh`

input.xml

```
16 <trento>
17   <enabled>true</enabled>
18   <basic>
19     <projectile>Pb</projectile>
20     <projectile>Pb</projectile>
21   </basic>
22   <output>
23     <hdf5>disabled</hdf5>
24     <quiet>enabled</quiet>
25     <header>enabled</header>
26     <ncoll>disabled</ncoll>
27   </output>
28   <physics>
29     <reduced-thickness>0.007</reduced-thickness>
30     <fluctuation>1.187</fluctuation>
31     <nucleon-width>0.956</nucleon-width>
32     <nucleon-min-dist>1.27</nucleon-min-dist>
33     <cross-section>6.28</cross-section>
34     <normalization>286.23</normalization>
35     <b-min>default</b-min>
36     <b-max>default</b-max>
37   </physics>
38   <grid>
39     <grid-max>14</grid-max>
40     <grid-step>0.1</grid-step>
41   </grid>
42 </trento>
```

Thanks