Usage of JEWEL generator

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Installing prerequisites

Dependencies

- JEWEL needs LHAPDF5 to provide the PDF's. Install LHAPDF following the instructions on the LHAPDF web page and download the PDF sets you want to use. Please note that you will need the fortran version of LHAPDF, that is version 5 (and not the new version 6). In its default setup JEWEL needs the CTEPQ6L1 (number 10042) and EPS09LOR_208 sets. The latter can be downloaded from the EPS09 web page.
- The provided `Makefile` assumes that JEWEL will be compiled with `gfortran`. People who wish to use a different compiler have to modify the `Makefile` accordingly.

Download and Install LHAPDF5

`https://lhapdf.hepforge.org/downloads?f=old`

`https://lhapdf.hepforge.org/lhapdf5/install`

Download PDF sets (e.g. 5.9.1)

`https://lhapdf.hepforge.org/downloads/?f=pdfsets/5.9.1/EPS09LOR_208.LHgrid`
`https://lhapdf.hepforge.org/downloads?f=pdfsets/5.9.1//cteq6ll.LHpdf`

Put them in (lhapdf path)*/share/lhapdf/PDFsets/*

alternative

Compiling JEWEL

Modify Makefile

LHAPDF_PATH := (your lhapdf install path)/lib/

Modifying your .bashrc or .zshrc

export LD_LIBRARY_PATH=/.../lhapdf-5.x.y/lib:$LD_LIBRARY_PATH
export LHAPATH=/.../lhapdf-5.x.y/share/lhapdf/PDFsets

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Run JEWEL

- Now you have two binaries: jewel-2.2.0-vac and jewel-2.2.0-simple
- ./jewel-2.2.0-vac ⟨configuration file⟩
- ./jewel-2.2.0-simple ⟨configuration file⟩
- Documentation
- The log file and output file are specified by the config file.

Caution

Watch out for xsecs.dat, pdf.dat, and splitint.
If you change physical parameters, delete these files before you run JEWEL again.

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- Show routine initpythia in jewel-2.2.0.f (roughly line 800)
- Pythia 6 Documentation (See pages 140, 145, and 195)

Gluons

MSEL=0
MSUB(13)=1
MSUB(68)=1

Quarks

MSEL=0
MSUB(11)=1
MSUB(12)=1
MSUB(53)=1

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How to understand HepMC2 ascii format

- Documentation link
- Reminder to myself: show an example
- Use Rivet

Rivet usage

rivet *(hepmc file)* -a *(analysis name)*
rivet output.hepmc -a MC_JETS

For Jewel outputs, use
rivet –ignore-beams output.hepmc -a MC_JETS

Warning

Rivet 3.1.5 and above seems to be incompatible with JEWEL.

Rivet installation

Native install using bootstrap script

`https://gitlab.com/hepcedar/rivet/-/blob/release-3-1-x/doc/tutorials/installation.md`

Execute the bootstrap to install rivet and all its dependencies.

However, the recommended way is to use Docker.

Hoffman2

On Hoffman2 cluster, due to security concerns, apptainer is used instead of Docker. Apptainer (formerly named Singularity) is compatible with Docker container format.

module load apptainer

Use apptainer/docker to install Rivet

docker pull hepstore/rivet:3.1.4

apptainer pull docker://hepstore/rivet:3.1.4

Using apptainer or docker

Docker

docker run -i –rm hepstore/rivet:3.X.Y (command)
docker run -i –rm -v $PWD:$PWD -w $PWD -u `id -u $USER`:`id -g`
hepstore/rivet:3.1.4 rivet output.hepmc -a MC_JETS

apptainer

apptainer exec (container image path)/rivet_3.X.Y.sif (command)
apptainer exec (path...)/rivet_3.1.4.sif rivet output.hepmc -a MC_JETS

To make life easier

Docker

```
alias rivet='docker run -i  --rm  -u `id -u $USER`:`id -g`  -v $PWD:$PWD -w $PWD  hepstore/rivet:X.Y.Z rivet'
alias rivet-mkanalysis='docker run -i  --rm  -u `id -u $USER`:`id -g`  -v $PWD:$PWD -w $PWD  hepstore/rivet:X.Y.Z ri
alias rivet-buildplugin='docker run -i  --rm  -u `id -u $USER`:`id -g`  -v $PWD:$PWD -w $PWD  hepstore/rivet:X.Y.Z r
alias rivet-mkhtml='docker run -i  --rm  -u `id -u $USER`:`id -g`  -v $PWD:$PWD -w $PWD  hepstore/rivet:X.Y.Z rivet-
alias yodamerge='docker run -i --rm  -u `id -u $USER`:`id -g`  -v $PWD:$PWD -w $PWD  hepstore/rivet:X.Y.Z yodamerge'
```

Apptainer

alias rivet='apptainer exec *(path)*/rivet_3.X.Y.sif rivet'
alias rivet-mkhtml='apptainer exec *(path)*/rivet_3.X.Y.sif rivet-mkhtml'
alias rivet-build='apptainer exec *(path)*/rivet_3.X.Y.sif rivet-build'
alias yodamerge='apptainer exec *(path)*/rivet_3.X.Y.sif yodamerge'

Using named pipe

The HepMC file can get really large.
Use named pipe to save space.

mkfifo

```
# suppose the output name is output.hepmc
mkfifo output.hepmc
./jewel-2.2.0-simple configuration.dat &
rivet –ignore-beams output.hepmc -a Some_analysis
```