Simulation in Batch Mode

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What is Batch Mode

- Simulate multiple events according to input macro file to generate the root output
- Input macro file provide what physics models, event types to generate, geometry, magnetic field, output destination, and no.of events to simulate

Input Macro File

- Standard input files are available in macros directory

  remoll/macros

- Hands-On-Remoll directory has three such files that we will use

  ```
  HandsOn_run_moller.mac, HandsOn_run_ep.mac
  HandsOn_kryptonite.mac
  ```

- Copy these files to you VM or to ifarm remoll/macros

Input Macro File

Activities Text Editor

Open ~/Work/LaTech/Research/MOLLE

```
#  Hands-On tutorial elastic generator macro file


# This must be called before initialize
/remoll/geometry/setfile geometry/mollerMother.gdml
# Parallel world geometry is optional - detector 28 (the primary de
/remoll/parallel/setfile geometry/mollerParallel.gdml

/remoll/physlist/parallel/enable

# This must be explicitly called
/run/initialize

/remoll/printgeometry true

/control/execute macros/load_magnetic_fieldmaps.mac

# Raster and initial angle stuff

/remoll/oldras true
/remoll/rasx 5 mm
/remoll/rasy 5 mm


/remoll/evgen/set moller
/remoll/evgen/thcommin 80.0 deg
/remoll/evgen/thcommax 100.0 deg

/remoll/beamene 11 GeV

/remoll/beamcurr 85 microampere
```

Set Geometries

You can also set a physics list here if you require specific physics interactions: /remoll/physlist/register QGSP_BERT_HP

Set standard field maps

Set the event generator

Set beam energy and beam current

Kryptonite materials are set here

```
# Make interactions with W, Cu, and Pb
# realistic rather than pure absorbers
#/control/execute macros/HandsOn_kryptonite.mac

##disable all detectors,
/remoll/SD/disable_all
/remoll/SD/enable 28
/remoll/SD/enable 47
/remoll/SD/print_all

/process/list

# Specify random number seed
#/remoll/seed 123456

/remoll/filename remollout_Moller_gen_2k.root
/remoll/target/print
/run/beamOn 2000
```

Control what sens. detectors to enable

Random seed control (optional)

We will use the input macro files just downloaded to do simple study

How to Run Simulation in Batch Mode?

1. Goto remoll directory
2. ./build/remoll destination+macro file name
3. This will start the simulation in batch mode
4. We will do following simulations first:
    a. Run 2000 moller electrons events
    b. Run 2000 ep elastic electron events
5. You can run these simulations and each one takes about 10 min
6. The output root files from these two jobs are also available at Hands-On Materials/Rootfiles

`remollout_Moller_gen_2k.root and remollout_Ep_gen_2k.root`

Enable/Disable Sensitive Detectors from Input files

- Simulation output file size can reduced if you know what sensitive detectors you want to record data
- We can first disable all the detector
- disable all detectors,

```
/remoll/SD/disable_all
```

- Then enable ones you want

```
/remoll/SD/enable 28
```

```
/remoll/SD/enable 47
```

Enable/Disable Sensitive Detectors from Input files

- You can control what data you want to record for each detector

```
/remoll/SD/detect lowenergyneutral 28

/remoll/SD/detect secondaries 28

/remoll/SD/detect boundaryhits 28
```

Enable/Disable Kryptonite

1. Enable kryptonite feature

```
/remoll/kryptonite/enable
```

2. Then you can either turn certain materials into kryptonite

```
/remoll/kryptonite/add VacuumKryptonite
/remoll/kryptonite/add Tungsten
/remoll/kryptonite/add Copper
/remoll/kryptonite/add Lead
/remoll/kryptonite/add CW95
```

3. You can also turn certain volumes into kryptonite by giving the name of the GDML solid shape

```
/remoll/kryptonite/volume Coll1_solid1
```

Enable/Disable Kryptonite

- We are doing this using a separate macro file
- This files has the Kryptonite related settings.

```
# Make interactions with W, Cu, and Pb
# realistic rather than pure absorbers
#/control/execute macros/HandsOn_kryptonite.mac

##disable all detectors,
/remoll/SD/disable_all
/remoll/SD/enable 28
/remoll/SD/enable 47
/remoll/SD/print_all

/process/list

# Specify random number seed
#/remoll/seed 123456

/remoll/filename remollout_Moller_gen_2k.root
/remoll/target/print
/run/beamOn 2000
```

```
# Enable kryptonite
/remoll/kryptonite/enable

# Set some default materials
/remoll/kryptonite/add VacuumKryptonite
/remoll/kryptonite/add Tungsten
/remoll/kryptonite/add Copper
/remoll/kryptonite/add Lead
/remoll/kryptonite/add CW95

# Set selected volumes kryptonite
##/remoll/kryptonite/volume Coll1_solid1

# List materials
/remoll/kryptonite/list
```

Remarks

Now we will utilize the simulation in batch mode and Hands-On root analysis script to do a very simple simulation analysis project