MICE Collaboration

# Hybrid MC update

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# Outline

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- Hybrid MC tests
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# Introduction

**Paolo has forwarded me the proposal for Hybrid MC, and I will mention several points.**

The MICE Monte Carlo is usually constituted of two parts. A G4BL simulation and a full MAUS Monte Carlo.

The simulation in fully automated to be executed on the GRID.

A full Monte Carlo generation can be quite CPU consuming and unnecessary in case of systematic studies that might involve only changes at the cooling channel geometry level.

Specifications of the implementation of the hybrid MC on the GRID need to be agreed between users in order to make it usable for several type or analysis (scattering, emittance studies, etc.).

Several hybrid versions of the official MICE Monte Carlo have been independently generated for different analysis by different users, generally without using the GRID infrastructure.

Different user cases can be covered with a single hybrid Monte Carlo infrastructure running on the GRID.

# Hybrid MC tests – Paolo's instructions

MICE Hybrid Monte Carlo software to be used on the Grid.
Forked from Chris Rogers https://github.com/chrisrogers1234/systematics_mc/

Instructions:
==========

- Check out https://launchpad.net/maus/trunk,
- merge with https://code.launchpad.net/~francois-drielsma/maus/tof-tracker-combined-fit
- build the trunk
- source ~/MAUS/merge/env.sh (or whatever)

To be included in new MAUS version, and transferred to cvmvfs

```
git clone https://github.com/pfranchini/MICE-hybrid-mc.git MICE-hybrid-mc
cd MICE-hybrid-mc
mkdir work

cd work
mkdir geometry_10069
python ${MAUS_ROOT_DIR}/bin/utilities/download_geometry.py --geometry_download_by run_number --geometry_dow
nload_run_number 10069 --geometry_download_directory=geometry_10069

python ~/MAUS/merge/src/common_py/calibration/get_scifi_calib.py --SciFiCalibMethod "Run" --SciFiCalibSrc 1
0069 --SciFiConfigDir calib-10069/
cd ..
```

- edit config.in to point to calib-10069/

Is done inside script on the GRID

```
export OPENBLAS_NUM_THREADS=4
python scripts/run_all.py
```

# Hybrid MC tests

- Locally on my box – simulation and reconstructions done OK.

- on the grid – only simulation is done, using MAUS-v3.2.1, expected to work in new release.

    - runing for:  23m

From logs:
./work/10069_systematics_v101/tku_base/0000:
total 30608
drwxr-xr-x 2 plt00p00 plt00p00     4096 Nov 19 22:40 .
drwxr-xr-x 7 plt00p00 plt00p00     4096 Nov 19 22:19 ..
lrwxrwxrwx 1 plt00p00 plt00p00      111 Nov 19 22:40 geometry_10069 -> /scratch/plt/13737506/MICE-hybri
d-mc-master/work/10069_systematics_v101/tku_base//reconstruction_geometry_10069
-rw-r--r-- 1 plt00p00 plt00p00 31295229 Nov 19 22:39 **maus_simulation.root**
-rw-r--r-- 1 plt00p00 plt00p00      271 Nov 19 22:41 reconstruction.log
lrwxrwxrwx 1 plt00p00 plt00p00       69 Nov 19 22:40 reconstruction.py -> /scratch/plt/13737506/MICE-hy
brid-mc-master/scripts/reconstruction.py
-rw-r--r-- 1 plt00p00 plt00p00     1469 Nov 19 22:19 reconstruction_config.py
-rw-r--r-- 1 plt00p00 plt00p00     7181 Nov 19 22:39 simulation.log
lrwxrwxrwx 1 plt00p00 plt00p00       65 Nov 19 22:19 simulation.py -> /scratch/plt/13737506/MICE-hybrid
-mc-master/scripts/simulation.py
-rw-r--r-- 1 plt00p00 plt00p00     1465 Nov 19 22:19 simulation_config.py

# Conclusion

- Test running well locally

- Test partially running on the GRID, waiting for new MAUS release.

- My only concern on running mutiple threads in single job on the GRID proved not to be an issue

# Introduction - 2nd part

The general idea is:

• Run the users' analysis on the data in order to apply on the full simulation the desired set of preliminary cuts and produce a beam outputfile (e.g. json) at the Tracker Station 5 position containing a defined list of variables

• Utilise a smearing procedure on the single beam file in order to generate as many different samples as necessary at the Tracker Station 5 position in order to produce enough statistics for the purpose of the study

• Run the MAUS simulation on each single sampled beam using the geometry defined by the user

The first step can be produced by the user; the beam have to be copied over in the GRID job submission server together with the user-defined geometry or datacards, while the last two items have necessary to run on the GRID.

A possible list of variables that could be included in the beam file for each particle are:

• position and momentum at Tracker Station 5
• TOF0 position
• TOF1 position