

MEMPHYS => Lund/iridium

June/July 2017

MEMPHYS



- MEMPHYS for... **ME**gaton * **Mass** **PHYS**ics !
- Geant4 simulation of large scale water cherenkov detector.
- Primary author of the code ? M.Fechner ?
- No license and clear authorship = public domain!
- At LAL, around 2005, used and improved by Jean-Eric Campagne and Nikos Vassilopoulos.

* And not Megatron, the transformer detector.

MEMPHYS in my life

- Involved as Geant4 support at LAL. I was and I am still an active **Geant4 member** (analysis tools, visualisation).
- This simulation helped to test and debug the « optical » and Cherenkov processes that was rather new in Geant4 at that time (P.Gumplinger, TRIUMF).
- Contribution to store a minimal « event model » in a file at the ROOT format but by using my very light Rio package through an « AIDA » implementation (long story...).
- Contribution to provide a 3D display for MEMPHYS based on Coin3D for the graphics and my OnX package for the GUI.

MEMPHYS hibernates



- Group neutrino at LAL => cosmology (Planck, now LSST).
- MEMPHYS hibernates and the world changes !

Wake up begin of 2017



- Request from Nikos to wake up MEMPHYS.

Done (1). LAL

- At CC/IN2P3, system, compilers, geant4 and all that had changed.
- Have it built and run on my Mac with the original geant4-8.2 to be sure of the physics before changing things. (Built with Apple/clang)
- **CRITICAL** : update the code to run on recent geant4-10.x.
- « DetectorConstruction.cpp » not touched, but had to update the « PhysicsList.cpp ». It looks ok but have to be cross checked by someone close of the physics.
- Modifs are « #ifdef GEANT4_VERSION » so that the code can still run on the geant4-8.2 !

Done (2). LAL

- Had to change the build system (CMT no more maintained). Use something (« **bush** ») much more simple based on bash (long story). (Rustic, but it permits me to build also for Windows, Android, iOS). But could have the geant4 **cmake** example logic for laptops.
- Had to change the way to store the « event model » (AIDA RIP around 2010). Use now my **inlib/exlib** for that. Very light code to store histo & ntuple at the root format without having to embark/tie to the whole CERN-ROOT for that. Now coming in geant4/analysis tools with the « **g4tools** ». (long story too).
- Have to build with c++11. Ok.

Done (3). Lund

- Account on iridium in May, thanks to Florido.
- Install first the geant4-8.2 version by using the default compiler : no resistance. Run a simple slurm job, ok too.
- Geant4-10, needed more work :
 - Default compiler not c++11 compatible, find and use a 4.9.3 from [/cvmfs/sft.cern.ch/lcg](http://cvmfs/sft.cern.ch/lcg)
 - Have to install a recent cmake (3.8.2) needed by Geant4-10.
 - Build geant4-10. no problem here.
 - Build and install MEMPHYS/geant4-10. It works ! 😊

Done (4). Lund



- Install clang (3.4). Thanks to Florido.
- The idea is to use a local compiler and have a full local build (it may ease a lot debugging).
- Build geant4-10 with it. (In fact, I think it is probably the first G4 app built with Linux/clang++/c++11 !).
- A slight resistance with one Geant4 file => reported.
- But MEMPHYS works with it ! 😊

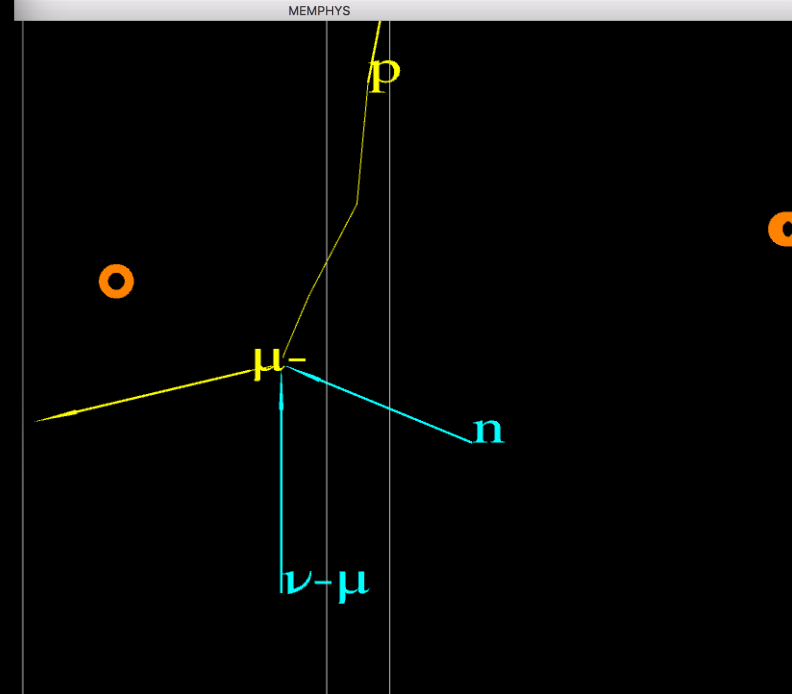
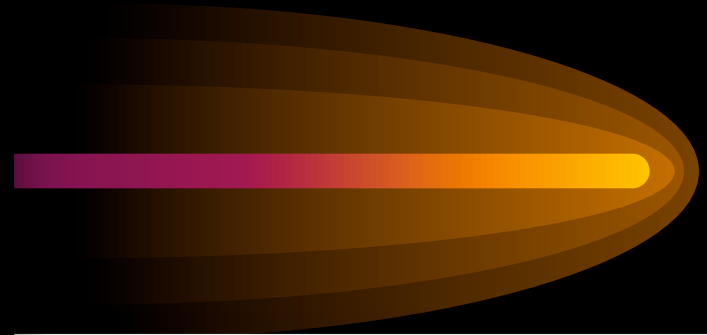
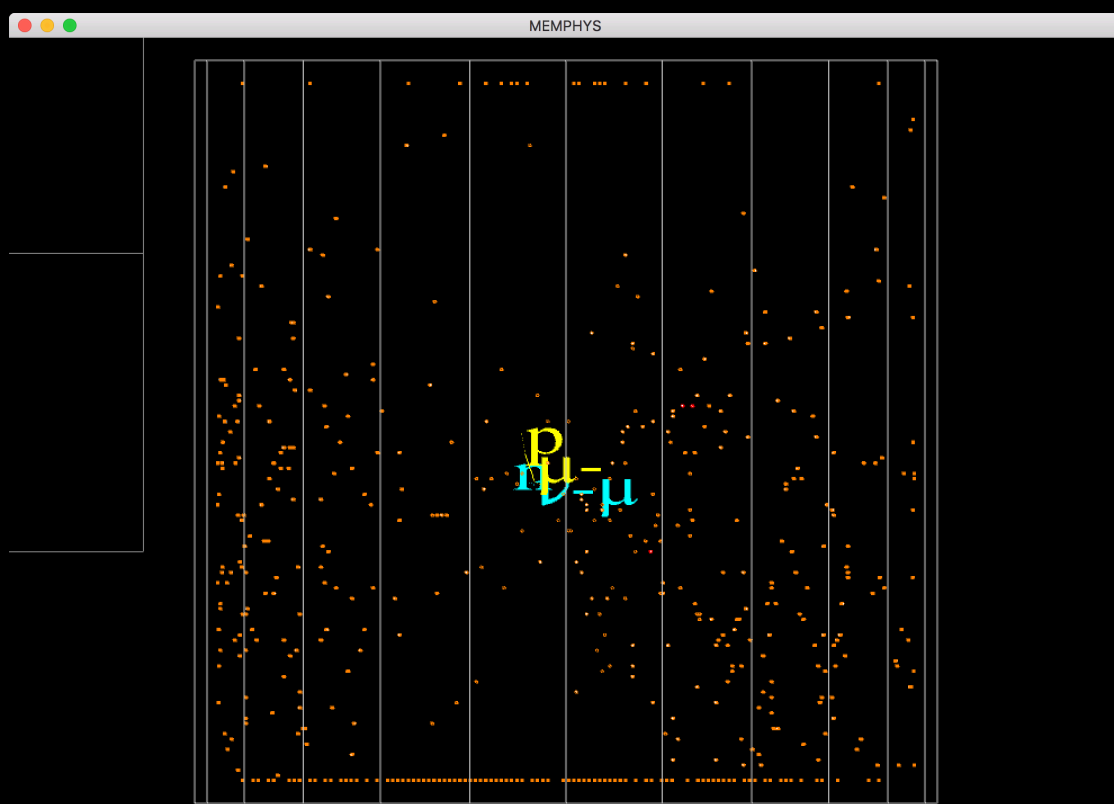
Done (5)

- Right now things readable (and copyable) at :
 /nfs/users/gbarrand/usr/local and ~/public
- Have a git repository on github :
 <https://github.com/gbarrand/MEMPHYS.git>
- Two releases/branches :
 - MEMPHYS / version_9_0_0 : on geant4-8.2
 - MEMPHYS / version_10_0_0 : on geant4-10 with g++
- There are README files to build, install and run.
- Have to do a release/branch for geant4-10 and clang.

To do...

- Well, doors are opened for a lot of things !
- Install on a more public place.
- I have some README to build and run, but I have started a MEMPHYS web page for instructions under my portal :
<http://softinex.lal.in2p3.fr>
- In principle cloning the code for a similar detector should be easy. (namespace MEMPHYS easy to change).
- I would like to restore some visualisation (with new tools).
- I would like to look about some parallelisation around the production of the .root files.

Vis Preliminary



The world changed in 2007/2010.
We can have vis on laptops but also on
Android, iOS and tactile Windows-10
devices.

Conclusions



- Not so much problem up so far to restore MEMPHYS.
- In principle the original request of Nikos is fulfilled.
- I can't really engage to a new simulation/experiment **but as a Geant4 and IN2P3 member**, I am interested to improve the MEMPHYS code which could be used as a test bed to test tools around « analysis tools », parallelisation and visualisation on a scale similar to what you want to do.
- (Right now I work only on some G4/examples...)