## GridCL, June 2012

### Presentation of the project

Time is over when we were doubling the speed of our programs just buying a faster computer every 18 months. Today more computing power is obtained increasing the number of "core" on each chip. One can already use GPUs as general purpose coprocessors, and soon many-core CPUs will be able to sustain concurrent threads in hundreds. In order to effectively exploit this computing power, scientists must deeply refactor their code. In GridCL, we have chosen to focus on OpenCL, a recent standard language for parallelism, which targets many kinds of hybrid architectures, and this may help us deal with the heteregenous hardware we mix in our computing grids. By the end of this project, we hope to convince and educate P2IO physicists about thinking parallel, we hope to evaluate how worth it is to integrate GPU cards in our grid resources, and we want to have our domain specific applications ready for many-core advent.

### Status

The very first months of the project have been dedicated to pursue and finalize the review of all P2IO laboratories and teams which could be involved in the project. The original members were mainly from high energy physics (LLR,LAL,IPNO), but we have now been joined by actors of astrophysics (IAS,IRFU) which bring their CUDA expertise to the group. Two pilot applications are currently under study and refactoring for OpenCL : RooFit, a general fitting package, and the tracking of charged particles in heavy ions CMS events. No results yet : it proves incredibly laborious to explore the many data structures within a huge software repository such as the CMS one. For what concerns the grid aspects, a GridCL virtual organization has been created, which we have populated with some of our existing multi-core computers. We plan to buy some GPUs and many-core hardware but we are tempted to wait for the came out of new NVIDIA Tesla Kepler cards (end of the year) and the new INTEL Knights Corners (also end of the year). The initial intention of buying a single integrated server with half a dozen GPUs has been dropped, and we are know in favor of something more flexible, made of several pairs of different cards, but we need to progress first on the pilot applications before we can better define the technical requirements and negociate with providers.