

# The PetaQCD project

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The study and design of a very ambitious petaflop cluster exclusively dedicated to Lattice QCD simulations started in early '08 among a consortium of 7 laboratories (IN2P3, CNRS, INRIA, CEA) and 2 SMEs. This consortium received a grant from the French ANR agency in July, and the PetaQCD project kickoff is expected to take place in January '09. Building upon several years of fruitful collaborative studies in this area, the aim of this project is to demonstrate that the simulation of a  $256 \times 128 \times 3$  lattice can be achieved through the HMC software, using a machine with a reasonable cost/reliability/power consumption. It is expected that this machine can be built out of a rather limited number of processors (e.g. between 1000 and 4000), although capable of a sustained petaflop CPU performance.

The proof-of-concept should be a mock-up cluster built as much as possible with off-the-shelf components, and 2 particularly attractive axis will be mainly investigated, in addition to fast all-purpose multi-core processors: the use of the new brand of IBM-Cell processors (with on-chip accelerators) and the very recent Nvidia GP-GPUs (off-chip co-processors). This cluster will obviously be massively parallel, and heterogeneous. Communication issues between processors, implied by the Physics of the simulation and the lattice partitioning, will certainly be a major key to the project.

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