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Computing Challenges at the Pierre Auger Observatory

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Pierre Auger Observatory needs a lot of computing resources for simulation of cosmic ray showers with ultra-high energies up to 10^{21} eV. We are able to use simultaneously several thousand cores and generate more than 1 TB of data daily in the current EGI grid environment. We are limited by available resources and a long duration of a single job for very high energies, which is already simplified by thinning parameter in the Corsika simulation program. Details of the time traces which would be useful for mass composition analyses and hadronic interaction physics get lost by thinning. Thousand times more computing power and correspondingly increased storage is needed for simulations without thinning. Significant speedup could be obtained by using many CPUs or even GPUs for generation of a single shower. We discuss the current trends in the middleware heading to a provision of a whole worker node with many cores to a single parallel job. The expected development in the Corsika and Geant4 towards parallelization and usage of GPU is needed for an efficient usage of the new infrastructure. Possibilities of computing in clouds are also discussed.

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