ICRC

The Astroparticle Physics Conference
34th International Cosmic Ray Conference
July 30 - August 6, 2015
The Hague, The Netherlands

Contribution ID: **750**   Type: **Poster contribution**

Parallelization schemes for AIRES's Monte Carlo

Thursday 30 July 2015 15:30 (1 hour)

In this work we introduce different parallelization schemes implemented in the AIRES (AIR-shower Extended Simulations) software, in order to perform simulations, without thinning algorithm, in HPC clusters.

The AIRES's particle stack was modified to define a new structure allowing its parallelization using MPI library.

Adopting this new structure, three different parallelization tactics were implemented according to how particles are transferred between the working nodes: 1) Transfer based on the amount of particles stored in the stacks, 2) Transfer based on the energy of particles stored in the stacks 3) Transfer based on the energy of particles stored in the stacks, with decisions according the characteristics of the particle's nucleus type.

As part of this paper will be present a comparison of the obtained results between the most performant parallelized version of AIRES and original version of AIRES, considering longitudinal and lateral profiles of vertical showers induced by Fe primaries of $10^{16.75}eV$.

Towards the end of this work we will include an analysis of performance results of each parallelization tactic evaluated by different simulations of vertical showers whose energies are between $10^{15.75}eV$ and $10^{18.75}eV$.

Collaboration

– not specified –

Registration number following "ICRC2015-I/"

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Session Classification: Poster 1 CR

Track Classification: CR-TH