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The parallel framework for the partial wave analysis

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Partial wave analysis is a fundamental technique for extracting hadron spectra and hadron decay properties.
It is employed in some current experiments like BES-III, LHCb, COMPASS, and future ones like PANDA.
The analysis is typically performed using the event-by-event maximum likelihood method. For the BES-III
experiment, fitting the accumulated data (about 1.225 billion J/psi decays) using currently employed software
takes a long time which significantly complicates and sometimes restricts the data analysis. The development
of new multicore CPU's and GPU's makes using parallel programming technologies natural to decrease the
data fitting time. For this purpose, the parallel framework for partial wave analysis is being developed. Par-
allelization options employing various computing technologies including OpenMP, MPI, and OpenMP with
Xeon Phi co-processor extensions were studied taking into account distinctive features of the task and exter-
nal software used in the reation. They were tested using the resources of the heterogeneous cluster HybriLIT.
The results on calculation speedup and efficiency as well as a comparative analysis of the developed parallel
implementations are presented.

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