Describing Heavy ion collisions with High Performance Computer

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Heavy ion collisions at intermediate energy region(20 ~ 200 MeV/u) are effective methods to study finite nuclei or nuclear matters. Transport theory can describe heavy ion collisions, which is non-equilibrium process between quantum many-body systems. Many transport models have been already developed such as GIBUU, UrQMD, AMD. In order to describe interactions and collisions between many nucleons (protons and neutrons), these numerical models require huge amount of computer resources.

There are two transport models developed in Korea, DaeJeon Boltzmann Uehling Ulenbeck (DJBUU) code[1] and Sindong Quantum Molecular Dynamins (SQMD) code[2], focusing on the experiments that will be conducted at Heavy ion accelerator RAON which is under construction in Daejeon. There exist significant differences between both models, so comparing results from two models is extremely meaningful. For valid comparison, many events (10,000 ~ 1,000,000) have to be executed, and we need to run codes with High Performance Computer (HPC). With beginner account gotten from Supercomputing Center in KISTI, some tests have been performed and noticeable improvements were shown. In this presentation, we introduce numerical simulation codes for heavy ion collisions, DJBUU and SQMD, and compare the efficiencies between HPC, NURION and Mac pro (late 2014).

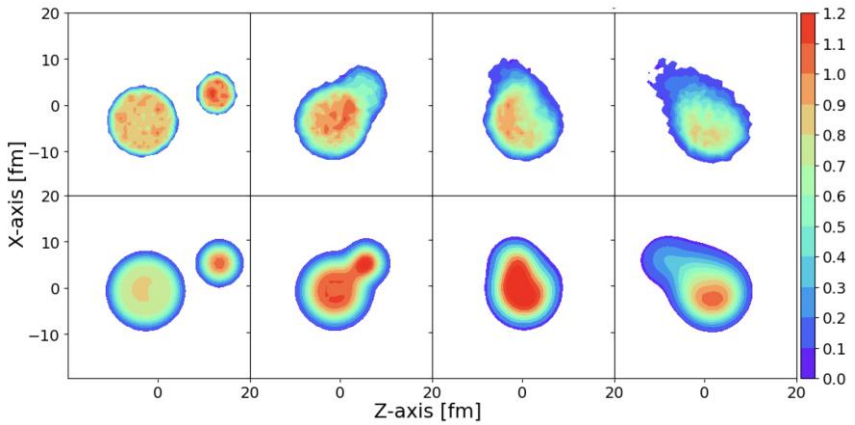

Figure 1 Contour results of each Transport codes, DJBUU (above) and SQMD (below)

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References

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