5 - 28 Study of Light Charged Particles Production in $^{12}C + ^{12}C$ at 95 AMeV with AMD-FM Model

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Light charged particles (LCPs) are copiously produced in various kinds of nuclear reactions. As one of the experimental observables, the energy spectra of the emitted particles play important role for studying the transport mechanism of nucleons in nuclear reactions. In this work, the production of LCPs from $^{12}C + ^{12}C$ reaction at 95 MeV/u are investigated by using a modified version of antisymmetrized molecular dynamics (AMD-FM)[1], coupled with GEMINI++[2].

In Fig. 1, the comparisons between the calculated results of the AMD-FM model and the experimental data at different emission angles in an absolute scale are presented. For protons, the experimental PLF spectra at 11° show smaller yield, but harder lope than those of the AMD-FM simulations. The experimental spectra at θ=19°, are almost perfectly reproduced by the simulation. The TLF spectra at low energy for these angles are over-predicted by about a factor of two. This overprediction is observed for all particles. For deuterons, the slopes of the IV component are well reproduced by the simulation, but the absolute cross sections are slightly overestimated at 13° and underpredicted at 43°. Similar results are obtained for tritons. For ^{3}He, on the contrary of the other LCPs, the contribution from the secondary decay process is very small and the spectra are dominated by primary emission at all angles. Similar observation is made for ^{4}He particles at larger angles. For the PLF component, the simulation overpredicts, similar to other LCPs except for ^{3}He.

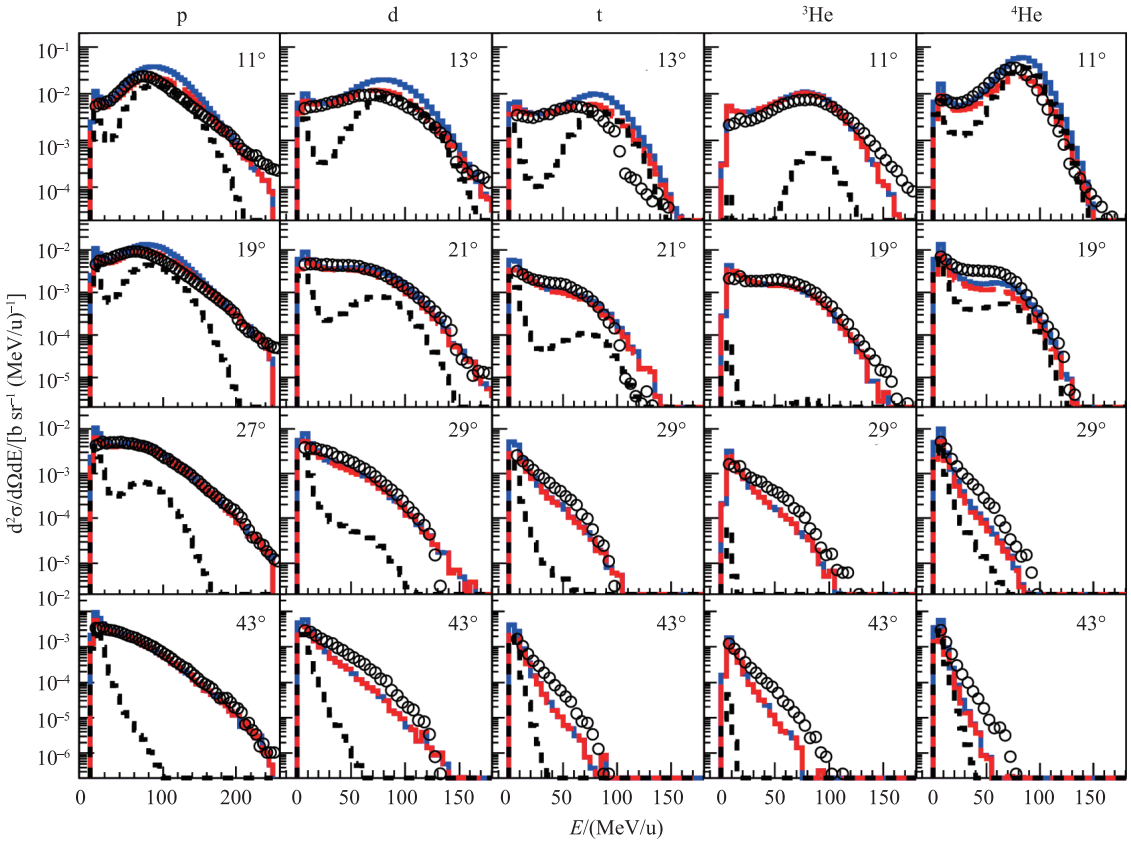

Fig. 1 Energy spectra of light charged particles at selected angles with impact parameter $b = 0 \sim 8$ fm. Experimental data are indicated by circles. The dashed histograms represent the particles generated from the primary hot nuclei, the dotted histograms represent the particles from the secondary processes, and the solid histograms show the total particles.

References

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[2] R. J. Charity, Phys. Rev. C, 82(2010)014610.

[3] J. Dudouet, D. Juliani, M. Labalme, et al., Phys. Rev. C, 88(2013)024606.