Light nuclei production in Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV

L. L. Zhu,[1] H. Zheng,[2] C.M. Ko, and Y. Sun
[1]*Department of Physics, Sichuan University, Chengdu 610064, China*
[2]*Laboratori Nazionali del Sud, INFN, via Santa Sofia, 62, 95123 Catania, Italy*

Based on an extended blast-wave model, which includes a space-momentum correlation in the phase-space distribution of high momentum nucleons and has its parameters fitted to the measured proton transverse momentum spectrum [1] and elliptic flow [2] from Pb+Pb collisions at $\sqrt{s}$=2.76 TeV for the two centralities of 10-20% and 30-40%, we have used the coalescence model to calculate the transverse momentum spectra and elliptic flows of deuteron and helium-3 [3]. As shown in Fig. 1, our results for deuterons agree with the experimental data from the ALICE Collaboration [4,5]. Although the deuteron elliptic flow obtained from the blast-wave model by using the deuteron mass is roughly consistent with

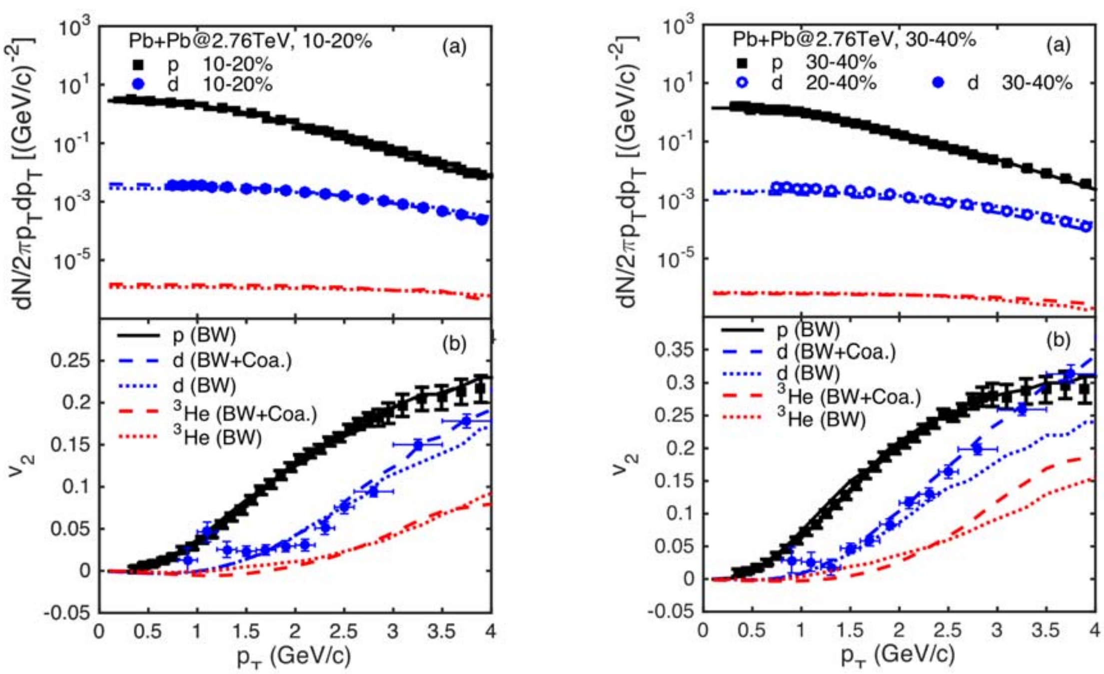

FIG. 1. Transverse momentum spectra and elliptic flows of midrapidity proton (p), deuteron (d) and helium-3 (^{3}He) from the blast-wave model (BW) and the coalescence model (BW+Coa.) for Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV and centrality of 10-20% (left window) and 30-40% (right window). Data shown by black solid squares and blue solid circles for proton and deuteron, respectively, are taken from Ref. [1] and Ref. [4] for their respective transverse momentum spectra, and from Ref. [2] and Ref. [5] for their respective elliptic flows.

the data within their systematic errors for the centrality of 10-20%, it fails to describe the data at large transverse momentum for collisions at the centrality of 30-40%. A similar difference is found between the helium-3 elliptic flows at large transverse momentum obtained from the coalescence model and the blast-wave model using the helium-3 mass. These results are similar to those shown previously for the elliptic flows of deuteron and helium-3 in Au+Au collisions at RHIC [6]. Our studies thus demonstrate that light nuclei production can provide the possibility to probe the properties of the emission source of nucleons in relativistic heavy ion collisions, complimenting the study based on the Hanbury-Brown-Twiss (HBT) interferometry of identical particles emitted at freeze-out [7,8] as originally pointed out in Refs. [9,10].

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