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Production of light nuclei, coalescence parameter and Blast-wave model comparison in heavy-ion collisions at RHIC.

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A strongly interacting medium, namely Quark Gluon Plasma (QGP), is formed in high-energy heavy-ion collisions at RHIC. Light nuclei (anti-nuclei) can be produced in such heavy-ion collisions by the recombination of produced nucleons (anti-nucleons) or stopped nucleons. This formation process is called final-state coalescence. The production of light nuclei is dependent on the baryon density and the correlation (freeze-out) volume. Therefore, by studying the yield and azimuthal anisotropy of light nuclei (anti-nuclei) and comparing them with that of proton (anti-proton) we can gain insight in the particle production mechanism via coalescence and physical properties of the expanding system at the thermal freeze-out. Unlike the quark coalescence phenomena of identified hadrons, nucleonic coalescence is directly measurable as both the light nuclei and nucleons (proton and anti-proton) are measured by the detectors in a given experiment.
In this poster, we will show the invariant yields of d and
$\overline{d}$ for Au+Au collisions at $\sqrt{s_{NN}}$ = 7.7, 11.5, 19.6, 27 and 39 GeV from the STAR experiment at RHIC. Light nuclei are identified using the Time Projection Chamber (TPC) and Time-of-Flight (ToF) detector of the STAR experiment. The ToF detector enhances the identification of the light nuclei and extends the p_T reach of light nuclei beyond 1 GeV/c. The p_T spectra of nuclei will be compared with p ($\overline{p}$) to obtain the nuclei to nucleon ratio and B_2 parameter to understand the light nuclei production mechanism in heavy-ion collisions. Light nuclei spectra will also be compared with the prediction from Blast-wave model, using the fit parameters obtained from Blast-wave fit of π, K, p spectra.

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