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ALICE

Recent results on light (anti-)nuclei production in Pb-Pb collisions with ALICE at the LHC

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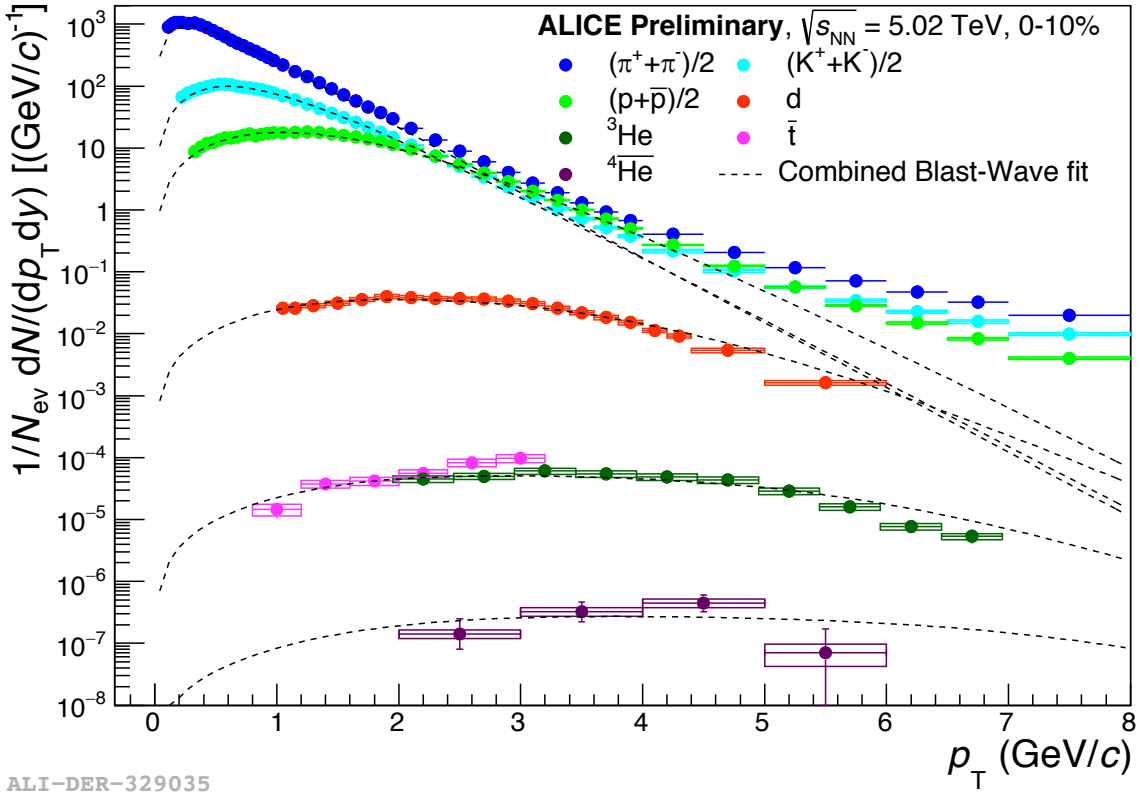
Introduction – production of light nuclei

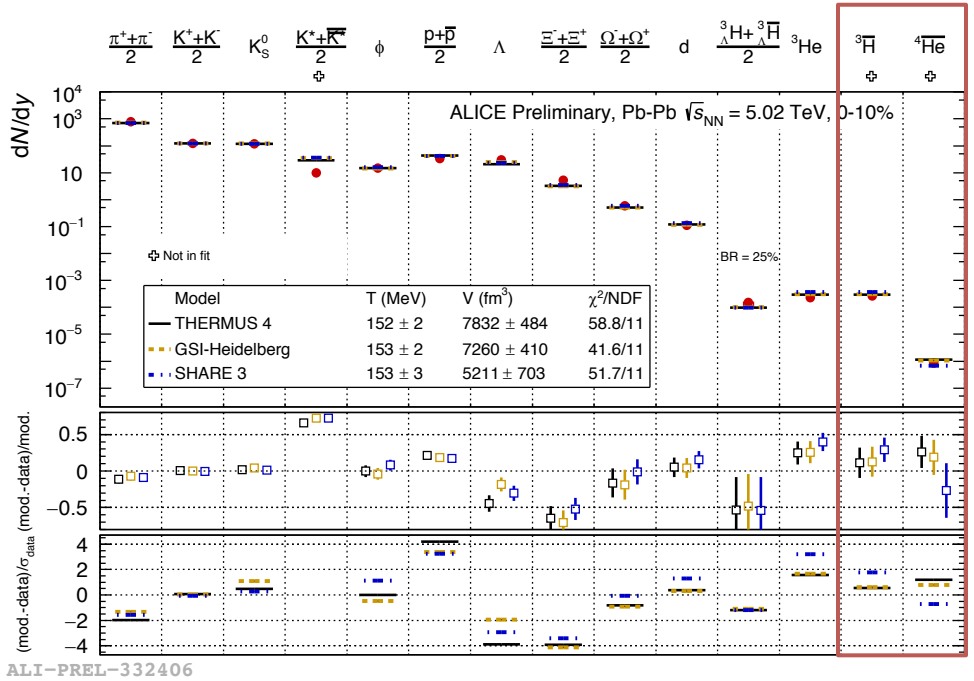
- Light (anti-)nuclei are produced at the LHC in pp, p-Pb and, in particular, Pb-Pb collisions
- The particle abundancies after hadronization provide information about their production mechanism
- Abundance of nuclei strongly sensitive to the chemical (T_{ch}) and kinetic (T_{kin}) freeze-out temperatures
- Binding energy of nuclei (few MeV) small compared to these temperatures
- Two alternative approaches exist to describe the production of light (anti-)nuclei:
  - → Statistical hadronization model (nuclei are produced at T_{ch} in thermal equilibrium)
  - → Coalescence model (nuclei are produced at T_{kin} by nucleons that are nearby in space and have similar velocities)

Particle p_T spectra including light nuclei

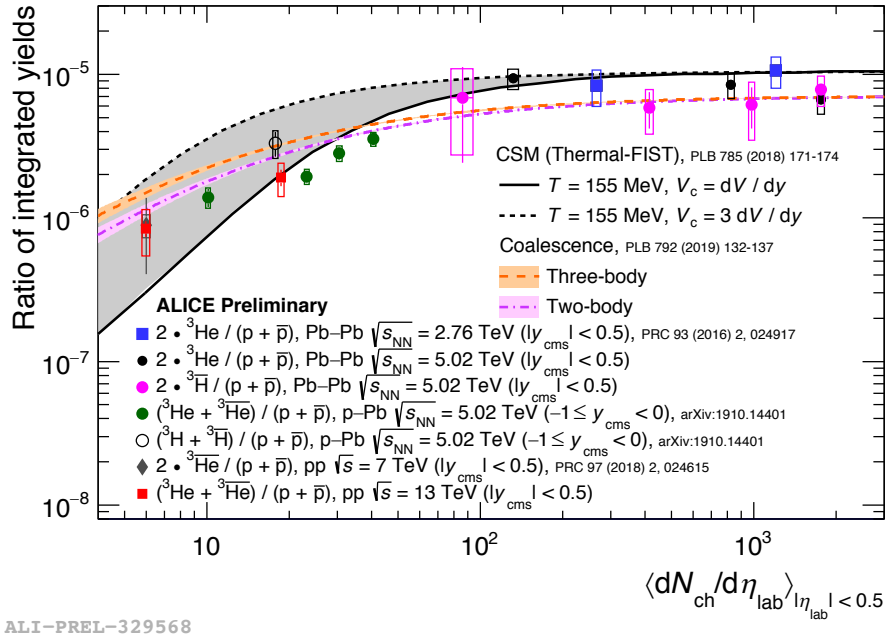


- p_T spectra of $\pi^{\pm}$, $K^{\pm}$, p, d, $\bar{t}$, ^{3}He and $^4\overline{\text{He}}$ in central Pb-Pb collisions simultaneously fitted with Blast-Wave function
  - → Describes all particle species including light nuclei quite well
- Spectra show clear radial flow with common flow velocity $\langle\beta\rangle$ and kinetic freeze-out temperature T_{kin}
- At higher p_T the spectra are not expected to be described by the Blast-Wave fit as the shape is dominated by high-p_T processes, like jets

Comparison with statistical hadronization and coalescence models



- Different thermal model implementations describe the p_T-integrated particle yields including light (anti-)nuclei well with T_{ch} of about 153 MeV



- The ratio of integrated yield of A=3 nuclei over integrated proton yield shows a clear trend as a function of multiplicity
  - → Rather well described by a canonical statistical thermal (CMS) and coalescence models