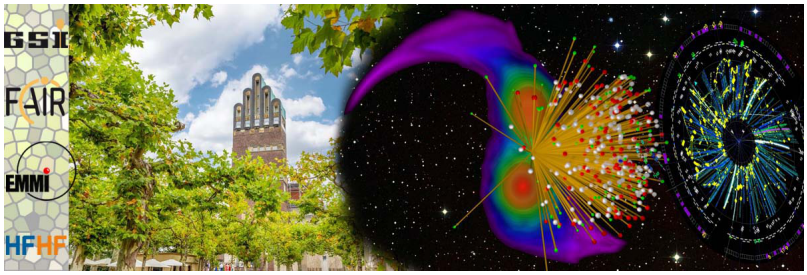

Contribution ID: **3** Type: **Oral**

Nuclear equation-of-state studies with the compact spectrometer for heavy-ion experiment (CSHINE)

Monday, 18 September 2023 15:00 (20 minutes)

The isospin-dependent equation of state of nuclear matter, i.e. symmetry energy $E_{sym}(\rho)$ plays an important role in the study of nuclear physics and Astrophysics. In terrestrial lab, heavy ion collision provides a unique way to constrain $E_{sym}(\rho)$. So a compact spectrometer for heavy ion experiment（CSHINE）is built and coincident events are measured.

Via HBT intensity interferometry method, the proton emission timescale $\tau_p \approx 100$ fm/c is extracted, and the dynamic emission order of $\tau_p < \tau_d < \tau_t$ is evidenced in $30MeV/u^{40}Ar + ^{197}Au$, indicating that the neutron rich particles are emitted earlier. Transport model simulations demonstrate that the emission order of light charged particles depends sensitively on the stiffness of the nuclear symmetry energy [PLB, 825, 136856 (2022)].

The anticorrelation of the neutron-to-proton ratio N/Z of the two emitted clusters in $25MeV/u^{86}Kr+^{208}Pb$ is observed, revealing a vivid ping-pong picture on how the isospin degree of freedom evolves to equilibration through cluster emission. The novel observation provides a new window to inspect the coupling of isospin dynamics and cluster formation, and confirms the general importance of symmetry energy in systems from ground to highly excited states [PRC, 107, L041601 (2023)].

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