



Contribution ID: 54

Type: Oral presentation

## In-medium and isospin effects of strange particles in heavy-ion

Monday, 22 June 2015 16:25 (20 minutes)

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Dynamics of strange particles produced in proton induced nuclear reactions and in heavy-ion collisions near threshold energies has been investigated within the Lanzhou quantum molecular dynamics (LQMD) transport model[1]. The in-medium modifications on particle production in dense nuclear matter are considered through corrections on the elementary cross sections via the effective mass and the mean-field potentials. A repulsive kaon-nucleon potential is implemented in the model through fitting the flow data and inclusive spectra in heavy-ion collisions, which enhances the energetic kaon emission squeezed out in the reaction zone and leads to a variation of the high-momentum spectrum of the  $K^0/K^+$  yields. It is found that the stiffness of nuclear symmetry energy plays a significant role on the isospin ratio with decreasing the incident energy and a hard symmetry energy has a larger value of the  $K^0/K^+$  ratio in the domain of subthreshold energies. The attractive antikaon-nucleon potential enhances the subthreshold  $\bar{K}$  production and also influences the structure of inclusive spectra. The strangeness production is strongly suppressed in proton induced reactions in comparison to heavy-ion collisions. The kaon-nucleon and antikaon-nucleon potentials change the structures of rapidity and transverse momentum distributions, and also the inclusive spectra[2]. The measured data from KaoS collaboration have been well explained with inclusion of the in-medium potentials.

[1] Z. Q. Feng, Phys. Rev. C 83, 067604 (2011); 84, 024610 (2011); 85, 014604 (2012); Nucl. Phys. A 878, 3 (2012); Phys. Lett. B 707, 83 (2012).

[2] Z. Q. Feng, Phys. Rev. C 87, 064605 (2013); Z. Q. Feng, Wen-Jie Xie, Gen-Ming Jin, 90, 064604 (2014).

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**Session Classification:** Equation of State of Neutron-Rich Nuclear Matter, Clusters in Nuclei and Nuclear Reactions

**Track Classification:** Equation of State of Neutron-Rich Nuclear Matter, Clusters in Nuclei and Nuclear Reactions