**Hadronic effects on Lambda hyperon polarization in relativistic heavy ion collisions**

H. Sung,[1] C. M. Ko, and S. H. Lee[1]

[1]*Department of Physics and Institute of Physics and Applied Physics, Yonsei University, Seoul 03722, Korea*

We have studied the effect of hadronic scatterings on the spin polarization of Lambda hyperon in Au-Au collisions at $\sqrt{s_{NN}} = 7.7$ GeV in a schematic kinetic approach by using thermally averaged Λ spin flip and non-flip cross sections [1]. These cross sections, shown in the left window of Fig.1, are calculated by including contributions from both the *s*-channel process through the $\Sigma^*(1358)$ resonance and the *t*-channel process via the exchange a scalar sigma meson. Although the thermally averaged cross sections due to the *t*-channel process is about a factor of 1.3 larger than those of the *s*-channel process, as shown in the middle window of Fig. 1, the ratio of the spin flip to non-flip cross sections is negligibly small compared to that from the s-channel process, which has a constant value of 1/3.5 [2]. Because of the latter small value, the spin polarization of Lambda hyperon is found to decrease by only about 7% during the hadronic stage of these collisions as shown in the right window of Fig. 1. Our result thus justifies the assumption in theoretical studies of Lambda hyperon polarization that compare its value calculated at the chemical freeze out to the measured one at the kinetic freeze out [3,4].

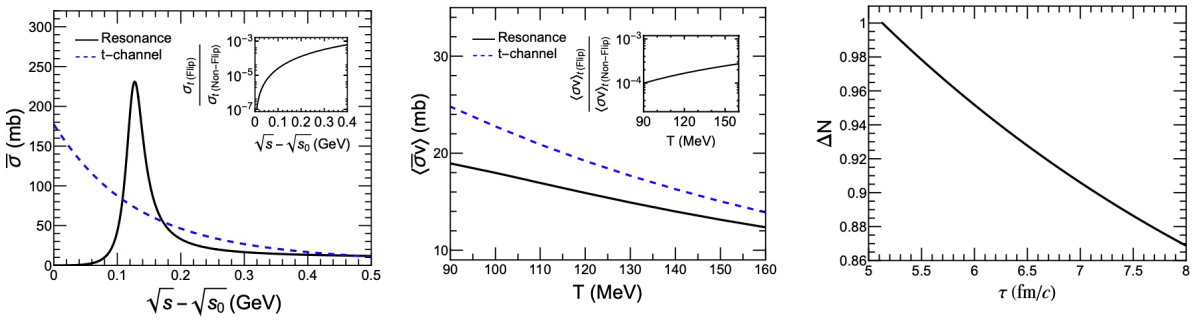


FIG. 1. Left window: Energy dependence of spin averaged $\boldsymbol{\Lambda + \pi \rightarrow \Lambda + \pi}$ cross section for the *s*-channel process through the $\boldsymbol{\Sigma^*(1358)}$ resonance (solid line) and the *t*-channel process via the exchange a scalar sigma meson (dashed line). Also shown in the inset is the ratio of spin flip to non-flip cross sections for the *t*-channel process. Middle window: Thermally averaged $\boldsymbol{\Lambda - \pi}$ scatting cross section in *s*-channel (solid line) and t-channel (dashed line) as functions of temperature. Also shown in the inset is the ratio of thermally averaged Lambda spin flip to non-flip cross sections as a function of temperature. Right window: Time evolution of the normalized number difference between spin up and spin down Lambda hyperons in Au-Au collisions at $\boldsymbol{\sqrt{s_{NN}} = 7.7}$ GeV.

[1] H. Sung, C.M. Ko, and S.H. Lee, arXivv:2404.15890 [nucl-th].

[2] C.M. Ko, EPJ Web Conf. **276**, 06001 (2023).

[3] I. Karpenko and F. Becattini, Eur. Phys. J. C **77**, 213 (2017).

[4] H. Li, L.-G. Pang, Q. Wang, and X.-L. Xia, Phys. Rev. C **96**, 054908 (2017).