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## Measurements of hyperon polarization in heavy-ion collisions at $\sqrt{s_{NN}} = 3 - 200$ GeV with the STAR detector

Thursday, 7 April 2022 10:00 (20 minutes)

In heavy-ion collisions, the observation of the global hyperon polarization,  $\bar{P}_H$ , ranging from  $\sqrt{s_{NN}} = 7.7$  GeV to  $5.02$  TeV has revealed the existence of large vorticities perpendicular to the reaction plane due to system's orbital angular momentum. We present recent results on  $\bar{P}_H$ , and differential measurements thereof, extended to the low energies of 3 and 7.2 GeV [1]. A notable advantage of the STAR acceptance at low  $\sqrt{s_{NN}}$  is the ability to measure the dependence of  $\bar{P}_H$  on  $y$  across the full range of hyperon production in  $y$  which can test the predictions of numerous model calculations. Further studies of differential measurements of  $\bar{P}_H$  are presented as well using Au+Au collisions at  $\sqrt{s_{NN}} = 19.6$  and 27 GeV which allow for comparisons to the low- $\sqrt{s_{NN}}$  measurements presented here and to the high-energy measurements studied in Ref. [2]. Studies of the vortical flow structure's dependence on system size are also possible using Ru+Ru and Zr+Zr collisions at  $\sqrt{s_{NN}} = 200$  GeV which are presented here as well. Furthermore, while  $\bar{P}_H$  reveals information about the vorticity driven by angular momentum, a recent study [3] measuring local polarization along the beam direction,  $\bar{P}_Z$ , revealed vorticity in the QGP arising from collective flow. The measurement stands in disagreement with a number of model calculations and, to shed light on the matter, measurements of  $\bar{P}_Z$  can be conducted in smaller systems than Au+Au or relative to higher-order event-plane angles. These measurements of  $\bar{P}_Z$  in Ru+Ru and Zr+Zr at  $\sqrt{s_{NN}} = 200$  GeV presented here will provide valuable insight into the mechanisms of flow-driven vorticity.

[1] M. S. Abdallah et al. Global  $\Lambda$ -hyperon polarization in Au+Au collisions at  $\sqrt{s_{NN}} = 3$  GeV. {it Phys. Rev. C}, 104(6):L061901, 2021.

[2] J. Adam et al. Global polarization of  $\Lambda$  hyperons in Au+Au collisions at  $\sqrt{s_{NN}} = 200$  GeV. {it Phys. Rev. C}, 98:014910, 2018.

[3] J. Adam et al. Polarization of  $\Lambda$  ( $\bar{\Lambda}$ ) hyperons along the beam direction in Au+Au collisions at  $\sqrt{s_{NN}} = 200$  GeV. {it Phys. Rev. Lett.}, 123(13):132301, 2019.

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