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Possible effect of mixed phase and deconfinement upon spin correlations in the $\Lambda\bar{\Lambda}$ pairs generated in relativistic heavy-ion collisions

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Spin correlations for the $\Lambda\Lambda$ and $\Lambda\bar{\Lambda}$ pairs, generated in relativistic heavy-ion collisions, and related angular correlations at the joint registration of space-parity nonconserving hadronic decays of two hyperons are theoretically analyzed. These correlations give important information about the character and mechanism of multiple processes, and the advantage of the $\Lambda\Lambda$ and $\Lambda\bar{\Lambda}$ systems over other ones is conditioned by the fact that the P-odd decays $\Lambda \to p + \pi^-$ and $\bar{\Lambda} \to \bar{p} + \pi^+$ serve as effective analyzers of spin states of the Λ and $\bar{\Lambda}$ particles. The correlation tensor components can be derived by the method of "moments" – as a result of averaging the combinations of trigonometric functions of proton (antiproton) flight angles over the double angular distribution of flight directions for products of two decays. The properties of the "trace" T of the correlation tensor (a sum of three diagonal components), which determines the angular correlations as well as the relative fractions of the triplet states and singlet state of respective pairs, are discussed . In the present talk, spin correlations for two identical particles ($\Lambda\Lambda$) and two non-identical particles ($\Lambda\bar{\Lambda}$) are generally considered from the viewpoint of the conventional model of one-particle sources. In the framework of this model, correlations vanish at enough large relative momenta. However, under these conditions – especially at ultrarelativistic energies – in the case of two non-identical particles ($\Lambda\bar{\Lambda}$) the two-particle annihilation sources (two-quark, i.e. quark–antiquark, and two-gluon ones) start playing a noticeable role and lead to the difference of the correlation tensor from zero. In particular, such a situation may arise, when the system passes through the "mixed phase" and – due to the multiple production of free quarks and gluons in the process of deconfinement of hadronic matter – the number of two-particle sources strongly increases.

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