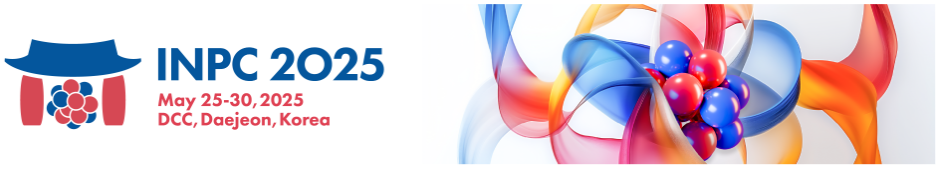

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Probing fluctuating color fields of QCD matter from spin alignment in relativistic heavy ion collisions

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In high-energy nuclear collisions, a considerable number of gluons can be produced in the quark gluon plasma or even the glasma phase as its precursor with overpopulated gluons that may be delineated by fluctuating chromo-electromagnetic fields (or color fields for short) in the color-glass-condensate effective theory. The recent measured spin alignment signals of vector mesons in relativistic heavy-ion collisions, possibly stemming from fluctuating spin correlations of quarks and antiquarks in the quark coalescence scenario for the formation of vector mesons, could provide an alternative probe for such fluctuating color fields. By utilizing the recent developed quantum kinetic theory of quarks with phenomenological models and approximations, we investigate the momentum dependence for dynamical spin alignment of ϕ mesons from color fields in the glasma phase. Also, the non-dynamical spin alignment coming from the color fields characterizing soft thermal gluons in the quark gluon plasma is qualitatively studied for comparison. Moreover, we propose to employ both the transverse and longitudinal spin alignment perpendicular and parallel to the beam direction, repectively, to further distinguish the different underlying effects.

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