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New perspective of QCD cosmology with Beyond the Standard Model

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This talk plans to introduce a couple of recent new phenomenologies and cosmology related to the QCD phase transition epoch, coupled to Beyond the Standard Model, in the thermal history of the universe. Baryogenesis with a QCD-induced dynamical chemical potential (a la Higgs relaxation mechanism), strong CP problem, and gravitational wave predictions will be covered in scenarios of this class, which can also be embedded into the scalegenesis to address the dynamical origin of mass based on the classical scale invariance. Typical new physics accessible at the upcoming collider experiments are to be a dark eta-prime with mass of sub GeV and leptoquarks with mass of sub GeV, or sub TeV, which depends on the type of baryogenesis. Possible issues left necessary to persist in the future will also be addressed.

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