The long range order in QCD: Applications to heavy ions and cosmology ARIEL ZHITNITSKY, University of British Columbia — We argue that the local violation of P invariance in heavy ion collisions is a consequence of the long range topological order which is inherent feature of strongly coupled QCD. The phenomenon is similar to many well-known topologically ordered condensed matter systems with a gap. Our arguments are based on an analysis of the so-called "deformed QCD" model which is a weakly coupled gauge theory, but nevertheless preserves all the crucial elements of strongly interacting QCD, including confinement, nontrivial theta dependence, degeneracy of the topological sectors, etc. We also discuss possible cosmological applications of this long range order in QCD. Talk is based on three recent papers:

[1] "QCD as a topologically ordered system," Annals Phys. 336, 462 (2013).
[2] "Local P Violation Effects and Thermalization in QCD: Views from Quantum Field Theory and Holography," Nucl. Phys. A 886, 17 (2012).
[3] "Inflaton as an auxiliary topological field in a QCD-like system," Phys. Rev. D 89, 063529 (2014).

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