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Fluctuation theorem in Bjorken expansion RYUICHI KURITA, the Univ. of Tokyo, RIKEN, Sophia University, KENICHI NAGAI COLLABORATION, KOICHI MURASE COLLABORATION, TETSUFUMI HIRANO COLLABORATION — In the hot and dense QCD matter, quarks and gluons are deconfined to form Quark-Gluon Plasma(QGP). The QGP, which existed in the early universe, can be created experimentally by the relativistic heavy ion collisions at RHIC and LHC. The dynamics of the QGP in these experiments has been described by relativistic hydrodynamics. Towards detailed description of the QGP dynamics, event-by-event initial fluctuations have been included in the hydrodynamic model. In addition to these fluctuations, fluctuations originated from thermal noises during hydrodynamic evolution should be taken into account on an event-by-event basis. To investigate this hydrodynamic fluctuation, causal fluctuating hydrodynamics was formulated recently.[1] Applying this framework to the (0+1)-dimensional Bjorken expansion, we investigate how hydrodynamic noises cause entropy fluctuations. The probability of the events with entropy decreased and that with entropy increased are related through "fluctuation theorem."[2] Through this theorem, we calculate the entropy fluctuation and claim that the thermal noise gets more important in the smaller systems such as p-A and peripheral A-A collisions.

[1]K. Murase and T. Hirano, arXiv:1304.3243
[2]D. J. Evans and D. J. Sarles, **Phys. Rev. E** 52, 5839 (1995)

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