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Exotic hadrons and/or molecules from relativistic heavy ion collisions

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Exotic hadrons are one of the most interesting topics recently studied in the hadron physics as their structure are related to the fundamental ingredients in QCD.

Moreover, the production of light nuclei and excited states became realistic in heavy ion collisions. Hence, we will discuss the production of exotic hadrons with strange, charm and bottom quarks in heavy ion collisions, and how the production rates can be used to discriminate between compact multiquark configuration from hadronic molecular configurations [1,2].

Specifically, we consider the coalescence model and the statistical model, which have been successful for explaining the productions of normal hadrons, to calculate the production yields of exotic hadrons. We give a detailed discussions for applications of the coalescence model to resonant states by including finite decay widths. We present that the production yields are sensitive to structures of exotic hadrons, namely compact multi-quark states or extended hadronic molecule states. As specific examples, we investigate the production of scalar mesons, $\Lambda(1405)$, dibaryons, and D_s mesons. We furthermore investigate charmonium-like and bottomonium-like states called X, Y, Z, which have been recently reported in several accelerator facilities, Belle, BaBar, BESS, LHCb and so on.

[1] S Cho et al. [ExHIC Collaboration], Phys. Rev. Lett. 106, 212001 (2011).
[2] S. Cho et al. [ExHIC Collaboration], Phys. Rev. C84, 064910 (2011).

On behalf of collaboration:

[Other]

Author: YASUI, Shigehiro (Tokyo Institute of Technology)

Co-authors: Prof. OHNISHI, Akira (Kyoto University); Prof. KO, Che-Ming (Texas A&M University); Prof. JIDO, Daisuke (Tokyo Metropolitan University); Dr MORITA, Kenji (Kyoto University); Dr YAZAKI, Koichi (RIKEN); Prof. NIELSEN, Marina (Universidade de São paulo); Prof. LEE, Su Houng (Yonsei University); Prof. CHO, Sungtae (Kangwon National University); Dr SONG, Taesoo (FIAS Frankfurt Institute for Advanced Studies); Dr SEKIHARA, Takayasu (RCNP, Osaka University); Dr FURUMOTO, Takenori (YITP, Kyoto University); Prof. HYODO, Tetsuo (YITP, Kyoto University)

Presenter: YASUI, Shigehiro (Tokyo Institute of Technology)

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