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Talk title: QCD critical point and net-proton number fluctuations

Speaker: Prof. Xiaofeng Luo, CCNU

Abstract:
Understanding the properties of quark matter and its phase structure can enhance our knowledge of universe evolution and the structure of visible matters. In the last two decades, many experimental evidences for the strongly interacting quark-gluon plasma (sQGP) have been observed in high energy heavy-ion collisions. Therefore, exploring the QCD phase structure at high baryon density, such as mapping the 1st order phase boundary and finding the QCD critical point, becomes one of the most important goals of the heavy-ion collisions. During 2010-2017, RHIC has finished the first phase of Beam Energy Scan program (BES-I), and STAR experiment has collected the data of Au+Au collisions at various collision energies from 200 to 7.7 GeV. To confirm the intriguing observations at BES-I, RHIC has started the second phase of beam energy scan program (BES-II) since 2018, focusing on the energies below 27 GeV. From 2018 to 2020, STAR experiment has taken the data of high statistics Au+Au collision at 9.2, 11.5, 14.6, 19.6 and 27 GeV (collider mode) and 3.0 - 7.7 GeV (fixed target mode). In this talk, I will discuss the recent experimental progress for exploring the QCD phase structure at RHIC-STAR experiment, especially focusing on the QCD critical point search. New facilities aiming for high baryon density region and future plan will be also discussed.

Self-introduction:
罗晓峰，华中师范大学粒子物理研究所教授、博士生导师。
本科 (2006)、博士 (2011) 毕业于中国科学技术大学近代物理系。2009-2011 年在美国劳伦斯伯克利国家实验室联合培养。毕业后作为师资博后加入华中师大并留校任教至今。先后在日本筑波大学、加州大学洛杉矶分校做访问学者。参与美国 STAR 以及德国 CBM 实验, 近 10 年来，致力于高能重离子碰撞中 QCD 相变临界点的实验研究，取得一批创新性和原创性的研究成果。首次观测到净质子数涨落对碰撞能量的非单调依赖, 为进一步确认 QCD 临界点位置、研究 QCD 相结构提供重要实验依据。系统研究了非临界效应对守恒荷涨落的影响，为寻找临界点提供参考基线。2018 年获首届美国布鲁克海文国家实验室 Merit Award。2012 年“晨光杯”中国高能物理学会青年优秀论文一等奖。现为 STAR 实验涨落与关联分析组召集人, CBM 实验理事成员。

Presenter: Prof. LUO, Xiaofeng