

## **The 150 HENPIC seminar by Shuzhe Shi, Stony Brook University and McGill University, October 8, 2021, Friday, 10:30am (Beijing time)**

Title: Reconstruction of heavy-quark potential from Bottomonium spectrum using DNN

Abstract: Bottomonium states are key probes for experimental studies of the quark-gluon plasma (QGP) created in high-energy nuclear collisions. Theoretical models of bottomonium productions in high-energy nuclear collisions rely on the in-medium interactions between the bottom and antibottom quarks. The latter can be characterized by the temperature ( $T$ ) dependent potential, with real ( $V_R(T,r)$ ) and imaginary ( $V_I(T,r)$ ) parts, as a function of the spatial separation ( $r$ ). Recently, the masses and thermal widths of up to 3S and 2P bottomonium states in QGP were calculated using lattice quantum chromodynamics (LQCD). Starting from these LQCD results and through a novel application of deep neural network (DNN), here, we obtain  $V_R(T,r)$  and  $V_I(T,r)$  in a model-independent fashion. The temperature dependence of  $V_R(T,r)$  was found to be very mild between  $T=0-330$  MeV. For  $T=150-330$  MeV,  $V_I(T,r)$  shows rapid increase with  $T$  and  $r$ , which is much larger than the perturbation theory based expectations.

[1] S. Shi, K. Zhou, J. Zhao, S. Mukherjee, P. Zhuang, arXiv:2105.07862.

About the speaker: Shuzhe Shi is currently a PostDoc at Stony Brook University. He obtained his master degree from Tsinghua University, under the supervision of Prof. Pengfei Zhuang, and received the PhD from Indiana University, Bloomington, supervised by Prof. Jinfeng Liao. Before the current position, he was a postdoc at McGill University and worked with Profs. Charles Gale and Sangyong Jeon.