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Recent results on soft and hard probes at RHIC

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In this talk, recent results from selected topics on soft and hard probes by experiments STAR and PHENIX at RHIC will be presented. Besides heavy-ion collisions at $\sqrt{s_{NN}} = 200$ GeV, RHIC has delivered collisions at lower energies in recent years, driven by the STAR BES-II program, ranging from $\sqrt{s_{NN}} = 27$ GeV to $\sqrt{s_{NN}} = 3$ GeV.

At top RHIC energies, heavy flavor hadrons are a valuable probe to study properties of the quark gluon plasma created in large systems, while their measurements in smaller systems can help us study cold nuclear matter effects. At lower energies, measurements of strange and light flavor hadrons can help systematically investigate the properties of QCD matter at finite baryon densities. Finally, at the lowest energy achieved from the STAR fixed target setup, $\sqrt{s_{NN}} = 3$ GeV, measurements on the collective flow of light and strange hadrons, particle yield ratios, hypernuclei lifetime and binding energy will be presented, and implications on the produced QCD medium properties will be discussed.

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