Contribution ID: **223** Type: **Invited**

Exotic mesons from COMPASS

Tuesday, 6 June 2023 15:00 (30 minutes)

The COMPASS experiment at CERN's Super Proton Synchrotron has been a key player in the quest for understanding the spectrum of light mesons. Using a high-energy pion beam, an unprecedented data set on diffractively produced isovector mesons was recorded. In addition to extending our knowledge on ordinary mesons, the data also allow us to search for exotic states not fitting the ordinary quark model. The $\pi_1(1600)$ with spin-exotic quantum numbers $J^{PC} = 1^{-+}$ is clearly observed in the $\rho\pi$, $\eta\pi$ and $\eta'\pi$ decay channels. Based on these data, the pole position of the $\pi_1(1600)$ was extracted for the first time, confirming its resonant nature. Corresponding signals are also observed in other decay channels, e.g. $b_1\pi$, consistent with theory expectations for a hybrid meson with gluonic degrees of freedom.

Theory predicts the existence of full multiplets of hybrid states, including ones with strangeness. Their identification, however, is more difficult since there are no spin-exotic quantum numbers for strange mesons. Taking advantage of the admixture of kaons to the hadron beam, COMPASS also studies the spectrum of strange mesons. In the $K\pi\pi$ final state, a total of 11 meson states could be measured, including a pseudoscalar supernumerous state with respect to quark models. One of the goals of the AMBER experiment, a new QCD facility at CERN, is to increase the data set on strange mesons by a factor of 20 with respect to COMPASS.

The talk will give an overview of the results on exotic mesons in COMPASS and provide an outlook towards the plans for strange meson spectroscopy with AMBER.

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Session Classification: Exotic hadrons and candidates

Track Classification: Exotic hadrons and candidates