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Elliptic anisotropy measurement of the $f_0(980)$ in pPb collisions and determination of its quark content by CMS

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The $f_0(980)$ is a candidate exotic hadron, first observed by $\pi\pi$ scattering in the 1970's. Its configuration still remains controversial—it can be a normal $s\bar{s}$ meson, a tetraquark $s\bar{s}q\bar{q}$ state, a $q\bar{q}g$ hybrid, or a $K\bar{K}$ molecule. Relativistic heavy ion collisions are in a unique position to identify the $f_0(980)$ quark content by the empirical NCQ (number of constituent quarks) scaling of elliptic flow v_2 . In this talk, we present the first reconstruction of $f_0(980)$ via its main decay channel, $f_0(980) \rightarrow \pi^+\pi^-$, using proton-lead collisions recorded by the CMS experiment at 8.16 TeV. The $f_0(980)$ yield is studied as a function of the azimuthal angle relative to the event plane, reconstructed from the forward hadron calorimeters, to extract the v_2 parameter. The v_2 of the $f_0(980)$ is then compared to v_2 values from other hadrons to infer in a novel way the quark content of the $f_0(980)$.

Category

Experiment

Collaboration (if applicable)

CMS

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