

# Quark Matter 2019 - the XXVIIIth International Conference on Ultra-relativistic Nucleus-Nucleus Collisions



Contribution ID: 517

Type: Oral Presentation

## Observation of $X(3872)$ in PbPb collisions with the CMS detector

Wednesday, 6 November 2019 17:40 (20 minutes)

The exotic meson  $\chi_{c1}(3872)$ , also known as  $X(3872)$ , was discovered a decade ago, but the structure of this new state is still under debate. The masses of possible charmonium states from calculations using constituent quark models are too large, and therefore an explanation of the underlying characteristics of this meson remains a challenge. The similarity of the  $\chi_{c1}(3872)$  mass and the  $D - \bar{D}^*$  mass threshold inspired the interpretation that  $\chi_{c1}(3872)$  is a  $D - \bar{D}^*$  “molecule” with small binding energy. Another explanation is that this meson is a tetra-quark, consisting of a di-quark and di-antiquark. Relativistic heavy ion collisions produce an extremely hot and strongly interacting medium, which provides a new environment in which to study the nature of multi-quark states. Because of the dramatically different radii of a  $D - \bar{D}^*$  “molecule” and a tetra-quark, the interactions of these two proposed states are expected to interact differently with the medium. Therefore, the yield of  $\chi_{c1}(3872)$  in heavy ion collisions can provide insight into its structure. The ratios of production cross-section of fully reconstructed  $\chi_{c1}(3872)$  over  $\psi(2S)$  in PbPb collisions at a nucleon-nucleon center-of-mass energy of 5.02 TeV with the CMS detector are presented.

**Primary author:** LEE FOR THE CMS COLLABORATION, Yen-Jie (Massachusetts Inst. of Technology (US))

**Presenter:** LEE FOR THE CMS COLLABORATION, Yen-Jie (Massachusetts Inst. of Technology (US))

**Session Classification:** Parallel Session - Heavy flavor IV

**Track Classification:** Heavy flavor and quarkonium