**Probing of exotic multiquark states in hadron and heavy ion collisions**

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The spectroscopy of exotic mesons with masses above the *2mD*open charm threshold has been full of surprises and remains poorly understood [1]. The currently most compelling theoretical descriptions of the mysterious *XYZ* mesons attribute them to hybrid structure with a tightly bound ** diquark [2] or ** tetraquark core [3 - 5] that strongly couples to S-wave **molecular like structures. In this picture, the production of a *XYZ* states in high energy hadron collisions and its decays into light hadron plus charmonum final states proceed via the core component of the meson, while decays to pairs of open-charmed mesons proceed via the **component.

These ideas have been applied with some success to the *XYZ* states[2], where a detailed calculation finds a ** core component that is only above 5% of the time with the **component (mostly**) accounting for the rest. In this picture these states are compose of three rather disparate components: a small charmonium-like ** core with *rrms* < 1 fm, a larger **component with *rrms*  *≈* 1.5 fm and a dominant component ** with a huge, *rrms ≈* 9 fm spatial extent.

In the hybrid scheme, *XYZ* mesons are produced in high energy proton-nuclei collisions via its compact (*rrms* < 1 fm) charmonium-like structure and this rapidity mixes in a time (t ~ *ħ/δM*) into a huge and fragile, mostly**, molecular-like structure. *δM* is the difference between the *XYZ* mass and that of the nearest ** mass pole core state, which we take to be that of the *χc1(2P)* pure charmonium state which is expected to lie about 20 ~ 30 MeV above *MX(3872)* [6, 7]. In this case, the mixing time, *cτmix* 5 ~ 10 fm, is much shorter than the lifetime of *X(3872)* which is *cτX(3872)* > 150 fm [8].

The near threshold production experiments in √s\_pN~8GeV energy range with proton-proton and proton-nuclei collisions with √s\_pN up to 26GeV and luminosity up to 10^32cm^-2^-1 planned at NICA may be well suited to test this picture for the X(3872) and other exotic XYZ mesons [9]. Their current experimental status together with hidden charm tetraquark candidates and present simulations what we might expect from A-dependence of XYZ mesons in proton-proton and proton-nuclei collisions are summarized.

**References**

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