

PANDA perspectives in exotics

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The new Facility for Antiproton and Ion Research (FAIR) is under construction at GSI in Darmstadt (Germany). Antiprotons are planned to be provided by the High Energy Storage Ring, at which the PANDA experiment will directly be located. It represents the central part of the hadron physics programme. The field of hadron spectroscopy has gained new momentum by the discovery of the so-called charmonium-like and bottomonium-like exotic states over the past two decades. The nature of many of the so-called exotic XYZ states in the charmonium region are, however, not yet understood. Precise measurements of hadron masses and widths are mandatory to sort out different theoretical models and clarify the nature of these unexpected states. One example is the $\chi_{c1}(3872)$, formerly known as $X(3872)$ – although being the first of the new charmonium-like states discovered since 2003, the nature of this state is still not clarified. In $p\bar{p}$ annihilation, such XYZ states can be produced in direct formation, allowing for a precise resonance energy scan. Using the example of the $X(3872)$, we quantified the expected sensitivity of energy scans of narrow resonances and how well we can distinguish between models that turn out to be indistinguishable from the LHCb data.

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