

## Three methods to search for the two $\Xi(1820)$ states

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The chiral unitary approach produces two states from the pseudoscalar-baryon decuplet interaction in the region of the  $\Xi(1820)$ . A recent BESIII experiment on the  $\Psi(3868) \rightarrow \Xi K^- \Lambda$  showed a clean peak that had an abnormally large width and was interpreted in [1] in terms of the two  $\Xi(1820)$ . In view of this, we propose to look at the  $\Omega_c \rightarrow \pi^+ (\pi^0, \eta) \pi \Xi^*$  reaction [2], where the  $\pi \Xi^*$  invariant mass shows an interference pattern of the two resonances. A third reaction  $\Psi(3686) \rightarrow \pi^+ \bar{K}^{0*}$  [3] looks at the  $\bar{K}^{0*}$  invariant mass distribution, where due to phase space restrictions, the lower mass  $\Xi(1820)$  is suppressed and the higher mass around 1875 MeV with a larger width shows up clearly.

[1] R.-Molina, W.-H.-Liang, C.-W.-Xiao, Z.-F.-Sun and E.-Oset,  
%“Two states for the  $\Xi(1820)$  resonance,”  
[arXiv:2309.03618 [hep-ph]].

[2] W.-H.-Liang, R.-Molina and E.-Oset,  
%“The  $\Omega_c \rightarrow \pi^+ (\pi^0, \eta) \pi \Xi^*$  reactions and the two  $\Xi(1820)$  states,”  
[arXiv:2404.18882 [hep-ph]].

[3] Man-Yu Duan, Jing Song, Wei-Hong Liang and E. Oset

Searching for the two poles of the  $\Xi(1820)$  in the  $\Psi(3686) \rightarrow \pi^+ \bar{K}^{0*}$  decay  
to be submitted.

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