

Candidate Resonant Tetraneutron State Populated by the $\text{He}^4(\text{He}^8, \text{Be}^8)$

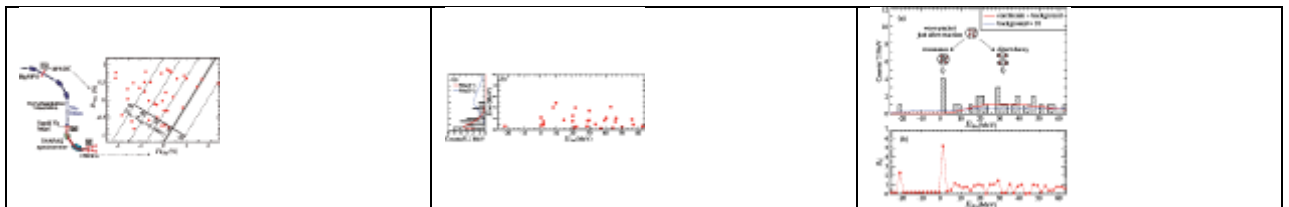
Reaction

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Phys. Rev. Lett. 116, 052501 – Published 3 February 2016

Abstract

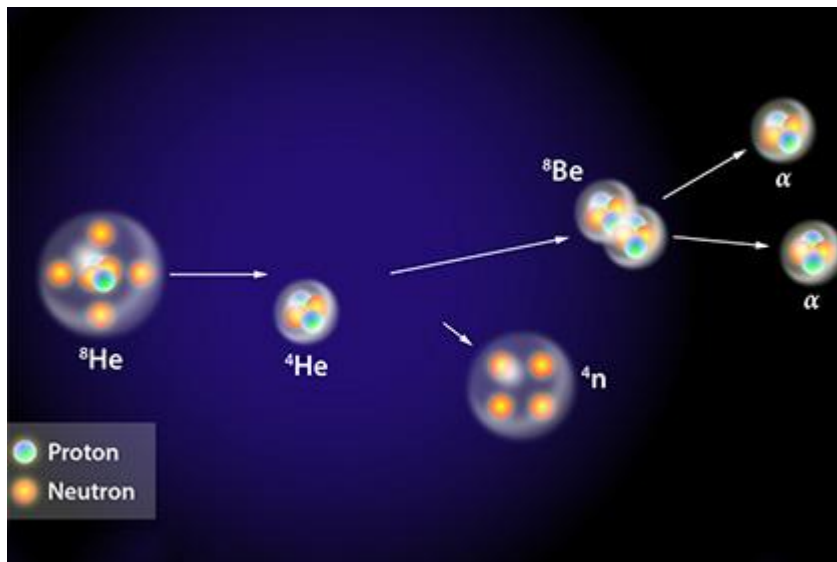
A candidate resonant tetraneutron state is found in the missing-mass spectrum obtained in the double-charge-exchange reaction $\text{He}^4(\text{He}^8, \text{Be}^8)$ at 186 MeV/u. The energy of the state is $0.83 \pm 0.65(\text{stat}) \pm 1.25(\text{syst})$ MeV above the threshold of four-neutron decay with a significance level of 4.9σ . Utilizing the large positive Q value of the $(\text{He}^8, \text{Be}^8)$ reaction, an almost recoilless condition of the four-neutron system was achieved so as to obtain a weakly interacting four-neutron system efficiently.



Received 30 July 2015

DOI:<http://dx.doi.org/10.1103/PhysRevLett.116.052501>

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Изображение: Alan Stonebraker / APS