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Neutron Interaction With 7Be at the SARAF: Evidence for Cluster Shell Model p-h States in 8Be and Implication for Big Bang Nucleosynthesis.

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The interaction of neutrons with 7Be that was measured at the SARAF in Israel with a quasi-Maxwellian neutron beam at 49.5 keV reveals a strong B(E1: 2- —> 2+) ~ 0.04 W.u., decay of the 2- state at 18.91 MeV in 8Be to the alpha-cluster 2+ state at 3.03 MeV [1]. This strong E1 decay leads to large cross section of the 7Be(n,g_1)*8Be(3.03) reaction at the "BBN window". It implies s-waves dominance of the cross section at the "BBN window", in contrast to previous extrapolations into the "BBN window"from lower energies (the n_TOF measurement [2]) and extrapolation from higher energies (the Kyoto measurement [3]). In addition, the phenomenological structure of all states below 19.5 MeV in 8Be (including the 2- state at 18.91 MeV) provides good evidence for particle-hole (p-h) states in the newly proposed Cluster Shell Model (CSM) of Della Roca and Iachello [4]. The states near the neutron and proton thresholds in 8Be show the characteristic of the p-h states predicted by the CSM. The measured B(E1) of the 2- state at 18.91 MeV is in accordance with other measured decays of the p-h CSM states to the well-known cluster ground-states and 2+ state at 3.03 MeV in 8Be. The new CSM model of Della Roca and Iachello [4] will be introduced with emphasize on the similarity between p-h states in 8Be and single particle states in 9Be.

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