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STRUCTURE AND REACTIONS OF N=7 ISOTONES: PARITY INVERSION AND TRANSFER CROSS SECTIONS

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The properties of low-lying states in N=7 isotones have been studied theoretically, going from ^{10}Li to ^{13}C. To reproduce in detail the changes of structure in these nuclei going towards the neutron drip line represents a considerable challenge for many-body theories.
In particular, this concerns the inversion of parity between the ground and first excited state observed going towards the drip line, which is experimentally well established in ^{11}Be but is under discussion in the case of the unbound nucleus ^{10}Li, while the normal sequence is observed in ^{12}B and ^{13}C.
The effects of many-body renormalization processes are considered in detail, and transfer reactions are calculated, showing that the cross sections observed in recent ^{9}Li(d,p)^{10}Li one–neutron transfer experiments [1,2] are consistent with, or better, require the presence of a virtual 1/2+ state [3]. Furthermore, theoretical cross sections for reactions leading to low-lying resonant states in ^{11}Be are successfully compared to data [4].

[1] H.B. Jeppesen et al, Phys. Lett. B, 642(2006)449

[2] M. Cavallaro et al, Phys. Rev. Lett. 118 (2017) 012701

[3] F. Barranco, G. Potel, R. A. Broglia, and E. Vigezzi, Phys. Rev. Lett. 119 (2017) 082501

[4] F. Barranco, G. Potel, R. A. Broglia, and E. Vigezzi, arXiv:1812.01761

Primary author: Prof. BARRANCO, Francisco (Sevilla University)

Presenter: Prof. BARRANCO, Francisco (Sevilla University)

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