

Collectivity in N=Z mass 70 nuclei

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There has been intense physics interest in the structure of self-conjugate medium mass nuclei in recent years [1-3]. Specific effort has been undertaken to map out the development of collectivity above mass 60, with emphasis on the influence of the deformation-driving $g_{9/2}$ orbital. A number of even-even nuclei in this area have been studied, with $B(E2)$ values deduced for ^{64}Ge , ^{68}Se , ^{72}Kr and ^{76}Sr (see ref. [4] and references therein). However no published measurements exist for the intervening odd-odd N=Z nuclei. An experiment was thus conducted to continue the mapping of deformation in the A=70 region by measuring the lifetime of the first excited 2^+ state in the odd-odd N=Z nucleus ^{70}Br .

Excited states in ^{70}Br were populated via one-nucleon-knockout at the NSCL facility at Michigan State University. De-excitation gamma rays were detected using the SeGA array, recorded in coincidence with recoils identified in the S800 spectrograph. The lifetime was deduced using the recoil distance Doppler shift technique, made possible through the use of a new differential plunger apparatus (TRIPLEX). The lifetime of the 2^+ state in neighbouring ^{70}Se was also measured for comparison, due to recent controversy over the shapes of the two nuclei. Lifetimes of low-lying states in ^{70}Br , ^{70}Se and other neighbouring nuclei will be presented and discussed.

[1] A. Petrovici, J. Phys. G Nucl. Part. Phys., 37 064036 (2010)

[2] K. Kanecko et al., Phys. Rev. Lett., 109 092504 (2012)

[3] M. Hasegawa et al., Phys. Lett. B, 656 51-55 (2007)

[4] A. Lemasson et al., Phys. Rev. C, 85 041303(R) (2012)

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