

Well-developed deformation in ^{42}Si

Dr. Satoshi TAKEUCHI
(RI Physics Laboratory, Nishina Center)

Excited states in the $^{38,40,42}\text{Si}$ nuclei have been studied via in-beam gamma-ray spectroscopy. Intense radioactive ion beams of ^{40}S and ^{44}S provided at the RIKEN RIBF enabled the systematic studies for excitation energies towards neutron magic number $N=28$. For Si isotopes, the systematic study of the 2^+ excitation energy indicate the weakening of the $N = 28$ shell closure [1,2]. Recently, several experiments have been performed to investigate the structures of ^{42}Si [3,4,5] as well as $^{38,40}\text{Si}$. However until now no experimental data exist for higher excited states which may relate to the nuclear shape or shell evolution. In order to study excited states in Si isotopes, we have measured de-excitation gamma rays from excited states higher than the 2^+ state by the DALI2 array via nucleon removal reactions. Besides a peak corresponding to the 2^+ decay, new gamma lines were observed in ^{42}Si . Applying a gamma-gamma analysis, a candidate for the 4^+ to 2^+ transition was found. The low excitation energy of the 2^+ state and an energy ratio of 2.93(5) between the 4^+ and 2^+ states indicate a large deformation and corroborate the suggested disappearance of the $N = 28$ shell closure in ^{42}Si . Together with the energy ratios of ^{38}Si and ^{40}Si , the results show a rapid deformation development of Si isotopes from $N=24$ to $N=28$.

Refs.

- 1) R.W.Ibbotson et al., Phys. Rev. Lett. 80 (1998) 2081.
- 2) C.M.Campbell et al., Phys. Lett. B 652 (2007) 169.
- 3) S.Grevy et al., Phys. Lett. B 594 (2004) 252.
- 4) J.Fridmann et al., Phys. Rev. C 74 (2006) 034313.
- 5) B.Bastin et al., Phys. Rev. Lett. 99 (2007) 022503.

Oct.30(Tue), 2012 13:30~
RIBF Hall, RIKEN

Contact: Nuclear Physics Seminar Organizing Committee
npsoc@ribf.riken.jp
<http://ribf.riken.jp/~seminar/>