



Magnetic rotational band in ^{116}Sb

Shabir Dar ^{a,b}, Soumik Bhattacharya ^{a,1}, S. Bhattacharyya ^{a,b,*}, R. Banik ^c,
S. Nandi ^{a,b,2}, G. Mukherjee ^{a,b}, S. Rajbanshi ^d, S. Das Gupta ^e, Sajad Ali ^f,
S. Chakraborty ^a, S. Chatterjee ^g, S. Das ^g, A. Dhal ^h, S.S. Ghugre ^g,
A. Goswami ^{i,b,3}, D. Mondal ^a, S. Mukhopadhyay ^{a,b}, H. Pai ^h, S. Pal ^a,
D. Pandit ^{a,b}, R. Raut ^g, P. Ray ^j, S. Samanta ^g

^a Variable Energy Cyclotron Centre, 1/AF Bidhannagar, Kolkata 700064, India

^b Homi Bhabha National Institute, Training School Complex, Anushaktinagar, Mumbai 400094, India

^c Institute of Engineering and Management, Saltlake Sector V, Kolkata 700091, India

^d Department of Physics, Presidency University, Kolkata 700073, India

^e Victoria Institution (College), Kolkata 700009, India

^f Government General Degree College at Pedong, Kalimpong 734311, India

^g UGC-DAE CSR, Kolkata Centre, Kolkata 700098, India

^h Extreme Light Infrastructure - Nuclear Physics, Măgurele 077126, Romania

ⁱ Saha Institute of Nuclear Physics, 1/AF, Bidhannagar, Kolkata 700064, India

^j ABN Seal College, Coochbehar 736101, India

Received 6 October 2021; received in revised form 5 January 2022; accepted 5 January 2022

Available online 10 January 2022

Abstract

The excited states of ^{116}Sb have been populated using the α induced reaction $^{115}\text{In}(\alpha, 3n)^{116}\text{Sb}$ at a beam energy of 40 MeV and investigated via in-beam gamma spectroscopic techniques. A positive parity sequence (B1) of strong M1 transitions with relatively weak crossover E2 transitions, connected to the yrast negative parity rotational band (B2) of ^{116}Sb , has been observed. The experimental B(M1)/B(E2) values for band B1 are found to decrease with angular momentum (I). The origin of this band (B1) has been interpreted in terms of Magnetic Rotation (MR) under the framework of Semi-Classical Model (SCM) and Shears mechanism with Principal Axis Cranking (SPAC) formalism and is assigned a four quasiparticle

* Corresponding author at: Variable Energy Cyclotron Centre, 1/AF Bidhannagar, Kolkata 700064, India.
E-mail address: sarmi@vecc.gov.in (S. Bhattacharyya).

¹ Present address: Department of Physics, Florida State University, Tallahassee, Florida, USA.

² Present address: Physics Division, Argonne National Laboratory, Lemont, Illinois 60439, USA.

³ Deceased.