

## High resolution study of Gamow-Teller transitions in $^{45}\text{Sc}$ nucleus

G.Susoy<sup>1</sup>, H. Fujita<sup>2</sup>, T. Adachi<sup>3</sup>, Y. Fujita<sup>2</sup>, E.Ganioğlu<sup>1</sup>, A. Algora<sup>4</sup>, M. Csatos<sup>5</sup>, J. Deaven<sup>6</sup>, E. Estevez<sup>4</sup>, C. Guess<sup>6</sup>, J. Guly'as<sup>5</sup>, K. Hatanaka<sup>3</sup>, K. Hirota<sup>3</sup>, D. Ishikawa<sup>3</sup>, A. Krasznahorkay<sup>5</sup>, H. Matsubara<sup>3</sup>, R. Meharchand<sup>6</sup>, F. Molina<sup>4</sup>, H. Okamura<sup>3</sup>, Y. Oktem<sup>1</sup>, H.J. Ong<sup>3</sup>, G. Perdikakis<sup>6</sup>, B. Rubio<sup>4</sup>, C. Scholl<sup>7</sup>, T. Suzuki<sup>3</sup>, A. Tamii<sup>3</sup>, J. Thies<sup>8</sup>, R.G.T. Zegers<sup>6</sup>, J. Zenihiro<sup>3</sup>

<sup>1</sup>Department of Physics, Istanbul University, Istanbul 34134, Turkey

<sup>2</sup>Department of Physics, Osaka University, Toyonaka, Osaka 560-0043, Japan

<sup>3</sup>Research Center for Nuclear Physics, Osaka University, Ibaraki, Osaka 567-0047, Japan

<sup>4</sup>Instituto de Física Corpuscular, CSIC-Universidad de Valencia, E-46071 Valencia, Spain

<sup>5</sup>Institute of Nuclear Research of the Hungarian Academy of Sciences P.O.Box 51, H-4001 Debrecen, Hungary

<sup>6</sup>NSCL, Michigan State University, East Lansing, Michigan 48824-1321, USA

<sup>7</sup>Institut für Kernphysik, Universität zu Köln, 50937 Köln, Germany

<sup>8</sup>Institut für Kernphysik, Westfälische Wilhelms-Universität, D-48149 Münster, Germany

In the early stage of the core collapse of supernovae, studying the weak nuclear response, especially the Gamow-Teller (GT) transitions of pf-shell nuclei is one of the key issues in nuclear and astronuclear physics [1]. Therefore, electron capture and  $\beta$  decay of pf-shell nuclei that mainly proceed by GT transitions play important roles [2].

In order to study the detail of the GT transition strengths starting from one of the  $T_z=3/2$  pf-shell nucleus  $^{45}\text{Sc}$ , where  $T_z=(1/2)(N-Z)$ , performed a  $0^\circ$  experiment at an intermediate energies of 140 MeV/nucleon at the Research Center for Nuclear Physics (RCNP) in Osaka [3-4] by using the magnetic spectrometer Grand Raiden (GR) [5] and applied the dispersion-matching techniques for the beam transportation in order to achieve high resolution. In  $^{45}\text{Ti}$  spectra energy resolution of  $\sim 35$  keV was achieved and the discrete states were observed up to 8.5 MeV [6].

By using high resolution ( $^3\text{He,t}$ ) reactions, the project to obtain B(GT.) distributions in pf-shell nuclei is in progress. It is expected that they can be used for the understanding of various astrophysical phenomena.

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