

$^9\text{Be}(^{37}\text{Ca},\text{X}\gamma)$  2007Do11,2007Bu15

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Ninel Nica, John Cameron and Balraj Singh		NDS 113, 1 (2012)	31-Dec-2011

Identification of the first excited state in  $^{36}\text{Ca}$ .

**2007Do11:**  $^{36}\text{Ca}$  ions were produced via two-step fragmentation technique, using the FRS-RISING setup at GSI. Primary  $^{40}\text{Ca}$  beam at 420 MeV/nucleon impinged a  $^9\text{Be}$  target. The  $^{37}\text{Ca}$  fragments were selected on the basis of energy loss, magnetic rigidity and time-of-flight. The  $^{37}\text{Ca}$  ions at an energy of 196 MeV/nucleon hit a second  $^9\text{Be}$  target. The reaction products were selected using calorimeter telescope array (CATE) of Si-CsI(Tl) modular  $\Delta E$ -E telescopes. One-neutron knockout reaction from  $^{37}\text{Ca}$ .

**2007Do11:** Measured  $E_\gamma$ , particle- $\gamma$  coin, using 15 Cluster Ge detectors with seven elements in each cluster, seven six-fold MINIBALL triple Ge detectors, and the HECTOR array of eight large-volume  $\text{BaF}_2$  detectors. Fragment trajectories were determined using the CATE array, and a thin Si  $\delta E$  detector. The  $\gamma$ -ray spectra were Doppler-corrected using Monte Carlo simulation GEANT4, corrected for fragmentation of the primary beam using time-of-flight information.

**2007Bu15:**  $^{36}\text{Ca}$  ions were produced via two-step fragmentation technique, using GANIL facility. Primary  $^{40}\text{Ca}$  beam at 95 MeV/nucleon impinged a carbon target. The  $^{37}\text{Ca}$  fragments were selected on the basis of energy loss, magnetic rigidity and time-of-flight using ALPHA spectrometer at GANIL. The  $^{37}\text{Ca}$  ions at an energy of 45 MeV/nucleon hit a  $^9\text{Be}$  target. The  $^{36}\text{Ca}$  fragments were selected using SPEG spectrometer at GANIL. One-neutron knockout reaction from  $^{37}\text{Ca}$ . Measured  $\gamma$  rays using an array of 74  $\text{BaF}_2$  detectors. The  $\gamma$ -ray spectra were Doppler corrected. **2007Bu36** is from the same group.

 $^{36}\text{Ca}$  Levels

E(level)	$J^\pi$ <sup>†</sup>	Comments
0	$0^+$	
3029 11	$(2^+)$	<p><math>J^\pi</math>: from systematics and shell model calculations.</p> <p>E(level): mirror energy difference <math>\Delta E_M = E(^{36}\text{Ca}) - E(^{36}\text{S}) = -262</math> 11 for the first excited <math>2^+</math> states in <math>^{36}\text{Ca}</math> and <math>^{36}\text{S}</math>. The energy of the <math>2^+</math> excited state in <math>^{36}\text{S}</math> is at 3291 keV in Adopted Levels. <b>2007Do11</b> interpret this large <math>\Delta E_M</math> value in terms of detailed shell-model calculations using <math>^{16}\text{O}</math> core, the <i>sd</i> shell isospin symmetric interaction, and experimental single particle energies from <math>^{17}\text{O}</math> and <math>^{17}\text{F}</math>.</p> <p>One-neutron knockout cross section=5.3 mb 20 (<b>2007Bu15</b>, preliminary value).</p>

<sup>†</sup> Inferred by **2009AmZZ** based on the structure of the mirror nucleus  $^{36}\text{Cl}$  – same As In Adopted Levels, Gammas dataset.

 $\gamma(^{36}\text{Ca})$ 

$E_\gamma$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
3029 11	3029	$(2^+)$	0	$0^+$	<p><math>E_\gamma</math>: weighted average of 3015 16 (<b>2007Do11</b>, statistical uncertainty of 15 keV and systematic uncertainty (from energy calibration) of 5 keV, added in quadrature) and 3036 11 (<b>2007Bu15</b>).</p>

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Level Scheme

