

$^9\text{Be}(^{56}\text{Ti},^{55}\text{Sc}\gamma),(^{55}\text{Sc},^{55}\text{Sc}'\gamma)$  **2017St22**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Apr-2022

This dataset adapted from compiled dataset in the XUNDL database from [2017St22](#) by Y. Ichikawa (RIKEN) and F.G. Kondev (ANL), Feb. 16, 2018.

[2017St22](#):  $^{56}\text{Ti}$  and  $^{55}\text{Sc}$  beams of  $\approx 200$  MeV/nucleon produced in fragmentation of 345 MeV/nucleon  $^{70}\text{Zn}$  beam incident on a  $^9\text{Be}$  target at the RIBF-RIKEN facility, followed by separation and identification of ions of interest using the BigRIPS separator and the ZeroDegree Spectrometer from the determination of mass-to-charge ratio by TOF-B $\rho$ - $\Delta E$  method. The excited states of  $^{55}\text{Sc}$  were populated via the  $^9\text{Be}(^{55}\text{Sc},^{55}\text{Sc}'\gamma)$  and  $^9\text{Be}(^{56}\text{Ti},^{55}\text{Sc}\gamma)$  reactions using a 10-mm thick  $^9\text{Be}$  target. Measured:  $E_\gamma$ ,  $I_\gamma$ , and  $\gamma\gamma$ -coin using DALI2 array of 184 NaI detectors. Comparison with large-scale shell-model calculations using NuShellX code with SDPF-MU $r$  effective interaction in the *sdpf* model space, and with ab initio many-body method with the valence-space formulation of the in-medium similarity renormalization group (VS-IM-SRG).

 $^{55}\text{Sc}$  Levels

E(level) <sup>†</sup>	$J^\pi$ <sup>‡</sup>	Comments
0	(7/2 <sup>-</sup> )	
695 5	(3/2 <sup>-</sup> )	
1267 7	(1/2 <sup>-</sup> )	
1730 20	(7/2 <sup>-</sup> )	
2786 20	(1/2 <sup>+</sup> )	
2806 12	(1/2,3/2,5/2 <sup>-</sup> )	$J^\pi$ : $\gamma$ to (1/2 <sup>-</sup> ).
3135 20	(3/2 <sup>+</sup> )	

<sup>†</sup> From least-squares fit to  $E_\gamma$  data.

<sup>‡</sup> As suggested by [2017St22](#), based on predictions of detailed calculations using shell-model and valence-space in-medium similarity renormalization group (VS-IM-SRG) method.

 $\gamma(^{55}\text{Sc})$ 

$E_\gamma$ <sup>†</sup>	$I_\gamma$ <sup>†</sup>	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
( $\approx 330$ )		3135	(3/2 <sup>+</sup> )	2806	(1/2,3/2,5/2 <sup>-</sup> )	$E_\gamma$ : existence of this transition suggested by <a href="#">2017St22</a> , but due to detector threshold setting, this $\gamma$ was not detected. This transition is not included in the Adopted dataset.
572 4	50.3 57	1267	(1/2 <sup>-</sup> )	695	(3/2 <sup>-</sup> )	$E_\gamma$ : authors' weighted average of 572 5 from $^9\text{Be}(^{56}\text{Ti},^{55}\text{Sc}\gamma)$ and 573 7 in $^9\text{Be}(^{55}\text{Sc},^{55}\text{Sc}'\gamma)$ .
695 5	100 11	695	(3/2 <sup>-</sup> )	0	(7/2 <sup>-</sup> )	$E_\gamma$ : authors' weighted average of 692 6 in $^9\text{Be}(^{56}\text{Ti},^{55}\text{Sc}\gamma)$ and 700 8 in $^9\text{Be}(^{55}\text{Sc},^{55}\text{Sc}'\gamma)$ .
1539 10	16.8 22	2806	(1/2,3/2,5/2 <sup>-</sup> )	1267	(1/2 <sup>-</sup> )	$E_\gamma$ : authors' weighted average of 1535 14 in $^9\text{Be}(^{56}\text{Ti},^{55}\text{Sc}\gamma)$ and 1542 14 in $^9\text{Be}(^{55}\text{Sc},^{55}\text{Sc}'\gamma)$ .
1730 20	3.5 13	1730	(7/2 <sup>-</sup> )	0	(7/2 <sup>-</sup> )	
1854 27	14.2 21	3135	(3/2 <sup>+</sup> )	1267	(1/2 <sup>-</sup> )	
2091 19	32.7 38	2786	(1/2 <sup>+</sup> )	695	(3/2 <sup>-</sup> )	
2452 26	10.0 14	3135	(3/2 <sup>+</sup> )	695	(3/2 <sup>-</sup> )	
<sup>x</sup> 3241 39						$E_\gamma$ : observed only in $^9\text{Be}(^{55}\text{Sc},^{55}\text{Sc}'\gamma)$ reaction.

<sup>†</sup> From [2017St22](#), where values are from  $^9\text{Be}(^{56}\text{Ti},^{55}\text{Sc}\gamma)$ , unless otherwise stated. Uncertainties in  $E_\gamma$  include statistical and systematics, combined in quadrature, the latter include contributions from energy calibration and possible shifts in peaks positions due to indirect feeding from higher-lying states, estimated from simulations using the GEANT4 code.

<sup>x</sup>  $\gamma$  ray not placed in level scheme.

$^9\text{Be}(^{56}\text{Ti}, ^{55}\text{Sc}\gamma), (^{55}\text{Sc}, ^{55}\text{Sc}'\gamma)$  2017St22

Legend

## Level Scheme

Intensities: Relative  $I_\gamma$ 

- ▶  $I_\gamma < 2\% \times I_\gamma^{max}$
- ▶  $I_\gamma < 10\% \times I_\gamma^{max}$
- ▶  $I_\gamma > 10\% \times I_\gamma^{max}$
- - - -▶  $\gamma$  Decay (Uncertain)

