

**$^9\text{Be}(\text{HI}, ^{76}\text{Zn}\gamma)$  2016Sh07**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Jun Chen and Ameenah R. Farhan		NDS 194,3 (2024)	8-Jan-2024

2016Sh07 do not seem to specify the heavy-ion (HI) projectile. If up to removal of two nucleons is assumed, and yields in Fig. 1 of 2016Sh07 are considered, HI may correspond to  $^{76}\text{Zn}$ ,  $^{77}\text{Zn}$ ,  $^{78}\text{Zn}$ ,  $^{77}\text{Ga}$  or  $^{78}\text{Ga}$ .

2016Sh07: secondary radioactive ion beams (RIBs) of  $^{82}\text{Ge}$ ,  $^{83}\text{As}$  and other neutron-rich isotopes in the vicinity of  $^{78}\text{Ni}$  were produced in  $^9\text{Be}(^{238}\text{U}, \text{X})$ ,  $E(^{238}\text{U})=345$  MeV/nucleon primary fragmentation reaction at RIBF-RIKEN facility. The fragment products were separated by tof-B $\rho$ - $\Delta E$  technique using the BigRIPS separator at RIKEN, optimized for transmission of  $^{79}\text{Cu}$ . The secondary target was 1.89 g/cm<sup>2</sup> thick  $^9\text{Be}$  placed at the eighth focal plane of the BigRIPS separator; typical midtarget energies were  $\approx 250$  MeV/nucleon. The reaction products from the secondary reaction were analyzed by tof-B $\rho$ - $\Delta E$  method using the ZeroDegree spectrometer optimized for transmission of  $^{78}\text{Ni}$ . Measured  $E\gamma$ ,  $I\gamma$ , particle spectra, (particle) $\gamma$ - and  $\gamma\gamma$ -coin spectra, Doppler-shift corrected  $\gamma$  spectra using DALI2 array of 186 NaI(Tl) detectors covering angles of  $\approx 18$ -148 $^\circ$  with respect to the beam direction. Coincidence timing window between the particles and  $\gamma$  detection was 10 ns.

$^{76}\text{Zn}$  Levels

E(level) <sup>†</sup>	J $\pi$ <sup>‡</sup>	Comments
0	0 <sup>+</sup>	
602 9	(2 <sup>+</sup> )	J $\pi$ : 2 <sup>+</sup> in the Adopted Levels.
1305 14	(4 <sup>+</sup> )	
2358? 21		

<sup>†</sup> From  $E\gamma$  data.

<sup>‡</sup> As given by 2016Sh07.

$\gamma(^{76}\text{Zn})$

$E_\gamma$	$I_\gamma$	$E_i(\text{level})$	J $\pi_i$	$E_f$	J $\pi_f$	Comments
602 9	100 10	602	(2 <sup>+</sup> )	0	0 <sup>+</sup>	
703 11	72 7	1305	(4 <sup>+</sup> )	602	(2 <sup>+</sup> )	
1053 <sup>†</sup> 16	33 4	2358?		1305	(4 <sup>+</sup> )	Placement of this $\gamma$ ray here is based on previously proposed (2005Va19 and 1990Wi12) $\gamma$ cascade 1053 $\gamma$ -464 $\gamma$ feeding the 1305, (4 <sup>+</sup> ) level, although, with an ambiguous ordering. Since no 464 $\gamma$ is reported by 2016Sh07, the 1053 $\gamma$ likely feeds the 1305 level, however, it should be noted that the 1053 $\gamma$ is reported by 2016Sh07 to be in coincidence with only the 602 $\gamma$ , whereas, with its placement here, it is expected to be in coincidence with the 703 $\gamma$ also.

<sup>†</sup> Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative  $I_\gamma$

Legend

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

