^{1}H(^{77}Cu,2pγ) 2019El02

History

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

2019El02: 229 MeV/nucleon ^{77}Cu isomer was produced in ^{9}Be(^{238}U,F),E=345 MeV/nucleon reaction with the ^{238}U beam provided by the RIBF accelerator complex at RIKEN facility. In-flight fission fragments were separated and analyzed by BigRIPS separator, based on Bρ-tof-ΔE-Bρ method, where Bρ was analyzed by the BigRIPS magnetic spectrometer, tof measured by plastic scintillators, and the trajectory (ΔE) of the particles by a set of parallel-plate avalanche counters (PPACs). The final ^{76}Ni nuclei, after proton removal from ^{77}Cu were analyzed using the ZeroDegree magnetic spectrometer, again based on Bρ-tof-ΔE method. Prompt γ rays from excited states in ^{76}Ni were measured using DALI2 array of 186 NaI(Tl) scintillators. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, and ^{76}Ni particles. Deduced levels, J^{π}, and exclusive cross sections for level population. Geant4 simulation of detector system to compare with experimental γ-ray spectra. Comparison with large-scale shell-model calculations in the valence configuration space of ($f_{5/2}p_{1/2}g_{9/2}d_{5/2}$) neutron orbitals, and *fp* proton orbitals.

^{76}Ni Levels

Cross section data are from 2019El02.

E(level)[†]	J$^{\pi}$[#]	Comments
0	0^{+}	Exclusive $\sigma\leq$6.9 mb. Inclusive σ=8.4 mb *4*.
990	(2^{+})	Exclusive $\sigma\leq$0.57 mb.
1920	(4^{+})	Exclusive $\sigma\leq$0.68 mb.
3431?[‡] *50*		Exclusive σ=0.65 mb *33*.
3828?[‡] *69*		Exclusive σ=0.38 mb *16*.
4147[‡] *35*	(4^{+},5^{+})	Exclusive σ=1.17 mb *25*.

[†] From Eγ values.
[‡] Newly proposed level in 2019El02. The 3431 and 3828 levels are tentative in this work.
[#] As given in Fig. 3 of 2019El02, based on previous assignments for the first three excited states, and from comparison with their shell-model calculations for the newly-proposed 4147 level.

γ(^{76}Ni)

E$_{\gamma}$	I$_{\gamma}$	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$
930	70 *15*	1920	(4^{+})	990	(2^{+})
990	100 *12*	990	(2^{+})	0	0^{+}
2227[†] *35*	62 *22*	4147	(4^{+},5^{+})	1920	(4^{+})
2441[†‡] *50*	35 *17*	3431?		990	(2^{+})
2838[†‡] *69*	20 *9*	3828?		990	(2^{+})

[†] New γ ray from 2019El02.
[‡] Placement of transition in the level scheme is uncertain.

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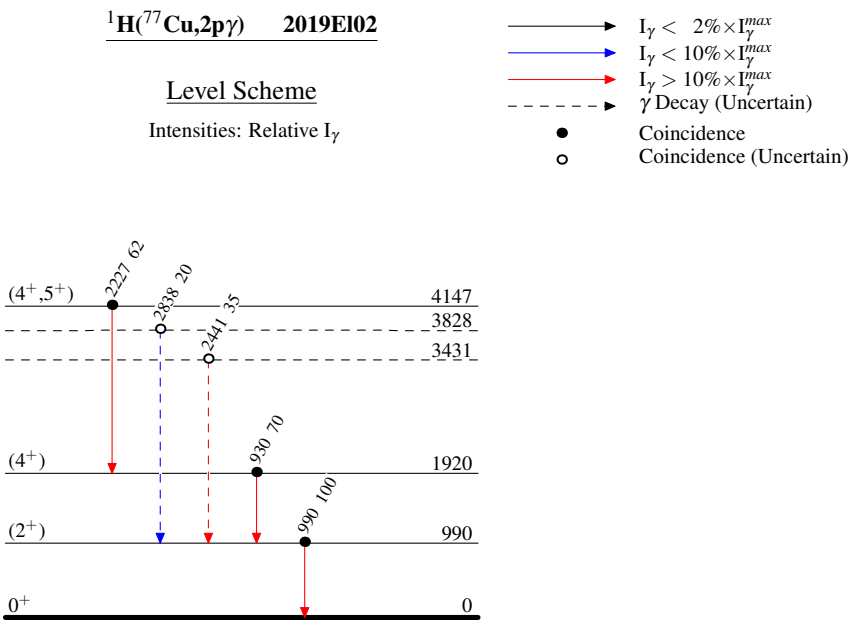
Level Scheme

Intensities: Relative I_γ



$^{76}_{28}Ni_{48}$