$^{1}H(^{56}Ni,D)$ 2014Sa46

History

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

This dataset adapted from compiled dataset from 2014Sa46 in the XUNDL database by E.A. McCutchan (NNDC, BNL), October 8, 2014.

2014Sa46: 37 MeV/nucleon, 72% pure ^{56}Ni secondary beam produced in fragmentation of E=140 MeV/nucleon ^{58}Ni beam on a ^{9}Be target at NSCL-MSU facility, followed by separation of ^{56}Ni fragments in flight using the A1900 fragment separator. Reaction target consisted of polyethylene $(CH_2)_n$ of 9.6 mg/cm^2 thickness. Positions and angles of the incident ^{56}Ni beam particles were determined by two microchannel plate (MCP) detectors located upstream of the target. Measured energies and $\sigma(\theta)$ of deuterons using the High Resolution Array (HiRA) consisting of 16 ΔE-E silicon-strip detector telescopes each backed by four CsI(Tl) crystals. FWHM=550 keV for peaks from the ground state and 3180 level. ^{55}Ni residues analyzed using the S800 spectrometer. Deduced level energies, J^π, and spectroscopic factors. Adiabatic Distorted Wave Approximation (ADWA) analysis of $\sigma(\theta)$ data. Comparison with shell model calculations using the SDPFM and SDPF-μ interactions and self-consistent Green′s functions theory.

^{55}Ni Levels

E(level)	J^π[†]	L[‡]	S[#]	Comments
0	$7/2^-$	3	6.7 *7*	Configuration=$1f^{-1}_{7/2}$.
2090	$3/2^-$	1	0.14 *3*	Configuration=$2p_{3/2}$. 2014Sa46 state that small spectroscopic factor for this state, reproduced by the theoretical calculations, indicates 3-qp configuration of $\nu 1f7/2)^{-2}\otimes\nu 2p_{3/2}$, and implies non-negligible $2p_{3/2}$ components in the ^{56}Ni ground state.
3180	$1/2^+$	0	1.0 *2*	Configuration=$2s^{-1}_{1/2}$.
3752?	$(3/2^+)$			E(level),J^π: from the Adopted Levels. E(level): for θ<9°, excess strength is observed at E>3.5 MeV which the authors assign to a previously observed $(3/2^+)$, 3.75-MeV level.

[†] From 2014Sa46, based on L-transfers and systematics of the N=27 isotones, except where noted.

[‡] From a comparison of experimental deuteron angular distributions to ADWA calculations.

[#] Normalization constant which is applied to the theoretical deuteron angular distributions to bring them into agreement with the experimental values; $d\sigma/d\Omega_{exp}=S\times[d\sigma/d\Omega_{ADWA}]$.