^{2}H(^{34}Si,pγ) 2014Bu01

^{34}Si(d,p)^{35}Si on 0^{+} ^{34}Si g.s. in inverse kinematics.

2014Bu01: A 20.5-MeV/nucleon, 1.1 ×10^{5} pps, and 95% pure ^{34}Si beam was produced via the fragmentation of a 55-MeV/nucleon ^{36}S^{16+} primary beam impinging on a 1075 μm-thick Be target, separated by the LISE3 spectrometer at GANIL, and incident on a 2.6(1) mg/cm^{2} Cd_2 secondary target. Beam ions were tracked using two position-sensitive multiwire proportional chambers (FWHM=1 mm) placed 0.92 m and 0.52 m upstream of target, an ionization chamber placed 40 cm downstream of target and a 1.5 cm-thick plastic scintillator located behind the IC for energy loss, TOF measurements, and beam monitoring. Protons from the (d,p) reaction were detected using four modules of the MUST2 array placed 10 cm from the target covering polar angles ranging from 105° to 150° with respect to the beam direction and a 16 Si strip annular detector at a distance of 11.3 cm covering polar angles from 156° to 168°. γ rays were detected using four segmented Ge detectors from the EXOGAM array perpendicular to the beam axis at a mean distance of 5 cm, and 9 cm downstream from the target with efficiency ε= 3.8 % *2* at 1 MeV. Measured σ(E$_p$,θ), Doppler-corrected Eγ, Iγ, (^{34}Si)p-coin. Deduced levels, J, π, L-transfer and spectroscopic factors. Comparisons with shell-model calculations.

^{35}Si Levels

E(level)[†]	J$^{\pi}$[‡]	L[#]	S[#]	Comments
0	7/2^{-}	3	0.56 *6*	Interpreted as the 1f$_{7/2}$ neutron on top of the ^{34}Si core.
910 *3*	3/2^{-}	1	0.69 *10*	Interpreted as the 2p$_{3/2}$ neutron on top of the ^{34}Si core. E(level): From measured Eγ. Other: 906 keV *32* from measured E$_p$. 2014Bu01 deduced that a contamination of the proton spectrum at E(level)=906 keV *32* due to transfer to the 3/2^{+} state at the nearby energy of 970 keV is less than 30% of the 3/2^{-} component with a confidence limit of 3σ.
2044 *7*	1/2^{-}	1	0.73 *10*	Interpreted as the 2p$_{1/2}$ neutron on top of the ^{34}Si core. E(level): From measured Eγ=1034 *6*+910 *3*. Other: 2060 *50* from measured E$_p$. J$^{\pi}$: 2014Bu01 stated that J^{π} is likely to be 1/2^{-} as its large spectroscopic factor value discards another large L=1, 3/2^{-} component.
≈5500	5/2^{-}	3	0.32 *3*	Interpreted as the 1f$_{5/2}$ neutron on top of the ^{34}Si core. S: 2014Bu01 reports S=0.32 *4* in Fig. 2, S=0.32 *2* in text on page 3, S=0.32 *3* in text on page 4, and a full error bar ≈0.05 in Fig. 3.

[†] From a least-squares fit to γ-ray energies. A broad structure is observed at ≈5500 keV from E$_p$. A broad structure is observed at 3330 keV *120* from E$_p$ and likely corresponds to the elastic deuteron break-up process, the cross section of which was estimated to be 0.1 mb/MeV (2014Bu01).

[‡] As given in 2014Bu01 based on L-transfers and shell-model predictions.

[#] From TWOFNR-ADWA analysis of measured proton angular distributions (2014Bu01). Additional uncertainties of ≈15% in spectroscopic factors due to global potentials in the ADWA calculation are not included.

γ(^{35}Si)

E$_\gamma$	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$
910 *3*	910	3/2^{-}	0	7/2^{-}
1134 *6*	2044	1/2^{-}	910	3/2^{-}

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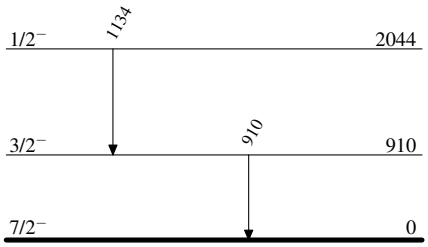
Level Scheme



$^{35}_{14}Si_{21}$