^{2}H(^{34}Si,pγ) 2014Bu01

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

2014Bu01: A 20.5-MeV/nucleon, 1.1 $\times 10^5$ pps, and 95% pure ^{34}Si secondary 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 $\sigma(E_p,\theta)$, Doppler-corrected Eγ, Iγ, (^{34}Si)p-coin. Deduced levels, J, π, L-transfer and spectroscopic factors. Comparisons with shell-model calculations.

2007GeAA: 30-AMeV ^{34}Si beam on 30-mg/cm^2 CD_2 secondary target at GANIL. Ejectiles were identified by the VAMOS spectrometer. γ rays were detected using the EXOGAM germanium clover array. Measured Doppler-corrected Eγ, Iγ, $\gamma\gamma$-coin, and (^{35}Si)γ-coin. Deduced levels, J, π, and compared with shell-model calculations.

^{35}Si Levels

E(level)[†]	J^{π}[‡]	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): Other: 906 *32* from measured E_p. 2014Bu01 deduced that a contamination of the proton spectrum at E(level)=906 *32* due to transfer to the 3/2^{+} level at 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): Other: 2060 *50* from measured E_p. J^{π}: 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, except for a broad level observed at ≈5500 keV from E_p. Another 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_γ	E_i(level)	J_i^{π}	E_f	J_f^{π}	Comments
910 *3*	910	3/2^{-}	0	7/2^{-}	E_γ: Other: 905 *1* from 2007GeAA.
1134 *6*	2044	1/2^{-}	910	3/2^{-}	E_γ: Other: 1133 *3* from 2007GeAA.

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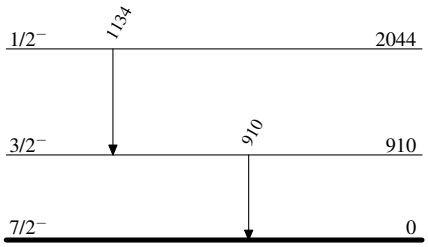
Level Scheme



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