^{2}H(^{34}Si,^{35}Siγ) 2014Bu01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Lijie Sun and Jun Chen	NDS 211,1 (2026)	30-Sep-2025

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

2014Bu01: A 20.5-MeV/nucleon, 1.1×10^{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- mg/cm^2 *1* CD_2 secondary target. Incoming beam ions were tracked using two position-sensitive multiwire proportional chambers upstream of the target. Outgoing ions were identified using an ionization chamber (IC) downstream of target for energy loss and a plastic scintillator behind the IC for TOF measurements. 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-strip annular Si 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.

Additional information 1.

2007GeZX: 30-AMeV ^{34}Si beam on 30-mg/cm^2 CD_2 secondary target at GANIL. Heavy ions produced in reactions 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. Compared 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): 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$^{\pi}$: 2014Bu01 states that J^{π} is likely to be 1/2$^-$ as its large spectroscopic factor value excludes 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.

† Additional information 2.

‡ 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)

Eγ	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	Comments
910 *3*	910	3/2$^-$	0	7/2$^-$	Eγ: Other: 905 *1* in 2007GeZX, with uncertainty likely statistical only considering it is from a γ-ray spectrum with a bin size of 4 keV.
1134 *6*	2044	1/2$^-$	910	3/2$^-$	Eγ: Other: 1133 *3* in 2007GeZX, with uncertainty likely statistical only considering it is a very weak γ ray seen in a γ-ray spectrum with a bin size of 4 keV.

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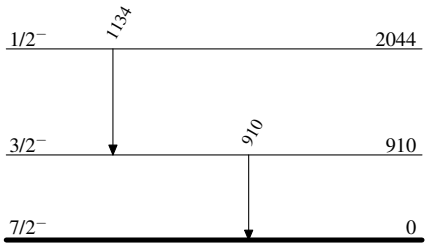
Level Scheme



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