^{100}Mo(t,^{3}He) 1979Aj03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172, 1 (2021)	31-Jan-2021

1979Aj03: E(t)=23 MeV triton beam was produced from the LASL three-stage Van de Graaff facility. Target was 338 μg/cm^2 self-supporting molybdenum (95.9% enriched in ^{100}Mo). Reaction products were momentum-analyzed with a Q3D magnetic spectrometer (FWHM≈25 keV).Measured $\sigma(\theta)$, θ=25°, 30°, 35°. Deduced levels, mass excess=−79480 keV *30* for ^{100}Nb from Q value.

2017Mi06: E(t)=115 MeV/nucleon beam produced in ^{9}Be(^{16}O,X),E=115 MeV/nucleon at NSCL, MSU, followed by separation of triton fragments using A1900 fragment separator. Reaction target=^{100}Mo 10 mg/cm^2 thick. Measured and analyzed ^{3}He scattered particles using S-800 magnetic spectrograph, neutrons from excited ^{100}Nb states by plastic and scintillation detectors, (^{3}He)n-coin, double-differential $\sigma(\theta)$. FWHM=500 keV. Multipole decomposition analysis (MDA) for L-transfers for two energy sections: 2.0 to 2.5 MeV, and 3.0-5.0 MeV. deduced B(GT)=0.04 *3* for excitations below 0.5 MeV, and 0.77 *15* for excitations up to 4 MeV. Deduced isovector spin giant monopole resonance (IVSGMR), and ^{3}He spectrum up to 20 MeV with L=0,1 and 2. Excitation and decay of the spin-isospin excitations. Comparison with pn-(R)QRPA and pn-RQTBA calculations.

^{100}Nb Levels

E(level)[†]	dσ/dΩ (μb/sr)	Comments
0+x	0.090	E(level): the ground state in Table I of 1979Aj03, with Q_0=−6690 *30* in (t,^{3}He) seems to corresponds to 314 keV *23*, which is the energy of the 2.99-s, (5$^+$) isomer measured by 2007Ri01 and 2007Ha32 in precise mass measurements of g.s. and isomer of ^{100}Nb. If x=314, then 314, 348, 521, and 735 populated in 12.4−μs isomer decay match with 0+x, 25+x, 210+x and 410+x levels from (t,^{3}He), respectively, as noted by 1999Ge01.
25+x *10*	0.093	
131+x *10*	0.080	
210+x?[&] *15*		
348+x *15*	0.19	
410+x *15*		
450+x[‡] *20*		
520+x[‡] *20*		
565+x *10*		
595+x?[‡] *20*		
680+x *20*	0.28	
720+x?[#] *20*		
784+x *20*		
820+x[#] *20*		
865+x[‡] *20*		
893+x *20*		
945+x[‡] *20*		
1040+x[‡] *20*		
1075+x[‡] *20*		
1136+x[#] *20*		
1180+x[#] *25*		
1260+x[@] *30*		
1300+x[@] *30*		

[†] Many states are suggested from the observation of 23 groups in 1979Aj03, several of which are unresolved structures. Measured Q value=−6690 *30* for the lowest excitation energy was assigned to the g.s. by 1979Aj03. But this Q value disagrees with Q=−6377 *6* (deduced from mass differences in 2017Wa10). However it agrees better if the first level populated in (t,^{3}He) is identified with the 2.99-s, (5$^+$) isomer at 314 *25* (2007Ri01). Mass excess=79480 keV *30* deduced by 1979Aj03 agrees well with

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^{100}Mo(t,^{3}He) 1979Aj03 (continued)

^{100}Nb Levels (continued)

measured mass excess=−79488 *10* (2007Ha32) for the 2.99-s isomer of ^{100}Nb. For the ground state, 2007Ha32 measured mass excess of −79802 *20* keV. However, it remains unclear why a high-spin ((5$^+$) isomer) would be preferentially populated in a charge-exchange reaction such as ^{100}Mo(t,^{3}He) instead of the 1$^+$ ground state or other known 1$^+$ states through Gamow-Teller transitions.

‡ Unresolved structure.

Resolved at one angle only.

@ Kinematically observable at one angle only.

& Observed at one angle only, but weak group of unresolved levels seen at all angles.