Adopted Levels

Q(β^-)=2.736×10^4 *53*; S(n)=0.9×10^2 *56* 2017Wa10

The ^{19}B nucleus is particle stable. Its mass excess is 59.77 MeV *53* (2017Wa10).

Theory:

Predictions and calculations for ground-state and excited-state parameters of ^{19}B: 1985Po10, 1989De52, 1990Lo11, 1992Wa22, 1995Ho02, 1995Ho13, 1995Ka23, 1997Ba54, 1997Ho04, 2001Ka66, 2001Wa38, 2004An21, 2004La24, 2006Ko02, 2012Yu07.

Discussions of cluster structure and possible neutron-halo structure of ^{19}B: 1994Fe01, 1995Fe08, 1995Gu07, 1999Ta09, 2000Gu04, 2000Ma28, 2001Mb02, 2001Ta04, 2002Gu10, 2002Ho05, 2005Ar12, 2005Ka02, 2005Li22, 2006Li31, 2007Fr22, 2010Gu15, 2010Ma38, 2012Fo18, 2015Ha20, 2015Ka02, 2016Xi04, 2017Ah08.

^{19}B Levels

Cross Reference (XREF) Flags

A	^{9}Be(^{40}Ar,^{19}B)	E	^{181}Ta(^{40}Ar,^{19}B)
B	^{9}Be(^{56}Fe,^{19}B)	F	Ta(^{48}Ca,^{19}B)
C	C(^{19}B,X)	G	U(p,^{19}B)
D	^{181}Ta(^{36}S,^{19}B)		

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	3/2$^-$	2.92 ms *13*	ABCDEF	%β^-=100; %β^-n=71.8 *+83−91*; %β^-2n=16.0 *+56−48*; %β^-3n<9.1 %β^-n, %β^-2n and %β^-3n: From (2003Yo02); see also P$_n$=1×P$_{1n}$+2×P$_{2n}$+...=(125 *32*)%>100% (1998Yo06), which implies the existence of significant multineutron emissions in the β-delayed neutron decay. J$^\pi$: From systematics, see (2001Ka66,2005Ka02). T$_{1/2}$: From (2003Yo02) which includes re-analysis of (1998Yo06: 3.3 ms *2*) data. See also T$_{1/2}$=4.5 ms *15* (1999Re16).

^{9}Be(^{40}Ar,^{19}B) 2003Oz01,2003Ba47

2000Oz01: A beam of ^{40}Ar at E≈1 GeV/nucleon impinged on a Be target (4007 mg/cm^2) at the GSI SIS/FRS facility. The ^{19}B fragments of interest were identified using the B_ρ settings along with scintillators to measured ΔE and time-of-flight. The ^{19}B production cross section was measured as roughly 4.86×10^{-10} b.

2003Ba47: Production yields for fragmentation of 140 MeV/nucleon ^{40}Ar projectiles on a berylium target were measured at the MSU/NSCL. The isotopes were separated with the A1900 separator and were identified using time-of-flight and ΔE information. The production cross section for ^{19}B was extrapolated as 2.35×10^{-6} mb or 2.13×10^{-8} mb using EPAX 1.0 (1990Su17) and EPAX 2.15 (2000Su04) empirical parametrizations, respectively.

2003Oz01: Beams of E(^{40}Ar)=94 MeV/nucleon ions bombarded either a Be target (471 mg/cm^2) or a Ta target (686 mg/cm^2) at RIKEN/RIPS. The fragments were collected with Δp/p=6% and ΔΩ=5 msr. Reaction products were identified based on ΔE, time-of-flight and magnetic rigidity (B_ρ). A production cross section of ^{19}B $\sigma_F=3.4\times10^{-11}$ b *11* on a Be target was measured.

^{19}B Levels

E(level)
0

^{9}Be(^{56}Fe,^{19}B) 1984Mu27

1984Mu27: A beam of ^{56}Fe at E=670 MeV/nucleon impinged on a Be target (7.9 g/cm^2) at the Lawrence Berkeley Laboratory Bevalac facility. The charge and mass of projectile fragments were determined with the 0° spectrometer facility using a detector telescope consisting of a wire-chamber hodoscope, a front scintillator paddle, a set of threshold Cherenkov counters and a back scintillator paddle. The charge resolution of the detector was σ_z=0.1 *e* and the mass resolution σ_A=0.25 amu.

This measurement presented the first evidence for the particle stability of ^{19}B. See also (2012Th01).

^{19}B Levels

E(level)
0

C(^{19}B,X) 1999Su17

1998SuZM,1999Su17: A secondary beam of E(^{19}B)=740 MeV/nucleon ions, produced at the GSI/FRS facility, impinged on a carbon target (10.163 g/cm^2). The rigidity-separated isotopes were identified by their charges and time-of-flight information. The interaction cross section σ_I(^{19}B)=1219 mb *83* was measured. The r.m.s. radius r_m=3.11 fm *13* was determined using the optical limit (OL) of the Glauber model. A "core plus 4n" structure for ^{19}B is suggested according to the valence radius analysis.

2000Ch20: A secondary beam of E(^{19}B)≈720 MeV/nucleon ions, produced at the GSI projectile fragment separator (FRS), impinged on a carbon target (10.16 or 5.34 g/cm^2). The isotopes were identified by the ΔE-time-of-flight-B_ρ method. Total charge-changing cross sections, σ_{cc} were measured within an accuracy of 5%. σ_{cc}(^{19}B)=901±201 mb.

See also (1999Bo46) and (2001Oz04,2015Ha20,2017Ah08: theory).

^{19}B Levels

E(level)
0

^{181}Ta(^{36}S,^{19}B) 1999Re16

1999Re16: Nuclei of interest were produced by the fragmentation of a 2.8 GeV ^{36}S beam on tantalum targets with thickness 288 μm, 377 μm, 539 μm or 854 μm, mounted on ≈100 μm thick carbon backings at GANIL. Five different settings of the LISE3 spectrometer were used to collect different nuclei. Particles were detected by six sillicon detectors and were identified using ΔE and time-of-flight information. The γ-ray energies emitted following the β-decay were measured using four germanium detectors, each with 70% relative efficiency, placed at θ≈0° relative to the secdonary beam direction. The half-life of ^{19}B was measured as $T_{1/2}$=4.5 ms *15*.

^{19}B Levels

E(level)	$T_{1/2}$
0	4.5 ms *15*

^{181}Ta(^{40}Ar,^{19}B) 1986Po13,2003Oz01

1986Po13: A search for extremely neutron-rich nuclei at the neutron drip line was carried out via projectile fragmentation of 44 MeV/nucleon ^{40}Ar impinged on a 166 mg/cm^2 thick ^{181}Ta target at GANIL. The fragments were collected using LISE spectrometer at 0° and identified with ΔE-E, time-of-flight information. Two settings of the spectrometer, B_ρ=3.10 and 3.20 Tm, were used to search for ^{22}C and ^{19}B isotopes with running times ≈30 hours. The previous observation of ^{19}B is confirmed. See also (1988GuZT).

1998Yo06,2003Yo02: Beta-decay properties of ^{19}B, ^{22}C and ^{23}N nuclei were studied using projectile fragments from 95 MeV/nucleon ^{40}Ar ions impinged on a ^{nat}Ta target (≈670 mg/cm^2) at RIKEN. The reaction fragments were collected and analyzed through RIPS at the maximun solid angle ΔΩ=5 msr with Δp/p=6% and were identified based on the ΔE-time-of-flight information. The half-life of ^{19}B was measured as $T_{1/2}$=3.3 ms *2* (1998Yo06) and 2.91 ms *13* (2003Yo02). The β-delayed neutron emission probability $P_n=1\times P_{1n}+2\times P_{2n}+...$=(125 *32*)% (1998Yo06) and P_{1n}=(71.8 +*83*−*91*)%, P_{2n}=(16.0 +*56*−*48*)%, P_{3n}<9.1% (2003Yo02) were deduced.

2003Oz01: Beams of E(^{40}Ar)=94 MeV/nucleon ions bombarded either a Be target (471 mg/cm^2) or a Ta target (686 mg/cm^2) at RIKEN/RIPS. The fragments were collected with Δp/p=6% and ΔΩ=5 msr. Reaction products were identified based on ΔE, time-of-flight and magnetic rigidity (B_ρ). A production cross section of ^{19}B $\sigma_F=1.59\times10^{-9}$ b *48* on a Ta target was measured.

^{19}B Levels

E(level)	$T_{1/2}$ †
0	2.91 ms *13*

† From (2003Yo02).

Ta(^{48}Ca,^{19}B) 2012Ga45

1991Mu19: ^{19}B and several other nuclei were identified in the fragmentation products of a 44 MeV/nucleon ^{48}Ca beam impinging on a 173 mg/cm^2 Ta target at GANIL using ΔE vs. time-of-flight method. The LISE spectrometer was fixed at 0° with respect to the incident beam and provided the momentum resolution $\Delta B_\rho/B_\rho=1.3\times10^{-3}$.

2012Ga45: XUNDL dataset compiled by TUNL, 2012.

A beam of E=60 MeV/nucleon ^{48}Ca was fragmented on a ^{nat}Ta target that was located between the SISSI solenoid spectrometers at GANIL. The ejectiles were transported 82 m to the focal plane of the SPEG spectrometer where they were identified by ΔE-E and their magnetic rigidity was determined. Furthermore their time-of flight was measured for the path between the SPEG spectrometer and a micro-channel plate detector located after a set of dipole magnets that followed the production target. Two sets of field settings ($B\rho$=2.4 Tm and 2.88 Tm) were used to reduce systematic uncertainties. Masses were determined for a set of calibration nuclei and nuclei of interest.

The ^{19}B mass excess ΔM=59.77 MeV *35* was deduced from momentum and time-of-flight.

1991Or01: A typo is present in Table 1, giving ^{19}B. However the observed nucleus and ΔM are related to ^{19}C.

^{19}B Levels

E(level)	Comments
0	ΔM=59.77 MeV *35* deduced from momentum and time-of-flight (2012Ga45). (2017Wa10: AME2016) gives ΔM=59.77 MeV *53*.

U(p,^{19}B) 1974Bo05

1974Bo05: The cross sections for spallation products were determined from E_p=4.8 GeV proton bombardment of a uranium target at the Bevatron. Reaction products were identified using ΔE-E and time-of-flight analysis. The upper limit for the ^{19}B production cross section was ≈1 μb. The study did not find evidence to prove the particle stability of ^{19}B.

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