

⁵H

Korshennikov et al. reported the observation of ⁵H in the 2001 paper entitled “Superheavy Hydrogen ⁵H” (2001Ko52). A 36 MeV/nucleon secondary ⁶He beam identified with the fragment separator ACCULINA at the Joint Institute for Nuclear Research in Dubna irradiated a cryogenic hydrogen target forming ⁵H by transferring a proton from the beam to the target. The target “di-proton” decays into two protons which were then measured in coincidence to reconstruct the decay energy of ⁵H. “A peak consistent with a ⁵H resonance at 1.7±0.3 MeV above the n + n + t threshold was observed, with a width of 1.9±0.4 MeV.” It should be mentioned that this decay energy has been reproduced in a few other secondary beam experiments (2005Go46) but has not been replicated in pion induced reactions (2009Gu03).

First indications that ⁵H was unbound with respect to neutron emission were reported by Tautfest in 1958 (1958Ta08) and Cence and Waddell in 1962 (1962Ce03). A 1963 report that ⁵H was bound (1963Ne02) could not be confirmed (1964Sc02, 1964Sh18).

This assignment was changed (2016Th03) from the initial compilation (2012Th01) where the discovery of ⁵H was credited to the 1987 paper by Gornov et al. (1987Go25). However, the reported resonance width of 8±3 MeV corresponds to a lifetime of less than 10⁻²² s which is shorter than the limit for the existence of a nuclide (1966Go41, 2004Th06).

- 1958Ta08 G. W. Tautfest, Phys. Rev. **111**, 1162 (1958).
1962Ce03 R. J. Cence and C. N. Waddell, Phys. Rev. **128**, 1788 (1962).
1963Ne02 B. M. K. Nefkens, Phys. Rev. Lett. **10**, 55 (1963).
1964Sc02 A. Schwarzschild, A. M. Poskanzer, G. T. Emery, and M. Goldhaber, Phys. Rev. **133**, B1 (1964).
1964Sh18 N. K. Sherman and P. Barreau, Phys. Lett. **9**, 151 (1964).
1966Go41 V. I. Goldanskii, Ann. Rev. Nucl. Part. Sci. **16**, 1 (1966).
1987Go25 M. G. Gornov, Yu. B. Gurov, V. P. Koptev, P. V. Morokhov *et al.*, JETP Lett. (USSR) **45**, 252 (1987).
2001Ko52 A. A. Korshennikov, M. S. Golovkov, I. Tanihata, A. M. Rodin *et al.*, Phys. Rev. Lett. **87**, 092501 (2001).
2004Th06 M. Thoennessen, Rep. Prog. Phys. **67**, 1187 (2004).
2005Go46 M. S. Golovkov, L. V. Grigorenko, A. S. Fomichev, S. A. Krupko *et al.*, Phys. Rev. C **72**, 064612 (2005).
2009Gu03 Yu. B. Gurov, V. S. Karpukhin, S. V. Lapushkin, I. V. Laukhin *et al.*, Bull. Rus. Acad. Sci. Phys. **73**, 139 (2009).
2012Th01 M. Thoennessen, At. Data Nucl. Data Tables **98**, 43 (2012).
2016Th03 M. Thoennessen, Int. J. Mod. Phys. E **25**, 1630004 (2016).

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