

U(p,X),Si(p,X):radius 2012Yo01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	R. B. Firestone	NDS 127, 1 (2015)	15-Jan-2015

First application of nuclear orientation method for study of isotope shifts in nuclei.

Target=silicon carbide for neutron-deficient Mg nuclei ( $^{21, 22, 23}\text{Mg}$ ) and uranium carbide for neutron-rich Mg nuclei ( $^{32, 31, 30, 29, 28, 27}\text{Mg}$ ).

Beam=high-energy protons from CERN-ISOLDE facility. Magnesium ions were laser ionized, accelerated to 50 keV, and mass separated. The Mg ions were excited in the  $3s\ ^2S_{1/2}$  to  $3p\ ^2P_{1/2}$  atomic transition (D<sub>1</sub> line at 280.35 nm) which has well-defined hyperfine structure. Atomic transition was detected by the fluorescence as function of the Doppler-shifted laser frequency with the scan of ion-beam velocity. The measurement of  $\beta$ -asymmetry resolved the contaminants. For this measurement nuclear orientation was achieved by optical pumping with circularly polarized light using magnetic field of 1 mT.

Atomic isotope shifts measured using collinear laser spectroscopy and  $\beta$ -asymmetry with reference to  $^{26}\text{Mg}$  for all measurements.

 $^{21}\text{Mg}$  Levels

E(level)	$J^\pi$ <sup>†</sup>	Comments
0	$5/2^+$	$\delta\langle r^2 \rangle(^{26}\text{Mg}, ^{21}\text{Mg}) = +0.176\ \text{fm}^2$ 24 (stat) 63 (syst) (2012Yo01). $\langle r^2 \rangle^{1/2} = 3.0629\ \text{fm}$ 40 (stat) 106 (syst) (2012Yo01).

<sup>†</sup> From Adopted Levels of  $^{21}\text{Mg}$  in ENSDF database.