Erratum: ^{6}Be and ^{8}C level widths [Phys. Rev. C 66, 047603 (2002)]

F. C. Barker

(Received 26 November 2002; published 25 April 2003)

DOI: 10.1103/PhysRevC.67.049902 PACS number(s): 23.50.+z, 27.20.+n, 99.10.Cd

It has been found that the computer program used in Ref. [1] to calculate the sequential-decay contributions to the widths of the ^{6}Be and ^{8}C levels was in error, leading to values of $\overline{P_s}$ that were much too large and of $\overline{S_s'}$ that were somewhat wrong. For example, for the case leading to Eq. (11) of Ref. [1], the corrected values are $\overline{P_s}=0.000666$ and $\overline{S_s'}=0.193$ MeV^{-1}. These lead to $\Gamma^0_{\mathrm{tot}}=64$ keV for the ground state of ^{6}Be, considerably less than the experimental value of 92 ± 6 keV. Inclusion of the contributions from sequential decay of ^{6}Be(0^+) is now causing a reduction in the calculated value of Γ^0_{tot}—if the sequential decay is neglected altogether, one has $\Gamma^0_{\mathrm{tot}}=85$ keV.

The calculated value is insensitive to changed values of many parameters. One change leading to slightly larger values of Γ^0_{tot} comes from the diproton contribution. In Ref. [1], the upper limit of the integrals involving $\rho(U)$ for diproton decay was taken as 50 MeV; however, $\rho(U)$ vanishes at $U\approx35$ MeV and increases above this energy, so that we now cut off the integrals at 35 MeV. For ^{6}Be(0^+) decay, this gives $\overline{P_d}=0.0372$ and $\overline{S_d'}=0.324$ MeV^{-1}.

It seems reasonable to assume $\mathcal{S}_{41}=1.25$, even though smaller values lead to larger values of Γ^0_{tot} for ^{6}Be(0^+). Then, for conventional values of the channel radii ($a_1=3.93$ fm, $a_2=3.75$ fm), one finds $\Gamma^0_{\mathrm{tot}}\approx66$ keV, more or less independent of the assumed energy of the ^{5}Li ground state.

It has been found that data involving the ground states of ^{5}Li and ^{5}He are best fitted with *R*-matrix formulas for a channel radius $a_2=5.5\pm1.0$ fm [2]. Because of the extended nature of ^{5}Li(g.s.), one might expect $a_1\gtrsim a_2$. If we take $a_1=a_2=5.5$ fm, we find $\Gamma^0_{\mathrm{tot}}=80$ keV, again insensitive to the value of Q_{1ps}. The increased value of Γ^0_{tot} is due mainly to the increased value of a_1.

For the 2^+ excited state of ^{6}Be, we now get $\overline{P_d}=0.280$ and $\overline{S_d'}=0.263$ MeV^{-1}. For $\mathcal{S}_{41}=1.25$ and conventional values of a_1 and a_2, with $Q_{1ps}=1.86$ MeV as in Eq. (12) of Ref. [1], we find $\overline{P_s}=0.098$ and $\overline{S_s'}=0.243$ MeV^{-1}, giving $\Gamma^0_{\mathrm{tot}}=0.56$ MeV. The value of Γ^0_{tot} now depends on the assumed value of Q_{1ps}, increasing from about 0.48 MeV for $Q_{1ps}=2.08$ MeV to 0.84 MeV for $Q_{1ps}=1.40$ MeV. At the same time, the branching ratio for ^{2}He emission decreases from 38% to 22%. From experiment, $\Gamma^0_{\mathrm{tot}}=1.16\pm0.06$ MeV and the branching ratio is about 20%. For $a_1=a_2=5.5$ fm, for the same range of Q_{1ps} values, one finds Γ^0_{tot} increasing from 0.53 MeV to 1.03 MeV and the branching ratio decreasing from 42% to 23%.

For the ground state of ^{8}C, the corrected values are $\overline{P_s}=0.00370$ and $\overline{S_s'}=0.255$ MeV^{-1}. The contribution to Γ^0_{tot} from the two channels considered is now about 26 keV, much less than the experimental FWHM values of order 200 keV. Changes in the assumed energy and width of ^{7}B ground state within the experimental uncertainties do not change the calculated contribution appreciably, nor do reasonable changes in the channel radii.

In summary, the *R*-matrix formulas used in Ref. [1] have difficulty in getting calculated widths for the ground state and first-excited state of ^{6}Be as large as the experimental values, and the calculated ^{2}He branching ratio as low as the experimental value, the best agreement being obtained with large values of the channel radii and a low energy for the ^{5}Li ground state. For the ground state of ^{8}C, the calculated contribution to the width from two decay channels is small compared with the experimental value.

I am grateful to D. J. Millener for pointing out my error.

[1] F. C. Barker, Phys. Rev. C **66**, 047603 (2002).
[2] C. L. Woods, F. C. Barker, W. N. Catford, L. K. Fifield, and N. A. Orr, Aust. J. Phys. **41**, 525 (1988).

 ©2003 The American Physical Society