

Erratum: Lifetime of the $^2F_{7/2}$ Level in Yb^+ for Spontaneous Emission of Electric Octupole Radiation **[Phys. Rev. Lett. 127, 213001 (2021)]**

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In our Letter the lifetime of the $^2F_{7/2}$ level in Yb^+ for spontaneous emission of electric octupole (E3) radiation was underestimated by a factor 2 and the corresponding matrix element $|V_{eg}(\text{E3})|$ of the $^2S_{1/2} - ^2F_{7/2}$ E3 transition was overestimated by a factor $\sqrt{2}$. The correct results are

$$|V_{eg}(\text{E3})| = 1.85(5) \times 10^{-37} \text{ Jm/V}, \quad (1)$$

$$\tau(^2F_{7/2}) = 9.96(50) \times 10^7 \text{ s}, \quad (2)$$

where the latter corresponds to 3.16(16) yr.

The error resulted from using the electric field amplitude of the perturbing laser radiation E_0^2 instead of the mean-square value of the alternating electric field $\langle E^2 \rangle = E_0^2/2$ in the quadratic Stark shift $\Delta\nu_{\text{QS}}$ introduced in Eq. (1). The correct expression using $\langle E^2 \rangle$ is

$$\Delta\nu_{\text{QS}}(\nu) = -\frac{\langle E^2 \rangle}{h} \left[\frac{\Delta\alpha_S(\nu)}{2} + \frac{\Delta\alpha_T(\nu)}{5} (3\cos^2\beta - 1) \right], \quad (3)$$

with $\Delta\alpha_S$ the scalar and $\Delta\alpha_T$ the tensor differential polarizabilities and h Planck's constant. The error repeats in the differential quadratic Stark shift, which needs to be corrected to $\Delta\nu_{\text{QS}} = -\langle E^2 \rangle \Delta\alpha_{eg}(\nu_0)/(2h)$. The error also propagates to the matrix element, which needs to be corrected to $|V_{eg}| = 1/(2\pi)\sqrt{h|\xi\Delta\alpha_{eg}(\nu_0)|}/4$.

With this, we obtain the aforementioned results on $|V_{eg}(\text{E3})|$ and $\tau(^2F_{7/2})$ and the corrected Fig. 1.

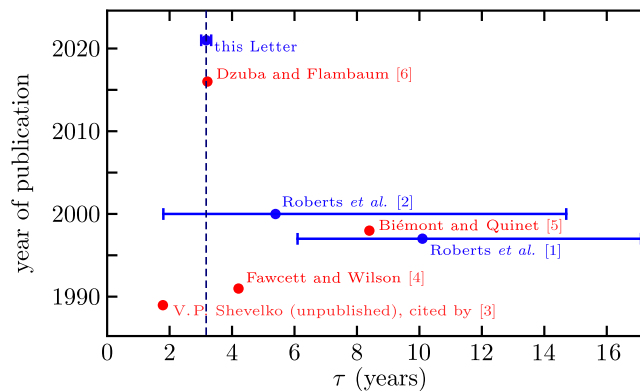


FIG. 1. Comparison of experimental (blue) and theoretical (red) values of the Yb^+ excited $^2F_{7/2}$ state lifetime τ . Previous experimental estimates [1,2] were based on observed laser excitation events and a rate equation analysis. Theoretical values are given in Refs. [3–6].

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- [1] M. Roberts, P. Taylor, G. P. Barwood, P. Gill, H. A. Klein, and W. R. C. Rowley, *Phys. Rev. Lett.* **78**, 1876 (1997).
- [2] M. Roberts, P. Taylor, G. P. Barwood, W. R. C. Rowley, and P. Gill, *Phys. Rev. A* **62**, 020501 (2000).
- [3] H. Lehmitz, J. Hattendorf-Ledwoch, R. Blatt, and H. Harde, *Phys. Rev. Lett.* **62**, 2108 (1989).
- [4] B. Fawcett and M. Wilson, *At. Data Nucl. Data Tables* **47**, 241 (1991).
- [5] E. Biémont and P. Quinet, *Phys. Rev. Lett.* **81**, 3345 (1998).
- [6] V. A. Dzuba and V. V. Flambaum, *Phys. Rev. A* **93**, 052517 (2016).