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Improved active fiber-based retroreflector with intensity stabilization and a polarization monitor for the near UV: erratum

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Abstract: In Sec. 6 (polarization monitor) of our recent publication [Opt. Express **29**(5), 7024 (2021)], we assumed a small value of δ. This is however incorrect. The correct approximation for small β leads to the updated Eqs. (10)–(11), resulting in a corrected Fig. 12.

In Sec. 6 on the polarization monitor of [1], we assumed a small value of δ, which is incorrect. The correct approximation $\beta \ll 1$ can be derived from a general treatment of the problem with the condition $|(S_3/S_0)_{\text{atom}}| \lesssim 0.3$, and leads to the following corrected Eq. (10):

$$|(S_3/S_0)_{\text{atom}}| \simeq \frac{1}{2}\sqrt{\left((S_3/S_0)_{\text{back}} - (S_3/S_0)_{\text{in}}\right)^2 + \left((S_2/S_0)_{\text{back}} + (S_2/S_0)_{\text{in}}\right)^2}, \qquad (1)$$

where we assumed for the incoming polarization $(S_3/S_0)_{\text{in}} \ll 1$ and $(S_2/S_0)_{\text{in}} \ll 1$. Note that the above equation gives the absolute value of $(S_3/S_0)_{\text{atom}}$ only.

The corrected Eq. (11) then reads:

$$\Delta\psi_{\text{back}} \simeq -2\,\Delta\psi_{\text{atom}}\,(1 + \cos\delta). \qquad (2)$$

Since δ is in general not small (but can be on the order of $10^3\pi$), even small relative fluctuations in δ will prevent the determination of $\Delta\psi_{\text{atom}}$ with our method. Furthermore, a single linear retarder is not a sufficient model for a combination of linear birefringent elements, but a circular
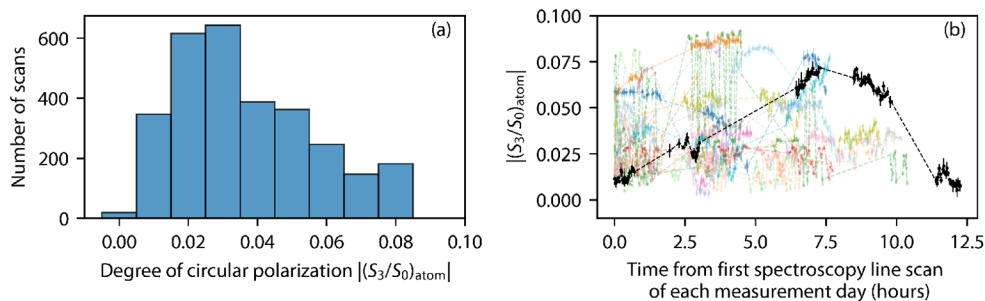

Fig. 1. Corrected Fig. 12 of [1] using the corrected model of polarization monitor, showing only the absolute value of circularly polarized fraction $|(S_3/S_0)_{\text{atom}}|$.

birefringence term (rotator) must also be included [2]. The latter can be non-zero even when cascading multiple linear retarders only, nor can it be assumed to be constant. This additionally prevents the determination of $\Delta\psi_{\text{atom}}$ from $\Delta\psi_{\text{back}}$. However, from the polarization-maintaining properties of our fiber we know that the variations of this angle are always below $\Delta\psi_{\text{atom}} \lesssim 3°$, which is sufficient for our experiment.

In contrast to δ, the beam splitter retardance δ_{BS} can be small, such that Eqs. (12) remain unchanged as long as polarizing effects of the beam splitter can be neglected.

The corrected Fig. 12 of [1] resulting from the above corrections is presented in Fig. 1 .

Disclosures. The authors declare no conflicts of interest.

References

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