Erratum

Erratum: Spin-flip Raman scattering in $KTaO_3$: Donors [Phys. Rev. B 29, 4646 (1984)]

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A section of the text was omitted from our paper. The last sentence on p. 4647 and missing text should read as follows:

. . .The scattering intensity was typically 200 counts/s with a time constant of 2.5 s, spectral slit widths of 1 cm^{-1}, and 300 mW of excitation through a 5-mm pathlength of sample near the exit face (i.e., nearly grazing incidence). Spectra were obtained with both 3511- and 3638-Å Ar II laser excitation to ensure that the observed processes were true Raman scattering. Anti-Stokes spectra were not observed, in general, which is in accord with expectations for thermalized carriers at 1.8 K. The choice of ultraviolet excitation wavelengths was designed to match the known value[12,14] of the direct band gap at 3.5 eV. The two Ar II lines employed were at 351.1 and 363.8 nm, corresponding to incident photon energies of 3.53 and 3.40 eV. Many earlier studies have shown that direct gaps yield very large resonance enhancements of Raman cross sections.

In Fig. 2 we graph the peak positions for the observed spectra versus applied magnetic field. The slope of these lines yields the gyromagnetic ratio directly. Note that no correction for linewidth is necessary in this procedure, unlike the case of phonon scattering. This is because the spin-flip spectra are described by the (modified) Bloch equations, not by anharmonic oscillator equations of motion. For the latter the broadening of the spectral line shifts its peak position; but in the former (spin system) it does not.[3] Consequently the g values extracted from this procedure are expected to be rather accurate. From Fig. 2 we obtain the results $g(110) = 2.10 \pm 0.05$. This g value is nearly isotropic. A zero-field splitting of 1.3 ± 0.5 cm^{-1} is found by linear extrapolation; this value is a lower bound on the true zero-field splitting. No nonlinearity in the relationship[23] between spin-flip energy and magnetic field is observed at high fields. There are two possible causes of nonlinear dependences at low fields: zero-field splittings in spin-flip data can arise from exchange between electrons bound to adjacent donors,[24–26] or to impurity states such as Fe^{3+} or Ni^{2+}, which have degenerate ground states. As discussed below, Fe^{3+} in $KTaO_3$ has . . .