Schmalbuch *et al.* Reply: In the preceding Comment [1] the authors claim that the generation of polar spins by linearly polarized light in InGaAs [2] is an experimental artefact. They state that if neither (1) the magnetic field, nor (2) the polarization of the probe pulse, nor (3) the strain-free mounted sample defines a characteristic direction, a dependence of the polar spin orientation on the direction of the light polarization of the pump pulse is impossible for symmetry reasons.

In their argumentation the authors did not consider Figs. 4(b) and 4(c) where we analyzed the amplitude θ_F of the polar spins as a function of the angle α, which is illustrated in Figs. 1(a) and 4(c) of Ref. [2]. This angle defines a sample rotation about the x axis (see also the inset of Fig. 1), i.e., for $\alpha \neq 0°$ the pump beam is away from normal incidence with respect to the sample surface. When changing α from $-7.5°$ to $1.5°$ we observe an almost linear change of θ_F with a sign reversal at $\alpha = -3°$. θ_F becomes positive for $\alpha < -3°$ while it becomes negative for $\alpha > -3°$, thus unambiguously demonstrating that polar spins of opposite spin orientations are excited for both cases. As such a sign reversal is *not* observed for circularly polarized light, it is a direct hallmark for optical orientation by linearly polarized light. As stated in our Letter, we carefully diminished the birefringence in our setup to less than 1% (see also Ref. [3]). We conclude that neither the birefringence of our setup nor the birefringence from incident light propagation away from normal incidence can explain the very large amplitude of θ_F after linear excitation, which is 85% (at $\alpha = -7.5°$) of the corresponding amplitude obtained for σ^+ excitation. In contrast to the authors' argumentation, the angle α is the symmetry breaking parameter in our experiments.

In follow-up experiments we found that the sign reversal is not always at $\alpha = -3°$, but rather varies from sample to sample over several degrees. We noticed that our InGaAs epilayers may be partially strained when probing spin-orbit (SO) fields [4,5]. This was unexpected in our thick (500 nm) InGaAs epilayers [2] where the strain was expected to be fully relaxed. Our InGaAs layers exhibit SO fields with both Rashba and Dresselhaus spin-orbit interactions (SOI). The strain-induced Dresselhaus field arises from the lattice mismatch between InGaAs and the GaAs substrate while the Rashba field is due to the strain gradient in the growth direction resulting from the thick InGaAs layer. As shown in Fig. 1, for electron drift along the [110] and $[1\underline{1}0]$ crystal directions we observe mostly perpendicular spin splitting due to Rashba and Dresselhaus SOI with constructive superposition for currents along [110]. For electron drift along $[\underline{1}00]$ and $[0\underline{1}0]$ we observe components of spin splitting parallel and perpendicular to the drift direction, with a sign change of the parallel component as a result of Dresselhaus SOI.

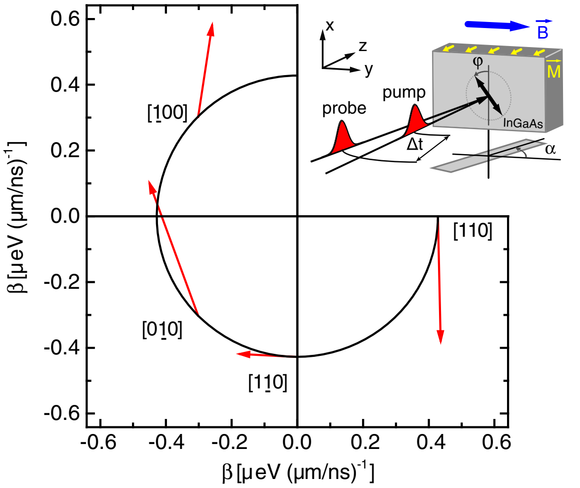

FIG. 1. Strength and direction of SO splitting in InGaAs grown on GaAs measured along different crystal directions revealing a superposition of Rashba and Dresselhaus fields. The inset shows the optical setup with the sample angle α.

We conclude that partial strain in our InGaAs results in anisotropic SOI. This result is not inconsistent with the strain-free mounting [3] of our samples. Although we currently cannot directly link the anisotropic SOI to the optical polarization, we believe that these fields may account for the variation in the critical angle at which the polar spin component reverses its direction.

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