Lippi, Barbay, and Tredicce Reply: In the interpretation of our experiment [1] we do *not* appeal to the results of [2], as incorrectly stated in the Comment [3], precisely because our measurements show results that are not compatible with the kind of mechanism responsible for gain in the single atom recoil situation. Indeed, we refer to [4] as the only prediction that does not disagree with our observations. Our claim is not one of uniqueness of interpretation, and indeed recent measurements suggest plausible alternatives [5]. However, the observations [1] do not support the interpretation proposed in Ref. [3].

The simple inclusion of recoil in the interaction between a single atom and the radiation field predicts gain at $\delta = 0$ [6] but does not account for the existence of thresholds. Close comparison shows that none of the experimental observations [(i)–(vi)] [1] are predicted by [6], hence gain at $\delta = 0$ is not sufficient to consider the interpretation proposed in [3] as a valid alternative. Furthermore, Ref. [7] does not predict any gain at $\delta = 0$. Reference [2] does not report the observation of thresholds, and mentions that "probe gain is always observed for $\delta \leq 0$, *whatever the sign of the frequency detuning*." We observe very clear *thresholds* in pump density *and* particle density and privileged values of detuning for gain to occur. Evidently, these observations cannot be reconciled and the physical processes cannot be the same.

We stress that our interpretation is based on the *global* consideration of all the observations, and not on parts thereof. Hence, when inferring the presence of a grating we can do so with a high degree of confidence.

Concerning *spontaneous vs intensity-grating-induced* gain, we take the adjective *spontaneous* to mean that the system is capable of dynamically responding, as a whole, to the seed. Because of the very short wavelength of the longitudinal grating, the strong diffusion effects present in a "hot" vapor should wash out any structure which does not result from a collective instability providing positive feedback. In addition, the phase of the optical standing wave fluctuated randomly because of a path difference between pump and probe of about 3 m, thus making the explanation of gain as induced by a field standing wave all the more implausible.

We now address the specific points raised in [3].

(1) "Similar" experimental conditions means that the parameters do not have identical values, and therefore a close comparison between the figures is not meaningful. Independently of the scales, we can state with a high degree of confidence that the depletion in the pump power appears in the intervals of detuning values for which we observe gain in the probe beam.

(2) Because of a mistake in a numerical coefficient, we obtained an incorrect estimate of the detunings. The corrected value for Ω_R in the figure is 3 GHz [8]. The discrepancy remarked upon in [3] is therefore removed, and our statement, point (ii) [1], has to be modified as follows: "(ii) gain reaches a maximum for a detuning close to the Rabi frequency."

(3) A transverse grating, as in [2], would have very few periods and reduce net gain. However, a comparison between [1] and [2] is not very meaningful, given the differences in their respective experimental characteristics.

(4) Our statement is different from what is interpreted in [3]. We state that "...the two forces can compensate each other *to a sufficient degree*" for "the collective process" to take place. This is simply a conclusion based on the experimental observations and on the relative signs between the external forces, and not a statement about a true equilibrium between them, as inferred in [3]. Furthermore, we remark that the calculation presented in Ref. [3] can be inaccurate in the case of a Gaussian beam. The perturbation caused by the transverse forces [3] is not so important compared to the large number of atoms that enter and exit at high speed (from the two lateral directions) the small interaction volume at all times. Hence we do not expect large qualitative differences to arise from the transverse forces.

To conclude, we agree that this system is very sensitive to additional nonlinear effects, such as radiation trapping. The latter indeed may enhance the formation of gratings, independently of nonlinear collective phenomena, whenever the particle densities are particularly high, as in Ref. [9].

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