Rau, Tajima, and Hojo Reply: In the Comment on our publication [1], Kim *et al.* [2] criticized three points. First, it is claimed that our work is not original as an earlier paper by Lai [3] "made essentially the same point." Second, it is said that there is no solution to Maxwell's equations that has a three-dimensional unipolar form, followed by a proof. And third, the authors mention that our Eq. (7) contains an error. We would like to address these criticisms in this order.

With respect to the first point, we have never claimed originality on the particle acceleration mechanism by electromagnetic radiation. In fact, we explicitly referred to some previous work by Scheid and Hora [4] (Ref. [10] in [1]) on this subject.

The derivation of the three-dimensional exact solutions to Maxwell's equations for electromagnetic waves of arbitrary length and width [Eqs. (2)–(6) of [1]] on the other hand is original, at least to our knowledge. The validity of these solutions even for ultrashort, subcyclic pulses was then (and perhaps still is) a hot topic. It is, for example, an important contribution to the physics of the interaction of Rydberg wave packets with subcycle pulses [5–8]. Furthermore, the one-dimensional numerical studies of the pickup and acceleration of plasma electrons from a thin film as well as the determination of the beam quality (longitudinal emittance) are novel.

In response to the second point, we should make two remarks. First of all, we have never claimed the existence of a three-dimensional "unipolar" pulse. We talked about "subcycle" pulses as the special case $k_0\sigma = 1$, extensively considered by us, describes a pulse with a half width shorter than a full wavelength $\lambda = 2\pi/k_0$. We did use the term "unipolarlike" pulses, both in order to connect to the terminology used in [5] and [6] as well as to emphasize the unusual form of these pulses.

Second, the proof given in this Comment is not new. Similar proofs can, for example, be found in [9–11]. More importantly, it does not have any impact on our analysis, since it does not apply to a one-dimensional setting. As mentioned by Kim *et al.*, unipolar pulses do exist in one dimension and we have considered the implication of this on the acceleration of particles in our original manuscript.

Finally, with respect to the third point, we would like to thank the authors of the comment for pointing out a typographical error in our Eq. (7). Indeed, the exponential term should read $\exp[-k_0^2 w_0^2/\{4(1+\rho^2)\}]$ rather than $\exp[-k_0^2\sigma^2/\{4(1+\rho^2)\}]$. With our definition of $\rho^2 = w_0^2/(2\sigma^2)$ [1], this gives the term pointed out by Kim *et al.* We would like to apologize for accidentally mixing up σ and w_0.

However, this typographical mistake does not change our one-dimensional analysis. The time integral over the 1D fields still gives a nonvanishing A (as pointed out by Kim *et al.*) and particle acceleration in one dimension still takes place. Our paper consisted of not only theory but also one-dimensional particle-in-cell simulations to prove this point.

Last, we should point out that particle acceleration by subcycle pulses has been observed experimentally [5–8]. It is the finding of these papers that the momentum transfer from wave to particles by these subcycle pulses is best described by the time integral over the electric field of a unipolar, one-dimensional wave. The fact that this time integral might vanish in three dimensions, as pointed out by Kim *et al.*, seems irrelevant (or artificially unrealistic) as the interaction time is not infinite. In other words, our analysis derived in the original Letter could be extended to more than one dimension if one allows for a limitation of the interaction region. This limitation can occur naturally as in the cases considered in [1], where the plasma electrons are held inside the slab until they are accelerated by the main part of the subcycle pulse, or artificially, as mentioned by us in the original Letter (p. 3313, left column, "Here we should point out...").

In conclusion, the typographical mistake pointed out by Kim *et al.* had no impact on our analysis, nor on our results. Particle acceleration by subcycle laser pulses will still take place in one dimension and, for a limited interaction region, even in three dimensions.

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