Abstract Submitted
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Impact of ion dynamics on electron acceleration and gamma-ray emission in hollow micro-channel targets[1] TAO WANG, Univ of California - San Diego, ZHENG GONG, Univ of Texas - Austin / Univ of Beijing, KATHERINE CHIN, ALEXEY AREFIEV, Univ of California - San Diego — Direct laser acceleration in hollow channels has been presented as a promising regime for generation of secondary particle and radiation beams. However, the impact of ion dynamics on the regime still lacks investigation. Our work [1] shows that when ions start to fill the channel, both electron acceleration and photon emission are susceptible to degradation. Ions reshape the electromagnetic field structure and shift the dominant contributor of work from the longitudinal laser electric field to the transverse one. The ion expansion also has a profound impact on gamma-ray emission, making it become volumetrically distributed while reducing the total emitted energy. We formulate a criterion for the laser pulse duration to minimize the undesired effects from ions and demonstrate its predictive capability through pre-pulse interactions. Our results provide a guideline for future experiments on micro-channel targets at multi-PW laser facilities with ultra-high intensities. [1] Tao Wang et al 2019 Plasma Phys. Control. Fusion 61 084004

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