Abstract Submitted
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Achieving Stable Radiation Pressure Acceleration of Heavy Ions via Successive Electron Replenishment from Ionization of a High-Z Material Coating[1] BIN QIAO, X. F. SHEN, H. ZHANG, Peking University, S. KAR, Queen's University Belfast, C. T. ZHOU, H. X. CHANG, Peking University, M. BORGHESI, Queen's University Belfast, X. T. HE, Peking University — Among various laser-driven acceleration schemes, radiation pressure acceleration (RPA) is regarded as one of the most promising schemes to obtain high-quality ion beams. Although RPA is very attractive in principle, it is difficult to be achieved experimentally. One of the most important reasons is the dramatic growth of the multi-dimensional Rayleigh-Taylor-like (RT) instabilities. In this talk, we report a novel method to achieve stable RPA [2,3] of ions from laser-irradiated ultrathin foils, where a high-Z material coating in front is used. The coated high-Z material, acting as a moving electron repository, continuously replenishes the accelerating ion foil with comoving electrons in the light-sail acceleration stage due to its successive ionization under laser fields with Gaussian temporal profile. As a result, the detrimental effects such as electron loss induced by the RT and other instabilities are significantly offset and suppressed so that stable acceleration of ions are maintained. [1] B. Qiao et al., PRL 108, 115002 (2012); [2] X. F. Shen, B. Qiao* et al., PRL 118, 204802 (2017); [3] X. F. Shen, B. Qiao* et al., NJP 19, 033034 (2017).

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