Ultra-intense and ultra-fast laser and laser-driven particle acceleration in the Shanghai Institute of Optics and Fine Mechanics

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A series of ultra-intense and ultra-fast lasers (of 0.2, 1 and 10 PW) have been developed in the SIOM (Shanghai Institute of Optics and Fine Mechanics of the Chinese Academy of Sciences), which have been in opening operation for the internal and international end users. Some laser driven particle acceleration experiments have been carried out based on these lasers recently. For example, the laser driven electron accelerator has been achieved with near GeV energy and $< 1\%$ energy spread [1]. Further, a free-electron lasing using a laser wakefield electron accelerator has been demonstrated [2]. Supported by the China–Russia Belt and Road Joint Laboratory on Laser Science, the further cooperation with Russian scientists in laser physics, laser technology, laser material, and related optical manufacture is expected.

[1] Ke L T, Feng K, Wang W T, Qin Z Y, Yu C H, Wu Y, Chen Y, Qi R, Zhang Z J, Xu Y, Yang X J, Leng Y X, Liu J S, Li R X and Xu Z Z 2021 *Phys. Rev. Lett.* **126** 214801

[2] Wang W, Feng K, Ke L, Yu C, Xu Y, Qi R, Chen Y, Qin Z, Zhang Z, Fang M, Liu J, Jiang K, Wang H, Wang C, Yang X, Wu F, Leng Y, Liu J, Li R and Xu Z 2021 *Nature* **595** 516–520