

Generation of high-charge electron bunch and ultrafast gamma-ray beam in laser-plasma accelerator

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High-charge electron bunch with broad energy spectrum has been experimentally produced during interaction between high-intensity femtosecond laser pulse and clustering gas jet with near critical density. The energetic electron bunch reaches the charge of 10nC with cut-off energy of 50 MeV and full divergence angle of 15°. When this high-charge energetic electron bunch shots into high-Z target with different thickness of several millimetres, ultrafast MeV position beam and gamma-ray beam are produced. The gamma-ray beam with broad energy spectrum reaches high-flux of 10¹⁰ photons per shot. This ultrafast high-flux MeV gamma-ray beams are promising sources for photonuclear reaction, non-destructive inspection and other potential applications.