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Stability of monoenergetic electron beam generation in laser-driven plasma acceleration EISUKE MIURA, SHIN-ICHI MASUDA, KAZUYOSHI KOYAMA, SUSUMU KATO, National Institute of Advanced Industrial Science and Technology (AIST) — We have so far reported the generation of monoenergetic electron beams with the energy up to 25 MeV by using a 2-5 TW, 50 fs laser pulse in laser-driven plasma acceleration.[1,2] In this paper, we will present the generation of more intense monoenergetic electron beams with higher energy. From a plasma with the electron density of 1.6 x10^{19} cm^{-3} produced by an 8 TW, 50 fs laser pulse, monoenergetic electron beams with the energy of 40-70 MeV and considerable amount of the charge up to 70 pC have been obtained. The shot-to-shot fluctuations of the energy, energy spread and charge of the monoenergetic beams were also evaluated. To improve the quality and stability of monoenergetic electron beams obtained by self-injection scheme, the optimum conditions including the plasma density, laser pulse duration, focusing geometry, and so on are investigated. A part of this work is supported by the Budget for Nuclear Research of the MEXT.

[1] E. Miura et al., Appl. Phys. Lett. 86 251501(2005).
[2] S. Masuda et al., Phys. Plasmas 14 023103 (2007).

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