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Guiding of 100 TW Relativistic Laser Pulses by 10 mm Plasma Channels LIMING CHEN, Advanced Photon Resaerch Center, Japan Atomic Energy Agency — First experiments for laser-gas plasma interaction about electron acceleration have been performed with 30 fs, 100 TW relativistic Ti:Sapphier laser pulse interaction with long slit ($1.2 \times 10\ mm^2$) gas plasmas. The world record *10 mm* length plasma channel formed that was longer than 20 times the Rayleigh length. Plasma density was the key factor for this long channel stimulation under *100 TW* laser pulse irradiation that was much higher than critical power for relativistic self-focusing. For the first time, channel characteristics such as laser bending, hosing and cavity formation were demonstrated experimentally. In case of long channel guiding, accelerated electron bunch was tightly collimated with low emmitance $< 0.8\ \pi$ *mm mrad* and quasi-monoenergetic electron bunch ($\sim 70\ MeV$) was obtained as well. Accelerated electron charge current with electron energy $> 1\ MeV$ was ~ 10 *nC/shot* which was highest value in laser accelerator, to our knowledge, and ascribed to the contribution of long plasma channel.

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