

PEM028-03

会場:展示ホール7別室1

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超高強度レーザーによる宇宙線加速模擬実験

Model Experiment of Cosmic Ray Acceleration due to an Incoherent Wakefield Induced by an Intensive Laser Pulse

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We performed a model experiment of cosmic ray acceleration by using intensive laser pulses. Large amplitude light waves are considered to be excited in the upstream regions of relativistic astrophysical shocks and the wakefield acceleration of cosmic rays can take place. We model such shock environments in a laboratory plasma by substituting an intensive laser pulse for the large amplitude light waves. A plasma tube, which is created by imploding a hollow polystyrene cylinder, was irradiated by an intensive laser pulse. Nonthermal electrons were generated by the wakefield acceleration and the energy distribution functions of the electrons have a power law component with an index of ~ 2 . The maximum attainable energy of the electrons in the experiment is discussed by a simple analytic model. In the incoherent wakefield the maximum energy can be much larger than in the coherent field due to the momentum space diffusion or the energy diffusion of electrons.

キーワード: 宇宙線, 粒子加速, 衝撃波, 実験室宇宙物理

Keywords: cosmic rays, acceleration of particles, shock waves, laboratory astrophysics