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Production and Pre-Acceleration of Intense Light Ion Beams Based on Laser Ion Sources

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The capability of laser ion sources to produce high intensity short pulse ion beams, especially from solid element, makes them promising pre-injectors for some application facilities, such as cancer therapy facilities and accelerator-based neutron sources. Aiming at these applications, some specific ions, like carbon, lithium ions, have been produced and optimized in terms of the high charge state yields and the repeatability of the ion pulses with the laser ion source at the Institute of Modern physics in the past years. Specially, the capability of 50-hour operation of the carbon ion beams have been demonstrate by the laser ion source, with the pulse-to-pulse repeatability within 15% for the main pulse parameters, the total charge, peak current and pulse duration. Furthermore, the intense C⁶⁺ ions produced by the laser ion source was accelerated by a radio frequency quadrupole (RFQ) linac based on the Direct Plasma Injection Scheme (DPIS) to the energy 586 keV/u. The peak current at the exit of the RFQ and after the dipole magnet achieved 27 and 13 eA, respectively.

Funding Agency

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Yes

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