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New Development of Laser Ion Source for Highly Charged Ion Beam Production

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Due to its capability of producing intensive short pulsed highly charged ion beams, laser ion sources had been considered as the most promising ion sources to realize the single turn injection mode for the filling of synchrotrons. In addition, the combination of a laser ion source and RFQ linac based on direction plasma injection scheme (DPIS) may shrink both the dimension and cost of the cancer therapy synchrotron to a large extent. To demonstrate the feasibility of the above mentioned application, our researches have been being focused on the production of C^{6+} ion beams by a laser ion source based on commercial Nd:YAG lasers. It turned out that a laser ion source based on a commercial Nd:YAG laser can meet the requirements of the cancer therapy synchrotrons in terms of the yields of C^{6+} and repeatability. Besides, the production of ions from a variety of elements heavier than carbon were also investigated, the experimental results of which will be presented.