

Development and demonstration of laser-driven quantum beam accelerators

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Summary :

Particle accelerators are used in a wide range of fields over academic, industrial, and medical purposes. However, the huge size of the system and the expensive construction cost have blocked their broader use. In this project, we aim to achieve significant downsizing of particle accelerators and reducing the cost through development and exploitation of laser plasma acceleration technology which enhances the acceleration gradient by several orders of magnitude compared with conventional accelerators. Broad contribution to social implementation in the following areas is expected.

- Development of small electron accelerators will drastically improve accessibilities to synchrotron and FEL light sources as infrastructure, significantly promoting a wide range of scientific and industrial applications.
- Development of small ion accelerators will reduce the cost for construction / operation of medical-purpose accelerators such as cancer therapy and promote the deployment to existing hospitals. It is expected to extend the span of life while keeping high QoL and reduce medical expenses.
- Development of stable high-power compact lasers enables widespread distribution of new domestic lasers to the global market, and contribute to laser-related industries.

