

# **Laser-driven particle acceleration for radiobiology and radiotherapy: where we are and where we are going**

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Radiation therapy of tumors progresses continuously and so do devices, sharing a global market of about \$ 4 billions, growing at an annual rate exceeding 5%. Most of the progress involves tumor targeting, multi-beam irradiation, reduction of damage on healthy tissues and critical organs, dose fractioning.

This fast-evolving scenario is the moving benchmark for the progress of the laser-based accelerators towards clinical uses. As for electrons, both energy and dose requested by radiotherapy are available with plasma accelerators driven by lasers in the power range of tens of TW but several issues have still to be faced before getting a prototype device for clinical tests.

They include capability of varying electron energy, stability of the process, reliability for medical users. On the other side hadron therapy, presently applied to a small fraction of cases but within an exponential growth, is a primary option for the future.

With such a strong motivation, research on laser-based proton/ion acceleration has been supported in the last decade in order to get performances suitable to clinical standards.