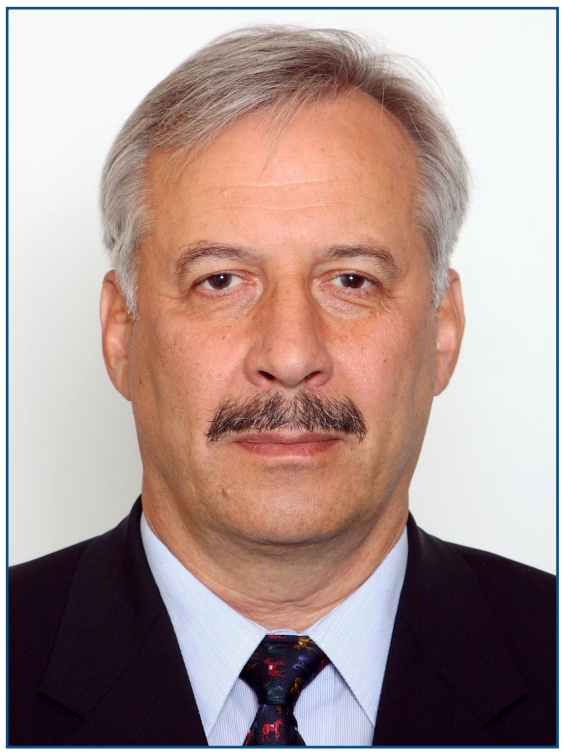
Institutul Național de Fizică și Inginerie Nucleară
Horia Hulubei

IFIN-HH

Seminar general

ON THE PROSPECTS OF LASER DRIVEN HADRON THERAPY



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The talk examines the prospects of using laser plasma as a source of high-energy ions for the purposes of proton therapy. The research in this direction has been conducted in almost all world leading laser science centres. The approach is based on the efficient ion acceleration observed in laboratory, theory and numerical experiments (*in silico*) on the high-power laser interaction with matter. The specific dependence of proton energy losses in biological tissues (the Bragg peak) promotes the solution of the main problem of the irradiation of a malignant tumour with a sufficiently strong and homogeneous dose, ensuring that the irradiation of the surrounding healthy tissues and organs is minimal. Presently all hadron therapy facilities in operation are based on the conventional accelerator technology making use of accelerators and complex ion beam transport systems (gantry) for beam delivery in the treatment room. Compared to standard accelerators of charged particles the use of high power laser systems, which, in principle, exhibits lower construction and operation costs, and moreover would require smaller beam transport system, leading to more compact facilities. The approach has a potential for developing the all-optical scheme with transportation and rotation of photon beams instead of high energy ions with magnetic transportation lines and gantries. Special target designs allow radiation therapy requirements for ion beam quality to be satisfied.

Joi 30 iulie 2015 ora 11^{00}
Biblioteca Națională de Fizică