ID: 1088  Fixed Field Alternating Gradient Accelerators (FFAG) for Fast Hadron Cancer Therapy

Authors Eberhard Keil (CERN, Geneva), Dejan Trbojevic (BNL, Upton, Long Island, New York), Andrew Sessler (LBNL, Berkeley, California)

Presenter Eberhard Keil (CERN, Geneva)

Abstract
Cancer accelerator therapy continues to be ever more prevalent with new facilities being constructed at a rapid rate. Some of these facilities are synchrotrons, but many are cyclotrons and, of these, a number are FFAG cyclotrons. The therapy method of “spot scanning” requires many pulses per second (typically 200 Hz), which can be accomplished with a cyclotron (in contrast with a synchrotron). We briefly review commercial scaling FFAG machines and then discuss recent work on non-scaling FFAGs, which may offer the possibility of reduced physical aperture and a large dynamic aperture. However, a variation of tune with energy implies the crossing of resonances during the acceleration process. A design can be developed such as to avoid intrinsic resonances, although imperfection resonances must still be crossed. Parameters of two machines are presented; a 250 MeV proton therapy accelerator and a 400 MeV carbon therapy machine.

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