

Summary of a Brief Presentation on Hadron Therapy Studies at RAL, UK

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Hadron therapy development in the UK has lagged far behind that in Europe, USA and in Japan. There have recently, however, been two separate UK therapy initiatives, one at the instigation of the new accelerator centres at the Cockcroft and the Adams Institutes, and the other at the ASTeC Division in Rutherford Appleton Laboratory. The former has obtained funding for specific studies of a non-scaling FFAG accelerator ring for medical applications, while the latter has commenced a more general, unfunded review of the options for tumour scanning by an accelerator and gantry.

At ASTeC, as a result of the review, a new method of scanning and a new design of a gantry are both being considered. Advice on both of these topics is needed from experienced workers in the field, but a decision has been made to withhold details of the ideas until patent applications have been filed. Despite this, it has been considered important to attend the workshop, in order to learn of the latest advances in scanning techniques, and to seek answers to specific related questions.

Among the questions of most relevance for the new studies are the following:

- Why do the specifications for beam scanning of tumours vary so much around the world?
- Why, eg, are 2 Grey/litre/min dose levels recommended in Europe, but 5 G/l/m in Japan?
- How uniform is the dose obtained over the full tumour volume, when not using a gantry?
- Does gantry use allow a more uniform scanning as well as reducing healthy tissue doses?
- Does use of a gantry involve different functions of I (beam current) v T (kinetic energy)?
- What is a typical ratio of I (average) to I (max) when scanning over a wide energy range?
- Are current stability levels of 1 to 2% achieved over the full range of the beam currents?
- Does a higher pulse rate machine have difficulty in monitoring the lower beam currents?
- Is the scanning accuracy affected by the time lost in setting-up for each, specific energy?
- How accurately may a tumour movement due to breathing be measured during scanning?

The accelerator and associated gantry being considered aims to increase the ratio for I (average) to I (maximum), so that a reduced scanning time, or accelerator beam power, or a combination of both, may be realised. It is planned to present the underlying basis of the accelerator design in an internal RAL report [1], which may be accessed at <http://epubs.cclrc.ac.uk> after November, 2007. The design for the gantry will be withheld, however, until funds are obtained to undertake an engineering design, in order to check that the design envisaged does offer some real advantages.

Reference

[1] G H Rees, An Alternative Scanning Method for Cancer Therapy, RAL-TR-2007-015, Nov. 07

Dear Dr Mitaroff and Professor Regler,

Attached please find a one page summary of my very brief presentation at the Vienna Gantry Workshop. My attendance proved to be most useful, as I learnt a great deal in a short time. It will be interesting now to find out if the RAL ideas do offer any genuine advantages.

Best regards,

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