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Compact Carbon Ion Therapy Gantry Design

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While ion therapy provides an immense opportunity for advancement in the treatment of various cancers, present-day mechanical systems that deliver beam from the accelerator to the patient are large and complex. A new patent pending compact beam delivery system concept has been explored and is presented here. The concept is to provide a continuously rotating magnet system wherein the traditional gantry angle for beam delivery is determined by timing of the entrance of the beam to the gantry from the upstream accelerator. Longitudinal position of the beam at the treatment location is determined by a scanning magnet at the entrance to the rotating system. Beam transport is provided through a set of fixed-field gradient magnets of compact design. The combined-function magnets have gradients chosen to provide a zero or very small focusing effect in the bend plane of the gantry, while providing sufficient focusing in the out-of-plane direction. The final beam energy and hence final penetration depth is determined by a patent pending fast-response energy selection system between the exit of the final magnet and the isocenter. By minimizing the adjustments required of the main fields and through the use of a fast response scanning magnet, treatment times can be reduced significantly. A self-consistent design of the concept and its overall properties as well as possible directions for enhancement are described

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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