

ION RAPID CYCLING MEDICAL SYNCHROTRON (IRCMS) STATUS AND FUTURE PLANS

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Best Medical International (BMI) entered a Cooperative Research and Development Agreement (CRADA) with Brookhaven National Laboratory in 2009 to advance the design of the ion Rapid Cycling Medical Synchrotron (iRCMS). The iRCMS is a state-of-the-art synchrotron designed for future cancer therapy facilities that foresee the need to deliver clinical or pre-clinical beams heavier than typical protons. The Collider Accelerator Department (CAD) at Brookhaven National Laboratory (BNL) has optimized an accelerator design under the CRADA funded by BMI specifically for the generation of carbon ions with a maximum energy of 400MeV/u in addition to protons of typical clinical energies. The accelerator is optimized to cycle with a frequency of 15 Hz to the top energy required to deliver treatment at a maximum depth of 27 cm. The iRCMS uniquely combines advanced spot scanning with rapid energy modulation thereby eliminating the contamination associated with patient specific hardware. Extremely small beam emittances are also associated with rapid cycling, which facilitates the generation of particle beams with unprecedented precision. The iRCMS lattice design is a racetrack with two zero dispersion parallel straight sections ideal for injection, extraction and RF systems. The racetrack is 12 meters wide and 23 meters long with the two arcs having a bending radius of ~5 meters. These arcs are made up of 24 combined function magnets with a maximum magnetic field of $B_{max} \sim 1.3$ Tesla. The iRCMS was conceived to include highly efficient single turn injection and extraction and shall utilize a linac to inject carbon ions and protons at a kinetic energy of 8 MeV/u. The status and future plans of this joint accelerator development project will be presented.