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The Beam commissioning of SC Cyclotron based Proton Therapy System with fast energy selection and Precise Gantry Positioning

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Since 2016, a superconducting cyclotron based proton therapy system has been designed, construction, installation and commissioning at China Institute of Atomic Energy (CIAE). It includes a superconducting cyclotron CYCIAE-230, a beam line with a fast energy selection system, a 360 ° gantry, and a pencil beam scanning nozzle. And there is another beam line for proton irradiation, for example, used for space science research. In this paper, the overall design of the PT system will be introduced briefly. The results of the beam commissioning, from the cyclotron to the nozzle will be emphasized. As early as Sept. 2020, the energy of proton beam accelerated by the superconducting cyclotron reached 231MeV; the 360° gantry had been tested by experts and found to have an isocenter of better than 0.3mm at any angle. After obtaining comprehensive commissioning permission in late November last year, we finished the test of the PT system with the following results: the energy of the cyclotron is 242 MeV, the energy range of the degrader is 71 MeV~242MeV, the maximum average beam intensity extracted is 462 nA, and the measured efficiency of the beam from the central region to outside the cyclotron is 74%; it is 45 ms the time interval varying one energy step of the degrader and 51 units of the magnets. The results will be presented in detail in the paper.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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