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Status of the RF system design for the SC240 cyclotron

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The superconducting cyclotron SC240 is used to accelerate proton beams to 240 MeV for proton therapy. The SC240 is an isochronous 4 sectors compact cyclotron with a central magnetic field of 2.5 T. Particles acceleration is performed under the second harmonic mode of the radio-frequency (RF) system, consisting of two independent cavities located in the cyclotron valleys. Block on the chimney is designed to avoid interference between two cavities. The isolation (S21) is less than -30dB. In cavities, two types of tuners applied to compensate for frequency offset are tuning loop and trimmer plate. The tuning frequency range of tuning loop is more than 1MHz, that can be used to adjust the frequency offset caused by machining error and installation error during cold test, rather than caused by thermal deformation when feeding high power into cavities, While the trimmer plate is just used in the opposite way. Efficiency of acceleration voltage in center region caused by different ground position of ion source is presented in the paper. Design and optimization of inductive coupler are described in details. Besides, the current operating status of the RF system will also be discussed.

Footnotes

Paper preparation format

Word

Region represented

Asia

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