

技术及应用

高流强RFQ质子加速器研制

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摘要 在国家“973”计划洁净核能项目的支持下, 中国科学院高能物理研究所与中国原子能科学研究院合作, 建成了我国首台强流质子加速器。它是1台四翼型结构的射频四极 (radio-frequency quadrupole, RFQ) 加速器, 这种先进加速结构可为来自离子源的低能强流束提供周期性强聚焦, 并同时在纵向对束流进行聚束和加速。我国建成的这台RFQ加速器束流能量为3.5 MeV, 脉冲流强46 mA, 束流工作比大于7%。本文将介绍这台RFQ加速器的物理设计、研制、调试和出束实验的结果。

关键词 [强流质子束](#) [射频四极加速器](#) [加速器驱动的次临界系统](#)

分类号

Development of High Intensity RFQ Proton Accelerator

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Abstract The first high intensity proton radio-frequency quadrupole (RFQ) accelerator with four-vane structure was built in collaboration between Institute of High Energy Physics and China Institute of Atomic Energy under the support of the accelerator-driven clean nuclear energy program in the State Key Basic Research Project in China. The advanced accelerating structure can provide a periodical strong focusing to the low-energy high-current beam from an ion source, while bunching and accelerating the beam in longitudinal direction. The RFQ accelerates proton beam of 46 mA pulse current to 3.5 MeV at more than 7% duty factor. The physics design, experimental study and beam commissioning of the RFQ are introduced in this paper.

Key words [high intensity proton beam](#) [radio-frequency quadrupole accelerator](#) [accelerator driven subcritical system](#)

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