

技术及应用

### 北京大学RFQ加速器研究进展

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**摘要** 北京大学在20世纪90年代末成功研制了1台整体分离环重离子射频四极场(RFQ)加速器ISR-1000, 近年来经升级后它可提供1 MeV/2 mA氧离子束流。为提高RFQ加速器在较高能量下的加速效率, 北京大学提出并正在研制1种新型分离作用RFQ加速结构(SFRFQ), 所建造的加速腔实验样机可与ISR-1000构成组合加速系统, 将mA级氧离子加速到1.6 MeV。北京大学参与了“973”项目350 MHz四翼型强流质子RFQ加速器的研究, 并研制了1台全尺寸无氧铜工艺腔。北京大学还计划在近年内建造1台中子源用201.5 MHz、2 MeV/50 mA微翼四杆型氦离子RFQ加速器。

**关键词** [射频四极场](#); [整体分离环RFQ](#); [分离作用RFQ](#); [四翼型RFQ](#); [四杆型RFQ](#)

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### Progress of RFQ Accelerator Study at Peking University

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**Abstract** Characterized by its compactness, convenience, high current and high transmission, radio frequency quadrupole (RFQ) accelerator is fit for accelerating the low-velocity ions directly from ion source and has become a common injector in low-energy end of main accelerators for many applications such as HPPA, SNS, ADS and RIB facilities. In 1990s the integrated split ring RFQ (ISR-1000) had been constructed and operated successfully at Peking University. In order to accelerate ion beam more efficiently in higher energy range, a novel accelerator structure called separated function RFQ (SFRFQ) had been proposed and its first prototype cavity had been designed and constructed. The prototype cavity will be verified as a post-accelerator for ISR RFQ-1000 and accelerate O<sup>+</sup> from 1 MeV to 1.6 MeV. To inject a higher current oxygen beam for the prototype cavity, the beam current of ISR RFQ-1000 was upgraded to 2 mA. Peking University had participated a National Basic Research Program ‘The study of the 350 MHz four vane RFQ for high current proton beam’ and built a full size copper model cavity. In addition, a 200 MHz mini-vane four rod RFQ to accelerate D<sup>+</sup> beam to 2.0 MeV is going to be manufactured for a neutron radiography system.

**Key words** [radio frequency quadrupole](#) \_ [integrated split ring RFQ](#) \_ [separated function RFQ](#) \_ [four vane RFQ](#) \_ [four rod RFQ](#)

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