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## The Beam Test of a Separated Function RFQ Accelerator at Peking University

The RFQ team at Peking University has been engaged in developing RFQ technology since 1980s. Traditional RFQ structure has been extensively used in accelerating low energy high current beams directly extracted from the ion sources. However as a large part of RF voltage is used for transverse focusing, the accelerating efficiency of the RFQ structure is rather limited. For this reason a novel structure called Separated Function RFQ (SFRFQ) has been proposed and developed with which the accelerating efficiency is remarkably enhanced. To verify the idea, a code SFRFQCODE was developed specially for cavity design and beam dynamics simulation. A prototype SFRFQ cavity of about 1m long was constructed and tested with O<sup>+</sup> acceleration. It turned out that the accelerating voltage of higher than 90 kV can be reached with a 26MHz 33 kW RF power at a duty factor of 1/6. For a 1 MeV O<sup>+</sup> beam input, the output energy of O<sup>+</sup> ions was 1.66 MeV with 20 kW 26 MHz RF power. The overall accelerating efficiency was more than 50% higher than that of a traditional RFQ. The experimental result is well consistent with that of simulation. The structure of the prototype SFRFQ and the layout of full power beam test are presented

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