

# 6 - 22 Development of 14 GHz ECR Proton Source

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A 14.5 GHz proton ion source is now under development at IMP. This ion source is aimed to produce high current proton beam with long-term operation stability and reliability. Fig. 1 illustrates the schematic structure of the ion source. This ion source is designed to be operated at 14.5 GHz so as to avoid the bulky and complicated microwave coupling system used on traditional 2.45 GHz proton source system. What is more important, higher plasma density is expected with 14.5 GHz microwave ECRH. The source magnet body consists of two permanent magnet rings, which are made of NdFeB materials. A copper plasma chamber indirectly cooled by water is used, and in order to protect the permanent magnets, a significant gap has been designed between the magnetic rings' inner bore and the plasma chamber outer surface. The whole assembly is only 160 mm in diameter and 120 mm long. The extraction voltage of the source is designed to be operated at 35 kV, and ion beam extraction simulation code PBGUNS is used to analyze the beam extraction from the ion source plasma.

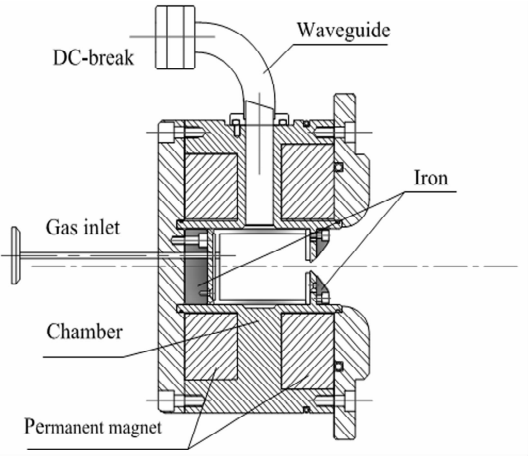


Fig. 1 The setup scheme of new ECR proton source.

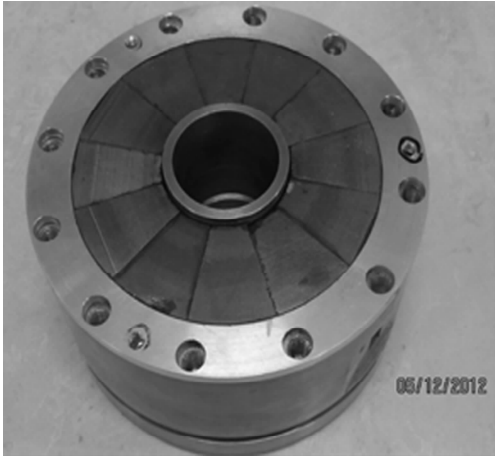


Fig. 2 Picture of the ion source magnet body.

Two permanent magnet rings and the plasma chamber have been fabricated and assembled. Fig. 2 is the picture of the ion source magnet body. The measurement of the axial field of the magnet is in good agreement with the simulation results with OPERA-3D. The experiment platform will be built soon in 2013. When the test bench is ready, we will start the commissioning.