6 - 20 Preliminary Results of LAPECR3

Cao Yun, Li Jiaqing, Feng Yucheng, Sun Liangting, Zhang Xuezhen, Wang Hui, Ma Baohua and Li Xixia

A high charge state all permanent Electron Cyclotron Resonance Ion Source (ECRIS) LAPECR3 (Lanzhou All Permanent magnet ECR ion source No. 3) was successfully built at IMP in 2012. LAPECR3 was designed for the Heavy Ion Medical Machine (HIMM) project. As a commercial production, LAPECR3 features a compact structure, small size and low cost, etc. The design drawing is shown in Fig. 1.



Fig. 2 The LAPECR3 ion source.

For researching the performance of LAPECR3, its low energybeam transport and analysis beam line have been built too, as shown in Fig. 2. The beam line is shorter, and magnet cell is smaller compared with general beam lines, which in addition to the compactness of the ion source makes the whole ion source system very economical and fit for commercial application.



Fig. 3 Spectrum optimized on C5+ ion beam.



Fig. 5 Spectrum optimized on Ar^{11+} ion beam.



Fig. 4 Spectrum optimized on O^{6+} ion beam.

After conditioning of the ion source, we focused on commissioning it for production of high charge state C, O and Ar ion beams. Though only preliminary operation and optimization was carried out, some good results have been achieved. About 100 $e\mu$ A of C⁵⁺ ion beam was produced at microwave power 350 W and extraction voltage 22.3 kV, and fig. 3 presents the spectrum when optimizing the production of C⁵⁺ beam. 365 $e\mu$ A of O⁶⁺ was produced at microwave power 700 W and extraction voltage 25.0 kV, and the spectrum optimized on O⁶⁺ ion beam is shown in Fig. 4. About 55 $e\mu$ A of Ar¹¹⁺ was produced at microwave power 800 W and extrac-

tion voltage 15.0 kV, and the spectrum optimized on Ar^{11+} ion beam is shown in figure 5. The part step for LAPECP2 will focus on emitteness measurement of the analyzed ion beams and i

The next step for LAPECR3 will focus on emittance measurement of the analyzed ion beams and investigations on the influences of ion sources parameters on ion beam intensities and emittance.