effectiveness of grounding grid had been simulated. The simulation result of grounding grid is shown in Fig. 7, and the engineering and measurement of the grounding grid is shown in Fig. 8.

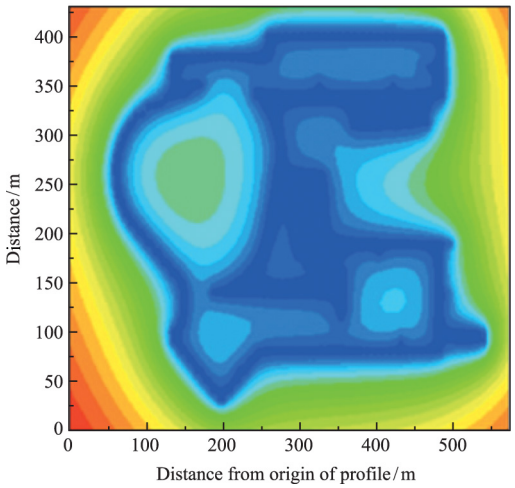

Fig. 7 (color online) Simulation of grounding grid.

Fig. 8 (color online) Building and testing of grounding grid.

7 - 16 Advances in Radiation Protection System of HIAF

Li Wuyuan, Su Youwu, Yang Bo, Yan Weiwei, Li Zongqiang, Li Yang, Mao Wang, Han Xilong and Wu Ting

High Intensity heavy-ion Accelerator Facility (HIAF) is the next generation heavy ion accelerator facility in China, which can produce secondary radiation during operation. In order to protect the environment, the public and workers from radiation, it is necessary to conduct radiation protection research and build personal safety interlocking system and radiation monitoring system.

The design of compact shielding in PF0 region of HFRS is optimized. The induced radioactivity of cooling water, vacuum pipe, concrete, air and other environmental materials of HIAF has been further studied in detail. Figure 1 shows the radiation dose rate distribution around the pipes of each cooling water station when the accelerator runs for a long time.

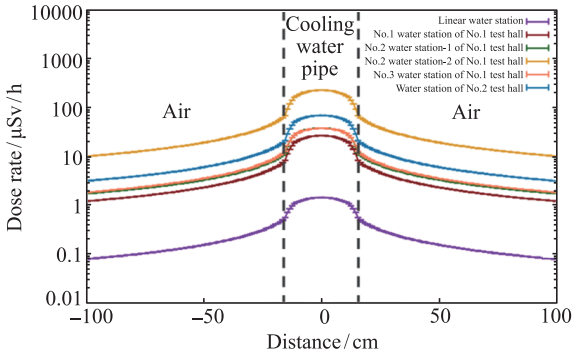

Fig. 1 (color online) Radiation dose rate distribution around water cooling pipes at each cooling water station of HIAF.

Fig. 2 (color online) Prototype of personnel access management system based on individual dose monitoring technology.

At present, the overall design of the personal safety interlock system and the construction of the minimum interlock system test platform has been completed. In addition, the prototype processing of the key component - "Personnel access management system based on individual dose monitoring technology" has been completed and the functional test of the system is under way. Figure 2 shows the schematic diagram of the prototype. The

detailed design of radiation dose monitoring system has been completed according to the characteristics of secondary radiation, and the fabrication of neutron dosimeters in SECR, iLinac and low-energy experimental terminal have been completed.

7 - 17 Successful Development of High Gradient Magnetic Alloy RF System for HIAF-BRing

Xu Zhe, Cong Yan, Jin Peng, Li Shilong, Zhang Ruifeng, Fu Xin, Han Xiaodong and Yi Xiaoping

The synchrotron RF team of High Intensity heavy-ion Accelerator Facility (HIAF) successfully developed the first low-frequency broadband, high gradient, fast response, oil-cooled magnetic alloy (MA) RF system in China.

1. Advanced Automatic MA Core Production Line

After more than ten years of technical research, the RF team has solved a series of key technical problems from materials to production processes, and jointly built the first high-performance MA core automation production demonstration line with independent intellectual property rights in China with domestic manufacturers, achieving the volume production of high-performance and large-sized MA core. The key parameters of the MA core meet the needs of HIAF projects, and it also has supported domestic related projects and other industries. (Fig. 1).

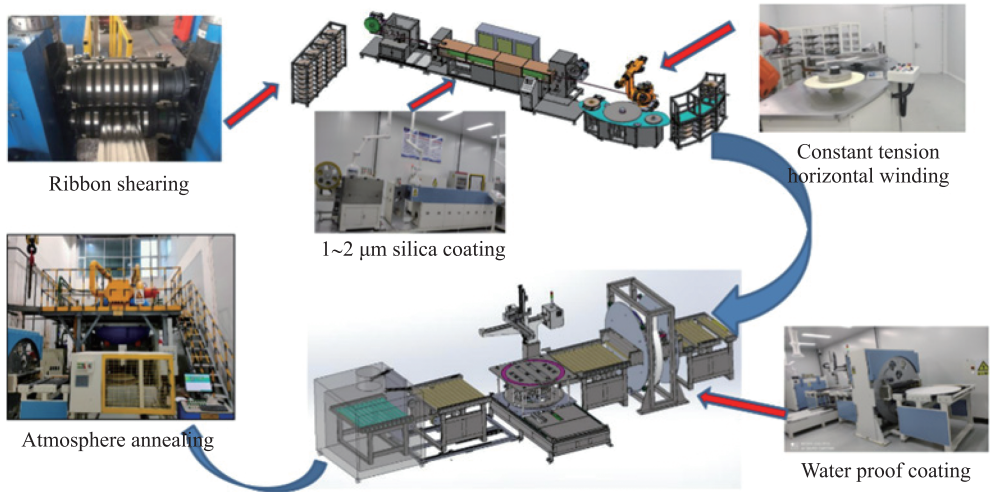

Fig. 1 (color online) Advanced automatic MA core production line.

2. The First oil-cooled MA RF System in China

On above basis, the first low-frequency, broadband, oil cooled MA core RF system in China has been successfully developed (Fig. 2). The cavity voltage achieved 66 kV (gradient $>$ 30 kV/m) within the frequency range of 0.29 to 2.1 MHz, harmonic suppression $>$ 23 dBc, amplitude stability $|A/A| \leqslant 1\%$, phase stability $|\varphi| \leqslant 1^\circ$

3. Performance Improvement of Domestic Large-sized MA Core

The RF team has successfully developed a new liquid cooled ϕ 780 mm MA core (CFT-L) with better broadband characteristics in the frequency range of 0.1 to 20 MHz. As given in picture below (Fig. 3), the key parameters of new core are 30% higher than the same type of MA core (FT-3L), which can further increase the cavity voltage.