Table 1 Regulatory limits and design goals for CiADS.

Target Receptor	Limit
Radiation Dose - Worker	GB 18871-2002 Standard: 20 mSv/a CiADS ALARA Goal: 5 mSv/a
Radiation Dose - Public	GB 18871-2002 Standard: 1 mSv/a CiADS ALARA Goal: 0.5 mSv/a and 0.1 μSv/ (any one hour)
Radiation Dose – Soil	CiADS ALARA Goal: 5 mSv/h

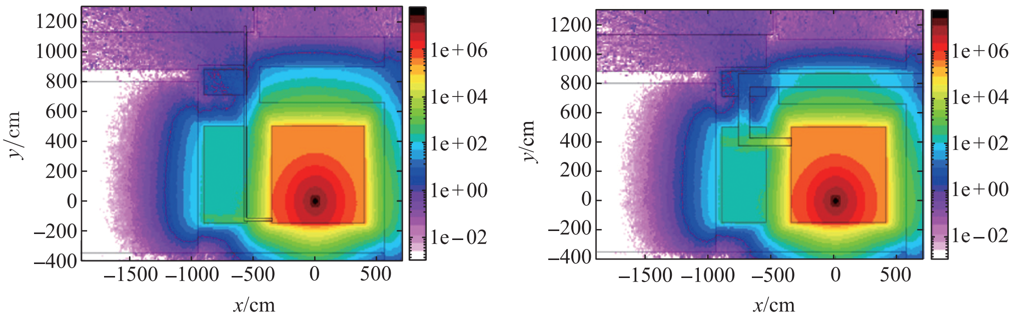

Fig. 2 (color online) Dose rate map in elevation views for CiADS linac with cable duct(left) and ventilation duct (right), μSv/h (the red contour lines on each plot are at 2.5 μSv/h).

References

[1] S. Henderson, W. Abraham d, A. Aleksandrov, et al., Nucl. Instrum. Meth. A, 763(2014)610.
[2] C. Strabel, H. Vincke, K. Zabrzycki, "Radiation Protection studies for the CERN Neutrino Facility (CENF)", EDMS, (2014)1427729.

8 - 32 The Establishment of the Standard Device for Gamma Ray Air Specific Release Kinetic Energy in the Inspection and Testing Center of Large Scientific Equipment

Liu Xuebo, Li Jingfeng, Su Youwu, Li Wuyuan, Li Zongqiang and Li Yang

In accordance with the recommendations of IAEA 398 Technical report and AAPM TG51 report of the American Association of Medical Physicists, it is necessary to establish the necessary metrology support capacity for the measuring equipment of radiation therapy in proton and heavy ion therapy centers, as well as equipment for personnel radiation safety protection and radiation environment monitoring. Therefore, The gamma ray air specific kinetic energy (protective level) standard device and gamma ray air specific kinetic energy (therapeutic level) standard device have been established at IMP, which can not only satisfy the metrology support service of the treatment center, but also fill the gap in the verification and calibration metrology support ability of ionizing radiation measuring instruments in northwest China.

The standard device for gamma ray air specific kinetic energy is shown in Fig 1. It is mainly composed of gamma radiation source, irradiation system, trolley positioning and three-dimensional mobile trolley, radiation safety and control system, *etc.* It is transmitted to the national standard through the standard ionization chamber to achieve accurate measurement of the ratio of air specific kinetic energy in radiation field. Next, we will conduct remote control in the control room (Fig. 2), conduct repeatability measurement, stability evaluation and uncertainty evaluation experiments, and complete the traceability of quantity values.

The establishment of ionizing radiation standard measuring station can be used for the verification and calibration of relevant ionizing radiation measuring equipment in northwest China. To establish the calibration method and process of therapeutic dose in advanced particle radiotherapy; to provide research tools and sites for the applied basic research of radiation dosimetry, micro-dosimetry, radiation protection and environmental protection.

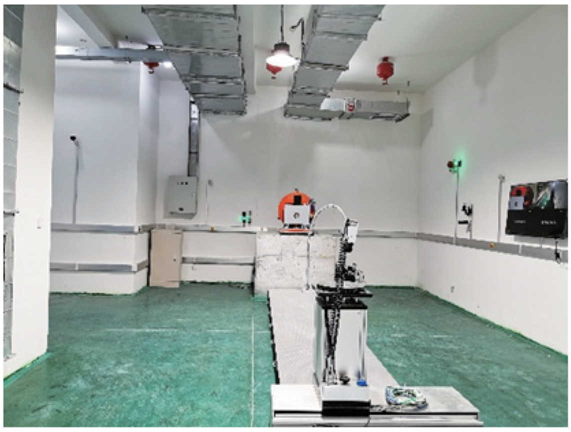

Fig. 1 (color online) The Gamma calibration laboratory.

Fig. 2 (color online) The Control room.

8 - 33 Radiation Shielding Design for a 10 MeV Rose-like Electron Irradiation Accelerator

Li Yang, Li Wuyuan, Su Youwu, Yang Bo, Mao Wang, Wang Lijun and Yan Weiwei

This article focuses on the radiation shielding research of the coaxial cavity electron accelerator, a petal-shaped electron accelerator independently developed by the Institute of Modern Physics at the Chinese Academy of Sciences. This study aims to provide reference for the radiation shielding design of similar devices in the future. The coaxial cavity electron accelerator mainly consists of an electron gun, a resonant cavity, nine external bending magnets, a 270-degree bending magnet, and a scanning system. Its working principle is shown in Fig. 1. The resonant cavity provides a radial accelerating electric field. After the electron beam is horizontally shot into the resonant cavity from the electron gun, it is accelerated along the radial electric field, and then enters the resonant cavity again through the external bending magnet after being deflected, repeatedly going through nine turns and ten passes of the resonant cavity, and finally ejected from the exit. Each time the electron beam passes through the resonant cavity, it gains 1 MeV of energy. Therefore, the energy of the ejected electron beam is 10 MeV. The ejected electron beam then passes through a 270-degree bending magnet, and its direction changes from horizontal to vertical downward. After being expanded into a parallel plane beam by the scanning system, it completes the irradiation of the object. Table 1 provides the main technical parameters of the coaxial cavity electron accelerator.

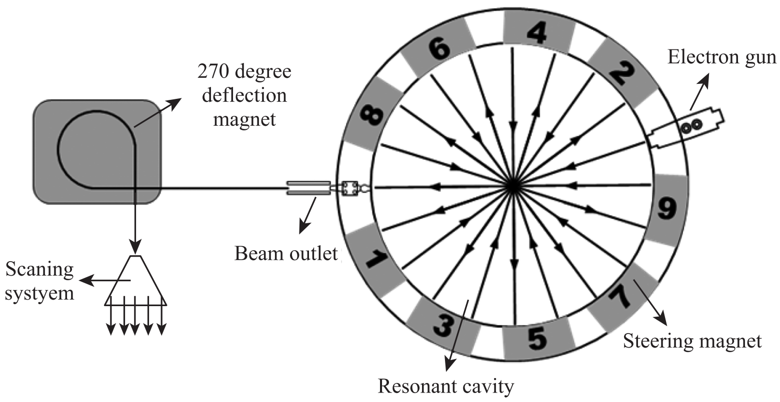

Fig. 1 (color online) Diagram of accelerator main structure and acceleration principle.

According to the design of the coaxial cavity electron accelerator, the beam loss occurs during the electron beam acceleration, ejection, and irradiation processes. Each beam loss point is a radiation source. The beam loss during the acceleration and ejection processes occurs on the nine bending magnets and the exit slit, with the corresponding beam energy ranging from 1 to 10 MeV. The total beam loss intensity is 6 μA, with less beam loss of high-energy