

## DIGITAL RADIATION PROTECTION

Li Tiehui, Chen Zhixing, Zhang Qingjiang, Li Nan, An Lisheng  
Institute of High Energy Physics, CAS  
P.O.Box 918, Beijing 100039, China

### *Abstract*

The paper raises the concept of digital radiation protection, and introduces its character, meaning, content, research means and application.

### DEFINITION OF DIGITAL RADIATION PROTECTION

Digital radiation protection makes the objects needing shielded digital, which is a mode applied in shielding field by modern information technology combing other subjects.

Digital radiation protection is raised after the concept of digital earth, the rapid development of information network technology and the theoretic development of radiation protection itself. With bringing out the digital radiation protection, the radiation protection theory evolve from conventional calculation and experimental measure to such a method that connects and intercrosses many kinds subjects closely, which is studied from the macroscopical point of view and applied in radiation protection by the modern information technical means

### CHARACTERISTIC OF DIGITAL RADIATION PROTECTION

**Digital:** digital goal. The digital goal of digital radiation protection is an object that can be monitored and controlled, including the body and the matter. Its excellence is that the goal can be deal with by computer. The goal's digitization indicates that the study of the radiation protection application goes into a new field.

**Information:** information radiation protection will exert a comprehensive function on radiation protection. The information is the inevitable result after the goal's digitization.

Radiation protection only can be utilized widely after the goal informationization. The goal's digitization supply the base for the radiation protection's informationization. The digitization goal can form an organic radiation protection information system by the modern data processing technique and the communication technique support. Consequently it can spread, exchange and control the information of multi- carriers.

**High efficiency and centralization:** lots of information can be obtained in limited time and space. After the goal's digitization, the data can be stored in the computers and be analysed and dealt with by information computer system, which can increase work efficiency.

**Cross-subject:** computer technology, multimedia communication technology, autocontrol technology, detector technology, material science technology etc..

**Virtual protection:** a real-life nuclear establishment (or the crowd, a single body etc. ) can be virtual to computer through digital dealing with, then we can centralize various information collected into computer through sensors to deal with, get some what we need and control the goal.

### SIGNIFICANCE OF DIGITAL RADIATION PROTECTION

Digital radiation protection is one of important content of environmental protection in digital earth.

Digital radiation protection is the necessary trend of radiation protection system's modernization.

Modernization of radiation protection system means:

from the shielding goal's stylebook collecting to the protection measure carrying out, every step is managed and controlled in high-efficiency reliable system.

Standardization of radiation protection.

Sharing of data.

Monitor forecast of environment radiation dose from the whole country's various provinces and cities.

Providing information to governmental department of policy decision.

Improving the managing efficiency of radiation protection.

### POSSIBILITY OF DIGITAL RADIATION PROTECTION (DEVELOPMENT OF RELATIONAL POLICY AND SUBJECTS)

Rapid development of relational science, especially computer technology, information technology, material science, bioscience, environment science etc., provide developmental base and method for digital radiation protection.

Unify of the world economy, except for a watchword, Earth Village is becoming reality. Various countries have put lots of money into information construction, and have formulated relational preferential policy, which all provide political guarantee for digital radiation protection.

### CONTENTS OF DIGITAL RADIATION PROTECTION

Digital of monitor goal: digital of radiological effluence environmental dose and area dose.

Automation of measurement: automation of data collecting, managing, analyzing and judging etc..

Information of protection data: integrating lots of protection data through modern computer's data-handled technology.

Modernization of protection facility: entrance guard and candid shot picture are adopted in shielding region.  
Network of controlled equipments: all equipments form a network and are controlled.

Globalization of virtual protection: data are enjoyed commonly and used efficiently.

### **RESEARCH MEANS OF DIGITAL RADIATION PROTECTION.**

The research means for digital radiation protection are running by intercrossing the knowledge in various courses. The main courses include:

Fundamental theory of radiation protection.

Lots of experimental data accumulated from radiation protection.

Detector technology.

Sensor technology.

Entrance guard technology.

Material science technology.

Autocontrol technology.

Computer technology.

Database technology.

Multimedia technology.

Network communication technology.

Wireless communication technology.

GPS(Global Positioning System) technology.

### **THE PROBLEMS OF THE DIGITAL RADIATION PROTECTION FACED**

The standardization problems of the sampling protection objects. It should recognize the international standards accepted.

There are a lot of subjects in the radiation protection field which are theoretically designed by using the physical model and need more experimental data.

Saving and proceeding the astronomical data. It involved such problems as the stored medium, the data storage technique, the computer's proceeding rate, the net transmitting rate etc..

The real-time proceeding data problems. There should be quick reaction to the sudden event in the modern information society, and the capability of the quick reaction is one of the most important characters of the digital radiation protection.

The reliability and security problems in the information net. It includes the work for establishing information legal system, the propagandising and education work for information security.

### **APPLICATION FIELD OF DIGITAL RADIATION PROTECTION**

Environment (forecast of environmental radiation dose, monitor of building materials and decorative materials).

National security (radiation check-up for entering and leaving a country, prevent diffusion of radioactive matter from terrorists, early warning system of national nuclear accident).

Society security (searching radioactive matter, tracking and inspecting radioactive waste, tracking and inspecting catastrophic accident of nuclear establishment in time, providing early warning information of radiation dose).

Nuclear power station.

Reactor for scientific research and education.

High and middle energy accelerator.

Medical accelerator.

Industrial accelerator.

X-ray equipment.

Nuclear-powered carried tool (aircraft carrier, nuclear-powered submarine).

Nuclear weapon.

### **SUMMARY**

The concept of the digital radiation protection has formed for a little period of time and needs the support of other related fields' technique. We hope the fellows who are concern the radiation project to table proposals to advanced the development of the digital radiation protection together.