

A CAMERA FOR REAL-TIME DETECTION OF GAMMA RADIATION DIRECTION

Fields of use

Cancer radiation therapy, Radiation-related industries

Current state of development

The solution has been demonstrated and tested in the laboratory

Type of cooperation

License agreements and/or technical cooperation

Intellectual property

A PCT patent application has been filed for the technology

Developed by

Jožef Stefan Institute

Contact

Jožef Stefan Institute,
Jamova cesta 39,
1000 Ljubljana,
Slovenija

Phone: + 386 1 47 73 224

E-mail: tehnologije@ijs.si

Web site: <http://tehnologije.ijs.si/>



Summary

An angle-sensitive camera has been developed for detecting the direction of incident gamma radiation. The camera senses, in real time, the position of the radiation source, which simplifies procedures in cancer radiation therapy and in other radiation-related industries.

Description of the invention

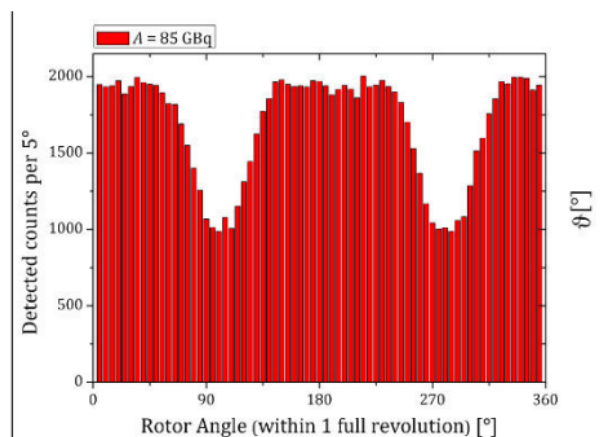
In the current medical practice in radiation procedures in clinical oncology (high dose rate brachytherapy), a gamma-radioactive source is temporary inserted into the patient in order to locally deposit a therapeutic radiation dose. This means that individual sessions do not last long, and it is desirable to know the location of the radioactive source in real time. Furthermore, accidental movements may displace the source which is not detected, and leads to inaccurate dosing.

The invention, a camera, sensitive to the incoming direction of gamma radiation, solves this problem since it is capable of sensing, in real time, the position of the radiation source inside the treated patient and thus introduces a qualitycontrol component to the radiotherapy procedures. The camera, while not a true imaging device, measures the dominant direction of the incident gamma rays, and hence the apparent position of the radioactive source. The camera is operated and controlled via computer software.

Figure: Measurement of incident radiation angles. Angular coordinates of incoming gamma rays are determined from the time dependence of count rate.

Events collected during one revolution of the rotor, lasting 0.4 s, are shown.

The camera was placed at a distance of 1 m from a Cs-137 source with the activity of 85 GBq.



The camera finds use in the fields of medical radiotherapy, specifically in high dose rate brachytherapy in clinical oncology. Other examples of use are in detection and localization of radioactive contaminations in nuclear medicine environments, and in nuclear power installations, as well as in real-time control of inventory and transportation of special nuclear material.

Main Advantages

- the camera senses, in real time, the position of the radiation source inside the treated patient in a noninvasive manner
- thus, unnecessary repetition of therapy is avoided
- unlike some existing complex solutions, involving complex detectors, readout, and interpretation of data, the invention involves a simple gamma ray detector and a corresponding readout system, making its use more cost-effective as well as more accurate
- technology is conceptually simple, and may be set up as a stationary device (for therapeutic applications), or installed on a remote-controlled element for increased safety (for applications requiring detection of radiation in potentially hazardous material, such as radioactive waste)

Partner Sought

License agreements and/or technical cooperation agreements with industry or research partners.