

Cherenkov-Based Radiation Beam Monitor

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ABSTRACT

Researchers at the University of California, Davis have developed an innovative Cherenkov-based system for calibrating radiotherapy beams, enabling precise, real-time calibration of radiation dose delivery, including for high-intensity FLASH radiotherapy, improving treatment accuracy and reliability.

FULL DESCRIPTION

This technology introduces a robust method and apparatus for the calibration of radiotherapy beams using Cherenkov radiation. By detecting Cherenkov radiation emitted within a specially designed monitor body, the system offers a more accurate and reliable means of calibrating radiotherapy beams, including high-intensity FLASH radiotherapy. This approach addresses the limitations of traditional ionization chambers, promising improved calibration accuracy for enhanced patient treatment.

APPLICATIONS

- Calibration of external beam radiation therapy devices, including X-ray, electron, and proton therapy machines.
- Quality assurance tools for radiotherapy clinics to ensure precise dose delivery.
- Research and development in radiotherapy technologies.
- Manufacturing of radiotherapy devices with integrated advanced calibration features.

FEATURES/BENEFITS

- Increases calibration accuracy for radiotherapy beams, including FLASH-RT.
- Overcomes the limitations of traditional ionization chambers, such as non-linearity and saturation.
- Reduces the complexity of beam calibration by minimizing the need for pressure and temperature adjustments.
- Enables real-time monitoring and adjustment of radiotherapy doses for better treatment outcomes.
- Addresses saturation and non-linearity issues of ionization chambers in high dose rate environments.
- Simplifies complex calibration processes due to pressure and temperature dependencies.
- Increases accuracy in current radiotherapy beam calibration techniques, impacting treatment precision.

PATENT STATUS

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INVENTORS

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OTHER INFORMATION

KEYWORDS

beam dosimetry, cancer treatment technology, Cherenkov radiation, FLASH radiotherapy (FLASH-RT), medical imaging, radiation oncology, radiotherapy calibration, solid-state detector, water-equivalent materials

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