High Resolution, Ultrafast, Radiation-Background Free PET

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ABSTRACT

Researchers at the University of California, Davis, have developed a positron emission tomography (PET) medical imaging system that allows for higher 3D position resolution, eliminates radiation background, and holds a similar production cost to existing technologies.

FULL DESCRIPTION

Time-of-flight PET (TOF-PET) is the leading medical imaging technique and is widely applied in clinics for diagnostic and disease monitoring purposes for cancers, cardiovascular diseases, and musculoskeletal disorders. Improving the timing accuracy of PET detectors would allow for high image quality that can be used to identify and diagnose diseases at very early stages. Existing detectors have intrinsic limitations that have thwarted further advancements in imaging resolution.

Researchers at the University of California, Davis, have developed a positron emission tomography (PET) medical imaging system that allows for higher 3D position resolution, eliminates radiation background, and holds a similar production cost to existing technologies. This technology addresses the current limitations of state-of-the-art PET detectors and has been designed to exploit the benefits of forthcoming innovation in detector materials and photodetector design. The main feature compared to state-of-the-art detectors for TOF-PET is its timing resolution, which is expected to improve from the current ~210 ps to less than 100 ps with the available technology. In addition, it would approach 20-30 ps with some forthcoming developments expected in detector materials and photodetectors. This design is expected to provide a very good 3D position resolution, show no intrinsic radiation background, unlike current systems, and comparable production cost.

APPLICATIONS

- Positron emission tomography (PET) medical imaging devices

FEATURES/BENEFITS

- High 3D resolution
- High spatial estimation
- High depth-of-interaction (DOI) point capacity
- No radiation background / background free detectors
- Ultrafast performance
- Lower production cost of detector material

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20240125952	04/18/2024	2021-676

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OTHER INFORMATION

KEYWORDS

nuclear medicine, TOF-PET, photodetectors, scintillation crystals, time resolution

CATEGORIZED AS

- **Imaging**
  - Medical
  - Other
- **Sensors & Instrumentation**
  - Medical
  - Other

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