

Dual-Grid Multi-Source X-ray Tube

Tech ID: 34342 / UC Case 2025-572-0

ABSTRACT

Researchers at the University of California, Davis have developed an advanced multi x-ray source array system employing dual cathode designs that enhance computed tomography ("CT") imaging by enabling pulsed, spatially multiplexed x-ray emission with reduced artifacts.

FULL DESCRIPTION

This technology introduces a multi x-ray source array system featuring multiple rotating anodes arranged on a single shaft, each paired with dual thermionic cathode assemblies capable of rapid pulsed operation. By electronically modulating charged particle beams with dual grids, x-rays are selectively generated from discrete anode focal spots, creating a two-dimensional array of individually controllable x-ray sources. The system rotates in unison with a detector array around the patient, enabling full tomographic data acquisition with minimal cone beam artifacts. Switching x-ray emission between odd and even anode sets eliminates beam overlap and improves image quality. Additionally, the technology offers flexible spatial control of x-ray focal spots and enhanced field-of-view coverage compared to traditional single-source CT systems.

APPLICATIONS

- ▶ Whole body and general-purpose computed tomography scanners in clinical radiology.
- ▶ Cone beam computed tomography for dental, orthopedic, and interventional imaging.
- ▶ Security scanning systems such as airline baggage and package inspection.
- ▶ Stereoscopic and multi-angle x-ray imaging requiring rapid source switching.
- ▶ Industrial non-destructive testing and material analysis using computed tomography.

FEATURES/BENEFITS

- ▶ Reduces cone beam artifacts through multiplexed source geometry and pulsed x-ray emission.
- ▶ Improves image quality and ensures complete sampling with large field-of-view coverage.
- ▶ Allows rapid switching and precise control of x-ray focal spots with dual grid cathode design.
- ▶ Enables complex x-ray source sequencing through a two-dimensional planar array arrangement.
- ▶ Shares filaments between cathodes for efficient use of filament resources.
- ▶ Supports both medical and non-medical computed tomography applications.
- ▶ Provides sub-millisecond temporal precision of pulsed x-ray beams for flexible imaging protocols.
- ▶ Mitigates beam overlap on large area detectors during simultaneous multi-source operation.

CONTACT

Amir J. Kallas

ajkallas@ucdavis.edu

tel: .



INVENTORS

- ▶ Boone, John M.

OTHER INFORMATION

KEYWORDS

anode, cathode,

computed tomography,

dual grid, filament,

rotating shaft, thermionic

cathode, x-ray focal

spots, enhanced imaging,

medical imaging

CATEGORIZED AS

- ▶ **Engineering**
 - ▶ Engineering
- ▶ **Imaging**
 - ▶ Medical
- ▶ **Medical**
 - ▶ Imaging
- ▶ **Sensors & Instrumentation**
 - ▶ Medical

RELATED CASES

- ▶ Addresses limited spatial sampling and z-axis coverage in traditional cone beam CT.
- ▶ Simplifies mechanical design challenges through multiplexing and dual cathode architecture.

2025-572-0

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Device and Method for Measuring Beam Quality in CT](#)

University of California, Davis

Technology Transfer Office

1 Shields Avenue, Mrak Hall 4th Floor,
Davis,CA 95616

Tel:

530.754.8649

techtransfer@ucdavis.edu

<https://research.ucdavis.edu/technology-transfer/>

Fax:

530.754.7620

© 2025, The Regents of the University of California

[Terms of use](#)

[Privacy Notice](#)