

Docket #: S20-018

Holographic X-ray Detection

Differential Phase Contrast (DPC) X-ray imaging measures both absorption and index of refraction of materials being imaged. This technique has several advantages compared to traditional absorption-only X-ray imaging. It can perform medical imaging with a substantially higher contrast to noise ratio for soft matter (such as tumor detection) and has many applications in security screening (such as explosive material identification).

The system uses a non-linear optical medium which forms a change in the index of refraction or the absorption of the material when exposed to X-ray radiation. After illumination, 2 μ m diffracted light is then analyzed to measure the magnitude and location of the changes in the index of refraction or absorption of the non-linear optical medium. The relative phases which reconstruct the pattern of X-ray illumination in visible light can then be digitized using a digital camera. Thus, an X-ray hologram is transformed into a digital signal, allowing for precise reconstruction of the interior of the object.

Stage of Research

Prototype

Related technologies:

[S16-173 Fates - Compact, Sensitive X-ray Differential Phase Contrast Imaging System](#)

[S18-123](#)

[Next Generation Explosive Detection with Differential Phase Contrast \(DPC\) Imaging - Artifact Removal and Automated Analysis](#)

Applications

- Medical & Security CT
- Dental X-ray imaging

- Mammography
- General X-ray imaging

Advantages

- 2.4um resolution while maintaining >80% quantum efficiency of incident x-rays

Patents

- Published Application: [20210247330](#)
- Issued: [11,391,679 \(USA\)](#)

Innovators

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