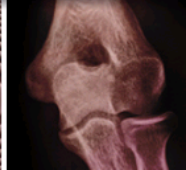
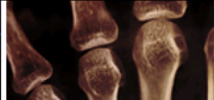




X-Ray Optics and Instrumentation



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Research Article

A Tunable Energy Filter for Medical X-Ray Imaging

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Abstract

A multiprism lens (MPL) is a refractive X-ray lens, and its chromatic properties can be employed in an energy filtering setup to obtain a narrow tunable X-ray spectrum. We present the first evaluation of such a filter for medical X-ray imaging. The experimental setup yields a 6.6 gain of flux at 20 keV, and we demonstrate tunability by altering the energy spectrum to center also around 17 and 23 keV. All measurements are found to agree well with ray-tracing and a proposed geometrical model. Compared to a model mammography system with absorption filtering, the experimental MPL filter reduces dose 13–25% for 3–7 cm breasts if the spectrum is centered around the optimal energy. Additionally, the resolution is improved 2.5 times for a 5 cm breast. The scan time is increased 3 times but can be reduced with a slightly decreased energy filtering and resolution.

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