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Mammography imaging studies using a Laue crystal analyzer as a scatter rejection optic

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Scattered radiation is a major souce of image degradation in medical imaging. Various techniques are used to minimize it, such as anti-scatter grids and line or raster scan imaging. Synchrotron based mammography imaging experiments have been performed with monochromatic x-rays in which a crystal analyzer has been used to reduce scatter onto the detector. The X27C R&D beamline at the National Synchrotron Light Source was used with the white beam monochromatized by a double crystal Si(111) monochromator tuned to 18 keV. Images were acquired in line scan mode with the phantom and detector both scanned together. The detector for these experiments was an image plate. A thin Si(111) Laue analyzer was used to diffract a portion of the beam transmitted through the phantom before the image plate detector. This “scatter free” diffracted beam was then recorded on the image plate during the phantom scan. Since the thin Laue crystal also transmitted a fraction of the incident beam, this beam was also simultaneously recorded on the image plate.

The imaging results will also be compared to images acquired without the analyzer to assess the improvement due to the scatter reduction. Also the analyzer images taken at various points in the rocking curve will be presented and interpreted.