# AbstractID: 4353 Title: Scatter Characterization in Cone-Beam CT Systems with Offset Flat Panel Imagers

**Purpose:**
X-ray scatter significantly degrades the quality of cone-beam CT (CBCT) reconstructions by introducing cupping and streaking artifacts. Simple correction techniques, based on subtracting a constant value across a projection, fail when the flat-panel detector is transaxially offset as is required to increase the reconstruction field-of-views for body scans. The purpose of this study was to measure x-ray scatter profiles for transaxially offset detectors and to characterize the resulting artifacts.

**Method and Materials:**
Data were collected on a table-top CBCT system. A pelvic phantom was imaged with a Varian 4030CB imager offset by 16 cm. Scatter was estimated by subtracting a nearly "scatter-free" projection data set, obtained by narrowing the axial collimator blades, from the full CBCT data set obtained with the blades in their fully open position. The resulting scatter estimate, valid in the narrow region of overlap, was extrapolated to generate a scatter estimate across the entire axial extent of the detector. This scatter estimate was then subtracted from the original CBCT data to generate scatter-corrected images.

**Results:**
The scatter profile in full-fan projections is relatively flat and symmetric. In contrast, in the half-fan configuration the measured scatter profile was asymmetric decreasing monotonically from the phantom-air boundary through the phantom center to the imager edge. The slope of this profile varied smoothly from the AP to lateral views resulting in reconstructions with abnormally bright and dark regions. Scatter correction using the measured profile proved effective. Cupping and doming amplitudes were reduced by 2/3. The average reconstruction error in the prostate region was reduced from over 120 HU to less than 40 HU.

**Conclusions**:
The asymmetries introduced by an offset detector result in non-uniform scatter profiles that generate unusual cupping artifacts. Our technique provides a means of characterizing these profiles.

**Conflict of Interest:**
Funding provided by Varian Medical Systems.