AbstractID: 7521 Title: Investigation of an innovative ROI imaging approach and its potential to IGRT

**Purpose:** In radiation therapy, it is not uncommon that one is interested only in a region of interest (ROI) of the patient and that the center of the ROI does not coincide with the rotation center. Recent development of CT imaging theory allows the design of innovative approaches to imaging ROIs. The benefits of ROI imaging include the reduction of imaging dose to the patient and of scatter and other artifacts. In this work, we propose a new ROI imaging approach and investigate its potential application to image-guided radiation therapy.

**Method:** Scanning approaches have been proposed for imaging such ROIs through Normal varying dynamically illumination collimation of imaging x-ray beam. In this study, we investigate and develop new imaging approach that uses a constant illumination collimation while using an effective, general trajectory through shifting detector and source in such a way that the x-ray illumination always covers the ROI. From such data that contain truncations, the backprojection-filtration (BPF) algorithm can be used for reconstructing the ROI images.

**Results:** We have performed numerical studies to validate and evaluate this imaging approach. In these studies, we have used digital phantoms to generate data with and without noise. The results of our preliminary numerical studies indicate that ROI imaging without varying the source collimation during data acquisition can be achieved.

**Conclusion:** ROI imaging without varying the source collimation during data acquisition can be achieved through varying the detector and source positions. The implication of the work to image-guided radiation therapy can be potentially high.