# AbstractID: 8850 Title: Development of an image-guided conformal small animal irradiation platform

**Purpose:** To develop an image-guided conformal small animal irradiation system for pre-clinical studies. The initial dosimetric and imaging properties of the system have been characterized.

**Method and Materials:** The system consists of a 225 kVp x-ray tube (GE Isovolt, maximum power 3 kW, focal spot=0.4mm-3.0mm), and 20.5×20.5 cm amorphous silicon flat panel detector (512×512 pixels, 7 frames-per-second) mounted on a rotating gantry. The system can rotate 360°, at a maximum speed of 3 RPM. The source-isocenter distance is 31 cm, and the source-imager distance is 62 cm. Cone-beam CT images are generated from projections over half or full rotation, and reconstructed using filtered-back projection. A motorized stage allows translational movement of specimen. Initial dosimetric characterization of the system has been done using EBT Gafchromic film in a solid water phantom at 2 cm depth. The unit is free standing and self-shielded.

**Results:** The maximum dose rate achievable at isocenter is 4.5 Gy/min for 220 kVp unfiltered beam, and 2 Gy/min for 220 kVp beam with 0.5mm added Cu filtration (HVL = 1.0mm Cu). The maximum dose rate for 100 kVp is 2.5 Gy/min (unfiltered) and 1.5 Gy/min with 2mm added Al filtration (HVL = 3.1 mm Al). Cone-beam CT images are generated with a resolution of 0.2×0.2×0.2 mm.

**Conclusion:** Image-guided conformal pre-clinical irradiation systems will enable novel translational research in radiation oncology and radiobiology. The presented system has been demonstrated to provide the dose rate, mechanical stability and image-guidance capabilities necessary to facilitate such research.