

**AbstractID: 9379 Title: MTF versus dose efficiency: a novel method to investigate high QE detectors for therapy imaging**

Electronic Portal Imaging Devices (EPIDs) offer great promise to facilitate increasingly precise and/or aggressive treatment techniques through sophisticated soft tissue target verification methods such as cone-beam Megavoltage CT (MVCT). Although sufficient contrast and resolution have been demonstrated in MVCT, doses are prohibitive for daily use due to the poor interaction efficiency (quantum efficiency, QE) of existing EPIDs. There has thus been interest in developing high QE detectors. However, due to the fundamental physics of x-ray interaction, high QE detectors are expected to suffer from additional blur. This work presents a method to measure the spatial resolution properties (the MTF) without requiring the development of a prototype device, allowing many options to be explored without commitment to engineering or exhaustive theoretical modeling. By using an existing detector as a probe, signal is collected on a layer-by-layer basis throughout the material to be investigated. The sum of the signal is equivalent to that of a final, high QE detector. The MTF for QEs of 2-74% in copper and tungsten were thus measured. MTF initially decreases rapidly in both materials, then more gradually for high QE. The rapid drop is beyond the electron range and is more significant in copper, indicating that blur due to photon scatter may also be material dependant, with denser materials performing better. A detector with 74% QE in copper has an MTF sufficient for clinical imaging tasks, demonstrating that the development of practical devices is warranted.