AbstractID: 1961 Title: Metal Artifact Suppression in High Energy Photon CT Imaging

Computed tomography is an important modality for 3-D imaging and is particularly useful for planning medical treatment such as surgery or radiation therapy. Unfortunately, CT images from conventional kilovoltage (kVCT) diagnostic scanners can be degraded significantly by artifacts if the imaged volume contains metal implants such as surgical clips, dental fillings, or metal prostheses. Various approaches have been used to suppress these artifacts. For example, new materials have been developed for surgical clips, and different image reconstruction techniques (using partial or filtered data sets) have been reported for artifact suppression. These techniques work to some degree, however, the problem of metal implant artifacts has not been solved completely.

With the move to image guided radiation therapy, there has been a general increase in the development of linear accelerator based megavoltage imaging. In particular, megavoltage CT (MVCT) has progressed significantly in the past few years, in part because of advances such as tomotherapy. Our group has also shown that MVCT can be achieved with a Co-60 source (Co60CT). It has been observed incidentally that metal artifacts are almost eliminated in MVCT and Co60CT images. In this presentation we will characterize this property of high energy CT imaging by analyzing Co60CT images of phantoms containing various metal inserts including rods, surgical clips and prostheses. We will show that Co60CT numbers scale linearly with electron density over the complete range. This work indicates that there may be an increased indication for MVCT and Co60CT imaging beyond radiation therapy guidance.