AbstractID: 11151 Title: Characterizing the scatter radiation of a micro-CT scanner using Monte Carlo

Purpose: Micro-CT scanners are used to create high-resolution images and to measure physical properties (e.g. bone mineral density) of the objects observed. Modern micro-CT scanners make use of cone beam geometry making the image information suffering from scatter radiation. This work aims to characterize the scatter radiation in the detector plane of a micro-ct scanner using Monte Carlo methods. **Method and Materials:** EGSnrc was used to simulate the particle transport through the main components of the XtremeCT (Scanco Medical AG, Switzerland) and through different phantoms. Based on phase space information in the detector plane, the primary and the scatter radiation were analyzed. By implementing a dedicated LATCH method, the scatter radiation was subdivided into several components providing a detailed characterization of the scatter radiation. In order to study the dependence of these scatter components on the object to be scanned, Monte Carlo simulations were performed for different phantoms which vary in size or composition. **Results:** For typical object sizes the scattered radiation contribution is in the order of 10% of the total radiation in the detector plane. Most of these scattered particles result from interactions in the object. As expected, the relative scatter contribution increases with increasing density and size of the object. On the other hand, the Monte Carlo simulations show that scatter radiation, particularly the component which is due to scattering within the object, contains information about the structure of the object and this information increases with increasing density. **Conclusion:** In this work, the scatter radiation of a micro-CT scanner was analyzed using Monte Carlo simulations. It is shown that the scattered radiation is dominated by scattering within the object. The results of this work provide a basis for future scatter correction methods in micro-CT applications. **Conflict of Interest:** This work was supported by Scanco Medical AG.