## Medical Physics Seminar Monday, September 14, 2015 1345 HSLC - 4:00 P.M.

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## A Review of Radiation Dosimetry Research Involving Computational Human Phantoms and Coprocessor-based Monte Carlo Dose Calculations

For more than half a century, the modeling of the human anatomy for the purposes of Monte Carlo dose calculations has been an exciting research topic in radiation protection, imaging, and radiation therapy. A recent review article found that computational phantoms — which can be classified into three generations (stylized, voxelized and BREP phantoms) — have followed a surprising pattern of exponential growth in the past 60 years. This seminar provides an in-depth discussion about the history of computational phantoms and technical challenges at different times. Basic geometry modeling techniques are introduced through selected phantoms and their applications in radiation dosimetry including the VirtualDose software tool for CT dose reporting that was developed from a family of age- and size-specific phantoms. The presentation also introduces the latest effort to drastically improve the speed of Monte Carlo dose calculations using hardware devices such as GPUs and MIC that merged recently for high-performance computing. Examples of clinical radiation dose application of these heterogeneous Monte Carlo computing methods are given using the ARCHER Monte Carlo code that is designed to work concurrently with CPU, GPI and MIC platforms.

## 1345 HEALTH SCIENCES LEARNING CENTER (HSLC) - 4:00 - 5:00 P.M.