

**Title: The TOPAS Tool for Particle Simulation - making Monte Carlo particle transport simulation accessible to the busiest physicist**

We will present the TOPAS - TOol for PArticle Simulation - a tool that makes Monte Carlo simulation more readily available for research and clinical physicists. TOPAS can model a passive scattering or scanning beam treatment head, model a patient geometry based on CT (computed tomography) images, score dose, fluence, etc., save and replay a phase space, provides advanced graphics, and is fully four-dimensional (4D) to handle variations in beam delivery and patient geometry during treatment. TOPAS users configure pre-built components (nozzle, patient handling, dosimetry or imaging components) to simulate a wide variety of particle therapies with no required knowledge of its underlying Geant4 Simulation Toolkit or any programming languages. All aspects of the simulation, including all 4D behaviors, are controlled from a unique, TOPAS Parameter Control System. TOPAS was engineered from the ground up to be flexible, yet easy to use, reliable and repeatable. The code includes a strong focus on “engineering-in” safety, employing a variety of techniques to make it harder for users to make mistakes. TOPAS is funded by the US NIH and developed by the SLAC National Accelerator Laboratory, Massachusetts General Hospital and the University of California San Francisco. TOPAS is currently in use at 121 institutions in 24 countries.