AbstractID: 6709 Title: PMC, a new fast Monte Carlo code for radiation therapy

Introduction : A fast and accurate MC code, have been developed. PMC takes the advantage of large available memory in current computer hardware for extensive generation of pre-calculated data.
Methods: The tracks of 5000 primary electrons are generated in the middle of a large homogenous phantom for various materials (water, air, bone, lung, and tissue) and energies (0.2,0.4, …1,2,..., 18 MeV) using EGSnrc code. The maximum electron steps is controlled by setting ximax=0.02 . The secondary electrons are not transported but its position; energy , charge, direction are saved. In PMC using the energy and medium of the incident electron , one track is selected from the related set . The selected track is then transported and rotated to the position and direction of incident electron and the transport starts. If the electron reaches a new material according to its energy a new track is picked up from related material. If a secondary electron and its energy is above the PMC cut offs (ECUT=100KeV) its position , charge ,energy and direction are saved in the stack. Once the track of the primary electron is finished each secondary is transported in the same manner as primary electron. For various energies a track from closest energy set is picked up and linear scaling is done for deposited energy and track length.
Results and discussion : The performance of the code is tested in various homogenous and heterogeneous phantoms and the results had very good agreement (up to 1.6%) with EGS and it runs 40 times faster than EGS .
Conclusion : Not a single physical calculation is done in PMC code even in the presence of heterogeneities. The pre-calculated data is generated for each particular material and this improves the performance of code both in terms of accuracy and speed.