Monte Carlo Calculations for the Linac Irradiations

V. Makarashvili, B. Micklich, S. Chemerisov, G. F. Vandegrift
Chemical Sciences and Engineering division
Argonne National Laboratory, 9700 S. Cass. Ave. Argonne IL 60439 - USA

ABSTRACT

Particle transport Monte Carlo code – MCNPX has been used to perform detailed calculations providing important input to the design and planning phases of the experiments at the LINAC facility of the CSE division at Argonne National Laboratory. Two main experimental projects at the Argonne LINAC facility are the NorthStar photonuclear production of Mo99 via (gamma, n) reaction on Mo-100 and the mini-SHINE fission-based Mo-99 production in a uranyl sulfate solution driven by a tantalum (or DU in the second phase of the experiments) photo-neutron target. Neutron and photon fluxes in various regions of the experimental geometry along with prompt (during the irradiation) and delayed dose rates (after the run from the activated materials), shielding requirements and yields of Mo-99 and byproducts have been calculated for both projects. The results of this work are presented here.