

Health Physics Applications in Shielding, Dosimetry and Space Radiation

In our research, we use health physics concepts and other programming tools (MCNPX, Matlab and C++) to solve problems in dosimetry, shielding, and space and general radiation protection. We are specifically conducting shielding design, calculation of dose/absorbed dose, absorbed fraction, Linear Energy transfer (LET), etc.. from electrons and protons with various energy spectra. Our research applications included estimation and modeling of absorbed dose to the human extra-thoracic region, space radiation studies of energy losses by protons in the CRaTER space detector, and estimation of depth dose as a function of various materials for Europa (one of Jupiter's moons). Currently, we are primarily focusing our research efforts on the dose prediction from future Solar Particle Events (SPE) in the Low Earth Orbit, and the Organ dose from extreme SPE radiation exposure on Mars. Other research interests include medical physics research to understand and model exposure in cancer patients.

Hanna Moussa

Radiological Engineering

Hanna Moussa earned his B.S. (Radiological Health Physics) and M.S (Radiological Sciences & Protection) degrees from the University of Massachusetts, Lowell in 1990 and 1991 respectively. He received his Ph.D. in Nuclear Engineering with a concentration on Radiological Engineering/Health Physics in 2000 from the University of Tennessee at Knoxville.

Dr. Moussa served as an assistant director, then director of the Radiological Safety Department (RSD) at the University of Tennessee from 1997 to 2004. He also worked as a senior health physicist at The Walter Reed Army Medical Center in Washington DC (through a contract with Battelle Memorial institute) from 2008 to 2010. Since 2004, he also held a position of research assistant professor in the Nuclear Engineering Department at The University of Tennessee. Last fall, he was appointed to a tenure track Assistant Professor position at Texas Tech University in the College of Human Sciences.

Dr. Moussa published over 30 peer-reviewed articles and conference papers in highly ranked health physics and radiation protection journals. His research has been primarily funded by NASA.

Dr. Moussa has working experience and documented expertise for over 12 years with MatLab and Monte Carlo radiation transport code for modeling the interaction of radiation with matter (MCNPX), with primary application to dosimetry, shielding and radiation transport. Dr. Moussa's expertise also includes: Radiation safety and control, radiation protection and detection, radiation transport and modeling, radiation shielding, dose and risk assessment, space radiation and nuclear and radiological instrumentation.

Dr. Moussa is an active plenary member of the Health Physics Society (HPS), and is currently serving on the society's membership committee. He is also an active member of The American Nuclear Society (ANS). He serves as the Editor-in-Chief for the Journal of Particle Physics Insights (PPI) and a regular reviewer for the Health Physics Journal.