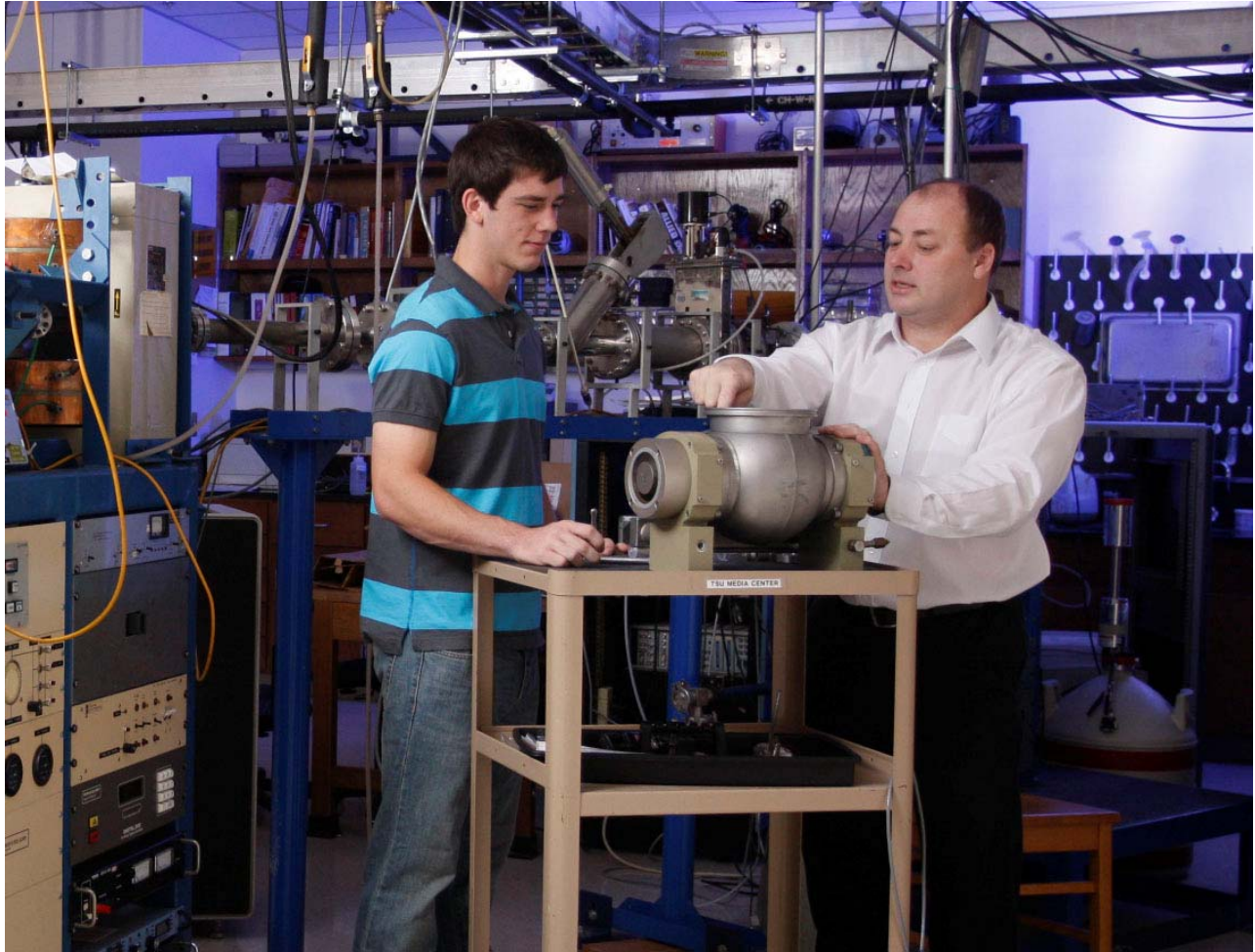


NUCLEAR



Daniel K. Marble

B.S. Electrical Engineering – University of Houston, 1984

M.S. Physics – University of North Texas, 1985

Ph.D. Physics – University of North Texas, 1991

Selected Papers

“Irradiation of Amorphous $\text{Ta}_{42}\text{Si}_{13}\text{N}_{45}$ Film with a Femtosecond Laser Pulse,” V. Romano, et. al., Appl. Phys. A: Material Science and Processing 104, pp 357, 2011

“Compact Detection System for High Sensitivity Hydrogen Profiling of Materials by Nuclear Reaction Analysis,” Marble, et. al, AIP Conference Proceeding 1099, pp 335, 2009.

“Gun Barrel Erosion Studies Utilizing Ion Beams,” J.K. Hirvonen, et. al, Surface Coatings and Technology 196, pp167, 2005.

NUCLEAR

Daniel Marble's interest is in nuclear physics and the use of accelerators for medical, industrial and educational applications. Nuclear physics plays an essential role in our lives. Natural radioactivity heats the Earth making possible for life to exist and all energy used to power our homes and run our factories including energy from gas, coal, and geothermal sources initially originates due to nuclear reactions in the sun. Scientists and engineers use nuclear physics and accelerators to make numerous devices and to solve hundreds of problems including food irradiation, processing of plastics, detection of cracks in metal structures, manufacturing and characterizing of electronics, manufacturing of gemstones, non-destructive inspection of cargo for homeland security, smoke detectors, medical imaging, and therapeutic radiation for curing cancer. Nuclear techniques including PIXE and Carbon Dating are also used to date, authenticate, and restore works of art and archeological artifacts. Accelerators are also excellent tools for teaching physics concepts and preparing student for future employment.

Marble's academic career began as a Civilian Assistant Professor of Physics at the United State Military Academy at West Point and Accelerator Lab Director. Over the years, he has held Joint Research Scientist appointments with several Department of Defense Accelerator Laboratories and served as a member of the organizing committee and chair for sessions on Teaching with Accelerators at the Bi-annual International Conference for the Application of Accelerators in Research and Industry. He is also a former President of the Texas Section of the American Association of Physics Teachers (AAPT) and was a member of the panel that developed the Texas Essential Knowledge and Skills (TEKS) for high school physics. Past awards include the Commander's Medal for Civilian Service to the Army, Jack and Louise Arthur Distinguished Teaching Award, and the Faculty Excellence in Scholarship Award.

Marble and his students in collaboration with scientists in academia, industry, and the national labs use the Texas Physics Consortium's state-of-the-art accelerator and scanning electron microscope facilities worth over \$2,000,000 to develop new nuclear based analytical techniques and to characterize industrial and environmental samples with ion beam. Recent investigations include a collaboration with researchers at CALTECH, Freescale Semiconductor, and the University of Bern to develop amorphous ternary films for high temperature devices and diffusion barriers for VLSI processing, the development of a coincidence detection system for high sensitivity, non-destructive detection of hydrogen, studies with DoD researchers on the delamination of chrome liners in gun barrels and the effects of nitrogen enriched propellants on gun nozzle erosion, the development and characterization of new materials for spintronics and drive applications, a study of air pollutants using proton induced x-ray emission analysis, and an investigation of the radioactivity of garnet based cutting sands for a local company. Marble is also working with coaches and kinesiology faculty to apply video analysis and the laws of physics to develop improved training methods for competitive athletics based upon a player's sport and position. The collaboration has recently published articles on training methods using the 60-yard shuttle for football and baseball players and is working to analyze weightlifting techniques for off-season training of football players.