

Abstract

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Consortium for Monitoring, Technology, and Verification – Year 1

The Consortium for Monitoring, Technology, and Verification (MTV) consists of 13 universities and 14 national laboratories working together to significantly advance our nation's capabilities to support international treaty verification. The MTV is developing new technologies that detect and deter nuclear proliferation activities and to train the next generation of nuclear professionals. The consortium develops collaborative relationships between MTV faculty and students with our national laboratory partners through student internships, faculty and student pair visits to national labs, national laboratory travel fellowships to MTV universities, class trips to national laboratory spaces, our Nuclear Engineering Summer School, and the MTV Student Virtual Research Symposium.

MTV has recruited 132 students (40 Fellows and 93 Associates) which includes support for 76 Masters and Ph.D. candidates as well as 56 undergraduate students. During the first two quarters (September 2019 – March 2020), the MTV project has generated 25 peer reviewed journal publications, provided 21 invited talks by MTV researchers, hosted 18 seminars by invited guests, presented 42 conference presentations by MTV students and faculty, and created or enhanced 15 university courses with MTV research.

Research teams have demonstrated significant progress in each of our major thrust areas. In Thrust Area 1, "Fundamentals of Nuclear and Particle Physics", we measured and quantified neutron and gamma-ray correlations from the spontaneous fission of Cf-252 and deployed the NuLat compact antineutrino detector. In Thrust Area 2, "Signals and Source Terms for Nuclear Nonproliferation", we identified unique forensic signatures for a variety of reactor classes with unique burnup and predictors and demonstrated laser-based characterization of moss samples treated with copper sulfate. In Thrust Area 3, "Nuclear Explosion Monitoring", we detected the infrasound signature from the Falcon 9 rapid scheduled disassembly using smartphone sensors and developed an organic glass fabrication facility to cast beta cells for radionuclide detection. In each of these research projects, student researchers contributed significantly to the research results. In the MTV Virtual Student Research Symposium xx students at varying stages of their degree programs will present research results to a broad audience consisting of academics, national laboratory scientists, industry collaborators, and government stakeholders.