



The National Quantum Initiative Act (NQIA) was signed in December 2018 to ensure that the United States developed technology applications to maintain a leadership role in quantum information science (QIS). QIS is imperative to economic and national security, commerce, and technology. In fact, in 2021, the Department of Defense requested funding for cyber security in excess of \$9.85 billion. Our future workforce, current K-12 students, must have an understanding of QIS, yet the principles of quantum mechanics are generally not taught to students unless they are physics majors. Development of a “quantum smart” workforce needs to begin before college, but most K-12 educators are not prepared to teach QIS principles and applications because they were not physics majors. Research showed that secondary teachers could not explain the photoelectric effect in depth, yet the photoelectric effect is considered to be one of the foundations for quantum mechanics. Since most students will not major in physics, it is vital to expose K-12 students to quantum concepts that surround them everyday such as credit card security, phones, computers, and basic technology. This project, *Quantum for All Students (QAS)*, will provide opportunities for students and teachers to learn about quantum.

The targeted audience includes secondary STEM educators and students, specifically high school students in grades 9-12. The focus of QAS is to increase STEM and ICT career awareness by providing opportunities for teachers and students to learn about how STEM content disciplines can fully integrate technology and engineering.

Project components include:

- 1) Professional development for STEM teachers to learn about quantum effects and effective curricular connections appropriate for high school students. Due to COVID, the 2021 workshop will be virtual, 2022 will be F2F, and 2023 will be F2F local student camps. Teachers will co-teach student camps in Year 2 and then provide local camps in year 3.
- 2) Student camps are to be led by educators who successfully completed the workshops and will be held locally in order to provide opportunities for under represented groups.

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