

**Quantum Technician Workforce Development – Quantum Learning Lab**

As part of the Elevate Quantum Technology Hub, the Quantum Learning Lab, an effort jointly led by Sandia National Labs and Central New Mexico Community College, will provide a workforce development facility to technician and engineers to support the growing Quantum Information Science and Technology (QIST) needs, as well as provide a location to scale existing programs, such as the K-12 QCaMP.

The QuLL will initially contain three training platforms:

* A Magneto Optical Trap that will teach the technical components and targeted concepts required for quantum sensing, communication, and computing with atomic systems.
* Ultrahigh vacuum (10^-9 Torr) utilized in most atomic-based quantum applications, as well as many other qubit technologies. This also has significant application to workforce training in adjacent industries (e.g., semiconductor)
* Absorption spectroscopy utilized in any atomic-based quantum application requiring laser addressing to tune the laser to the appropriate wavelength. Again, applicable workforce training for any industries that utilize lasers.

**Theory, Operation, and Maintenance**

Quantum technicians will be required to understand not only a basic theory of QIST, but also knowledge of the science behind ultrahigh vacuum systems, optics/lasers/detectors, and associated electronics. They will need to be proficient in the setup and operation of quantum information and computing systems. Most importantly, the technicians will need to have in-depth knowledge and hands-on experience in the maintenance of all the hardware systems. This will include not only routine or scheduled maintenance, but also advance troubleshooting skills using model-based problem-solving techniques.

To facilitate both theory, operations, and maintenance training, the QuLL will contain 1) a classroom area, 2) the three initial experimental setups in good working order, and 3) versions of the three experimental setups to be used for maintenance and advanced troubleshooting.

**Expansion to other Academic Institutions**

The workforce training curriculum will be developed and piloted at Central New Mexico Community College. It will be created in a way that it will allow other institutions within the Elevate Quantum regions, such as Fort Lewis College and Front Range Community College, will be able to replicate the training lab and fully utilize the curriculum.

Additionally, new employees to the QIST research groups at SNL and AFRL, as well as students from the Center for Quantum Information and Control at the University of New Mexico, could utilize the QuLL in order to get hands-on experience to supplement their theoretical coursework.

**Industry Adjacencies**

In order to fully utilize the capacity and better meet the overall high technology workforce training needs of the region, the QuLL will be also used to train technicians with skills that are common to adjacent industries (e.g., semiconductor manufacturing). There are a variety of companies that utilize high and ultrahigh vacuum system, laser and laser alignment, and spectroscopy system on their manufacturing lines. In addition to the specific technical competencies, high tech companies require the type of advanced troubleshooting and problem-solving skills that will be taught in the workforce development program. Companies with a regional presence that hire maintenance and engineering technicians with the skills that will be taught in the QuLL workforce development program include: Intel Corporation (NM), 3D Glass Systems (NM), Insight Global (CO), and Advanced Energy (CO). Additionally, these technicians would have the skills required by non-QIST jobs at the various national labs (NREL, SNL, LANL) and NIST.

**Potential Sources of Matching**

* QuLL lab (approximately 1000 sqft) at current CNM FUSE Makerspace ($75k over 3 years)
* CNM FUSE Makerspace permanent building on Main Campus (open in 2027)
  + CNM will be building a 25,000 sqft facility directly north of Isotope Park in CNM’s Main Campus. This facility will be costing CNM an estimated $33M.
  + The QuLL will be permanently moved to this new facility with approximately 1250 sq ft lab space (5% of the total building or $1.65M)
* Equipment Donations (SNL, AFRL, Quantinuum, etc).
* Senator Ben Ray Lujan, Jr. Appropriation ($861k)

