CLACKAMAS COUNTY

PUBLIC & GOVERNMENT AFFAIRS
PUBLIC SERVICES BUILDING
2051 KAEN ROAD | OREGON CITY, OR 97045

TO: Board of County Commissioners
FROM: Public and Government Affairs
SUBJECT: Oregon Institute of Technology Quantum Computing Earmark Request
DATE: February 27, 2024

REQUEST: PGA is seeking Board direction on sending a letter of support for the Oregon Institute of Technology's Congressionally Directed Spending (CDS, also known as earmarks) request for a quantum computing initiative.

BACKGROUND: The Oregon Institute of Technology (OIT) is proposing a new quantum computing research and education program. They are requesting $1.4 million in federal appropriations to purchase equipment and begin a program at both their Wilsonville and Klamath Falls campuses. The program would support local higher education and help build a workforce pipeline for advanced computer and quantum technology fields.

OIT will be submitting this earmark request through Representative Andrea Salinas' office to the Commerce-Justice-Science appropriations bill. This request does not directly compete with County earmark requests, both in terms of funding sources and sponsoring Congressional office.

ATTACHMENTS: Draft Letter of Support – February 27, 2024
OIT Quantum Computing CDS Proposal

CLACKAMAS COUNTY

BOARD OF COUNTY COMMISSIONERS
PUBLIC SERVICES BUILDING
2051 KAEN ROAD | OREGON CITY, OR 97045

Rep. Andrea Salinas, OR-6
109 Cannon House Office Building
Washington, DC 20515

February DRAFT, 2024

Dear Representative Salinas,

Clackamas County supports the Oregon Institute of Technology's funding request for a quantum devices and computing initiative through the FY2025 Commerce-Justice-Science Appropriations Act. This proposal aligns with Clackamas County's economic development and workforce priorities and our shared interest in expanding domestic research and production in the high-tech sector.

The requested equipment would support a research and education program that offers cutting-edge capabilities in quantum devices, quantum mechanics, quantum artificial intelligence (AI), and advanced quantum computing.

High-tech, software, and media companies are a key economic cluster in Clackamas County. These companies need highly-skilled, trained workers but are facing a shortage of qualified workers. Oregon Tech would address this critical workforce need by educating and training at least 200 graduates annually through a rigorous program that would include applied science and hands-on skill building.

By fostering a workforce well-versed in the theoretical and practical aspects of quantum technologies, Oregon Tech will play a pivotal role in advancing the field and ensuring that graduates are equipped with the necessary skills and knowledge to contribute effectively to the rapidly evolving landscape of quantum science. Quantum technology is a promising and transformative technology, and I am proud that Oregon Tech is a recognized leader in this field. This is an exciting opportunity for Oregon and Clackamas County's growing high-tech economy.

Sincerely,

DRAFT
Tootie Smith, Chair
On Behalf of the Clackamas County Board of Commissioners

Quantum devices and computing initiative at Oregon Institute of Technology

Description: Funding is requested for a quantum device and computing initiative at the Oregon Institute of Technology (Oregon Tech). This proposed initiative to be deployed at the Portland-Metro and Klamath Falls campuses of Oregon Tech (OT) will involve the development of leading-edge capabilities in research, education, and training in the intersection of quantum devices, quantum mechanics and quantum artificial intelligence (AI) and advanced quantum computing (Figure 1). In terms of its scope and impact on undergraduate and graduate training and curriculum and workforce development through certificate programs, the proposed project is unique with, to the best of our knowledge, no comparable initiatives elsewhere.

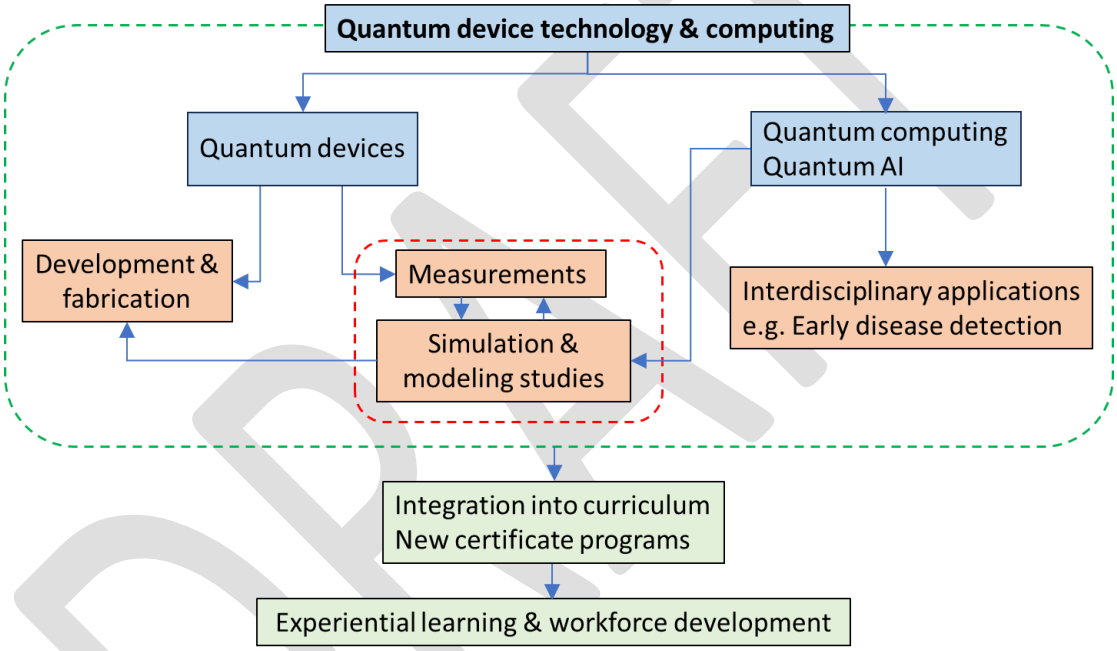

Figure 1: *Schematic representation of proposed quantum initiative at OIT.*

Research component: This initiative will involve the development of quantum devices such as single photon detectors and other quantum optical structures. The development of such devices will require the fabrication of device structures in the nano-meter scale dimensions. This fabrication will be primarily enabled by an electron beam lithography system, which we propose to acquire through this funding. The developed devices will be tested by using quantum optics measurement instrumentation, that will be acquired through this funding. Simulation/modeling/theoretical studies will also be done on these devices using the quantum computing software and equipment, which we propose to acquire through this initiative. These modeling/simulation studies will help understand differences between experiment and theory and inform further development of optimal device structures. We will also explore the potential integration of quantum AI (software to be acquired through this funding) in the simulation of quantum devices, which can in

principal lead to optimum device structures capable of high performance. In addition to quantum devices, a major focus will be on deploying quantum computing and quantum AI approaches to other applications. To illustrate, we plan to explore the use of quantum computing and AI in conjunction with deep learning approaches in the early detection of diseases such as cancer. A detailed budget with an itemized list of all the proposed instrumentation is included.

Educational & training component: All these proposed research studies will provide hands-on experience to many undergraduate and graduate students at OT. Additionally, this initiative will be used to incorporate quantum technologies into existing undergraduate and graduate curriculum at the Portland-Metro and Klamath Falls campuses of OT. The proposed curriculum initiatives will bridge the gap between theory and practice and provide students with access to quantum device fabrication and computing hardware, advanced simulation platforms, and a variety of quantum sensors and measurement devices. This environment will enable students to conduct basic to advanced experiments, particularly in the field of quantum AI, and pave the way for breakthroughs in computation, communication, and sensing. An illustrative example of our planned integration of research into curriculum is the incorporation of single photon quantum device measurements instrumentation into undergraduate curricula. Consequently, students will gain hands-on experience in fundamental quantum experiments, crucial for understanding the principles underlying all quantum technologies. The measurement instrumentation will facilitate not only a deeper comprehension of quantum mechanics through direct experimentation but also provide practical skills in quantum computing, specifically through the implementation of the Deutsch algorithm.

This initiative will also include the development and deployment of undergraduate level certificate courses on quantum technology and computing with flexible online options. This is expected to contribute to a skilled workforce in the quantum technology areas.

Anticipated impact: The proposed project is interdisciplinary combining electrical engineering, physics and computer science, impacting about 200 undergraduate and graduate students annually at OT and elsewhere through associated curriculum, hands-on experiences and certificate programs with online options. A broader impact will be from addressing the unmet workforce needs of quantum technology industry in the Portland area and elsewhere in Oregon. This interdisciplinary approach, combining physics, engineering, and computer science, will enable students to engage in research and apply their knowledge in real-world quantum technology scenarios. By fostering a workforce well-versed in the theoretical and practical aspects of quantum technologies, this educational strategy will play a pivotal role in advancing the field and ensuring that graduates are equipped with the necessary skills and knowledge to contribute effectively to the rapidly evolving landscape of quantum science.