

Northwestern Quantum Week Quantum Innovation Symposium

April 22, 2026 | Northwestern University

Inder Monga

Inder Monga is the Director of Berkeley Lab's Scientific Networking Division and Executive Director of Energy Sciences Network (ESnet), the Department of Energy's sole high-performance networking user facility and its data circulatory system. ESnet connects and provides services to more than 50 DOE research sites, including national laboratories, supercomputing facilities and scientific instruments, and peers with 270+ research and commercial networks worldwide. Inder is also the Deputy Project Lead for the American Science Cloud project for the Genesis Mission, principal investigator for the Quantum Application Network Testbed for Novel Entanglement Technology (QUANT-NET) project, and co-PI of the National Science Foundation's FABRIC testbed. The holder of 25 patents, he received a B.S. in electrical/electronics engineering from the Indian Institute of Technology, a master's in computer engineering from Boston University, and is completing his Ph.D. in computer science at the University of Amsterdam.

From Links to Logic: Building a Distributed Quantum Computing Testbed

Abstract: As quantum processors approach the projected limits of monolithic scaling, the architectural path toward fault-tolerant, large-scale systems increasingly points toward modular, Distributed Quantum Computing (DQC) frameworks. However, bridging the gap between localized quantum coherence and field-deployed entanglement remains a formidable systems-engineering challenge.

In this talk, we detail the development and deployment of the QUANT-NET testbed, a multi-node research infrastructure that integrates trapped-ion processors with telecom-compatible entanglement substrates over fiber. We focus on our two-level control design, which provides a critical abstraction layer between low-level hardware pulses and high-level entangled links. This dual-control approach allows for the dynamic orchestration of quantum resources via an open-source protocol stack, effectively shielding the application layer from the quantum physical-layer complexities.

We conclude by discussing how this "lab-to-field" framework informs our current research trajectory toward heterogeneous qubit integration. By exploring the inclusion of neutral-atom arrays and ensemble-based interfaces, we aim to define the interoperability requirements and control architectures necessary for a unified, heterogeneous quantum network.