# Faisal Shah Khan

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## Profile

Mathematical scientist working in quantum computing and quantum information. Research focuses on quantum correlations in protocols, security, and memory-limited systems, with connections to AI and financial modeling. Teaching spans undergraduate mathematics, research supervision, and courses in quantitative methods and finance.

## Academic Appointments

- **SKEMA Business School (Raleigh, NC)** Aug 2021–present
  Adjunct Professor. Courses include AI and data science (consulting methods, business intelligence, deep learning), international finance, and statistics for business decisions. Faculty adviser to the Data Science & Quantum AI student club.
- **Khalifa University (Abu Dhabi, UAE)** Jan 2010–Jun 2020
  Assistant Professor of Mathematics; later PI, Center on Cyber-Physical Systems (C2PS). Founding faculty member of the Department of Mathematics; co-developed and launched the B.Sc. in Mathematics (Statistics and Mathematical Finance tracks); supervised undergraduate and graduate research; led internally funded quantum computing research, including early work in quantum annealing.
- **University of Portland (Portland, OR)** Jun 2007–Dec 2009
  Adjunct Assistant Professor. Taught undergraduate mathematics and statistics to business, mathematics, and engineering majors.

## Education

**Ph.D.**, Mathematical Sciences, Portland State University, 2009.

**M.S.**, Mathematics, Portland State University, 2003.

**B.S**., Mathematics, Santa Clara University, 1997.

## Research and Consulting Appointments

- **RETHINC Labs, Kenan Institute of Private Enterprise, UNC (Chapel Hill, NC)** 2024–present
  Research Fellow. Investigating data-driven and computational methods for decision systems in finance and operations. Collaborate on interdisciplinary projects at the intersection of business analytics and applied mathematics; mentor student researchers in quantitative modeling.

- **DP World (Dubai, UAE; remote)** 2021–2022
  Senior Project Consultant. Developed operations research models for container yard optimization and supervised engineers implementing quantum algorithms (D-Wave). Work bridged applied mathematics, logistics, and computational optimization.

## Selected Publications

- *When Recall Fails, Discord Remembers: A Quantum Analogue of Kuhn's Theorem*, Quantum Economics and Finance, 2(2), 141-147, 2025.
- *Quantum Advantage in Trading: A Game-Theoretic Approach*, (with N.M. Linke et al.), Quantum Economics and Finance, 2(1), 40-51, 2025.
- *Calculating Nash equilibrium on quantum annealers* (with O. Okrut et al.), to appear in *Annals of Operations Research*, 2024.
- *Hybrid-quantum approach for the optimal lockdown* (with S. Zaman et al.), *IET Quantum Communication*, 2023.
- *Quantum information technology and innovation* (with D. La Torre), *Technology Analysis & Strategic Management*, 2021.
- *Quantum prisoner's dilemma and high-frequency trading on the quantum cloud* (with N. Bao), *Frontiers in AI*, 2021.
- *Partitions of correlated n-qubit systems* (with S.J.D. Phoenix and B. Teklu), *Quantum Information Processing*, 2021.

*Full publication list available on Google Scholar.*

## Books

- **Editor**, *Artificial Intelligence and Beyond for Finance*, World Scientific, 2024. A contributed volume exploring the intersection of artificial intelligence, quantum computing, and financial strategy.
- **Editor**, *Unlocking Quantum Information Technology: Opportunities for Business and Management*, World Scientific, 2024. A cross-disciplinary volume focused on quantum information systems with applications in business and enterprise.
- **Author**, *The Little Book of Games: Examples and Insights for Everyone*, Independently published, December 2024. A creative and accessible introduction to game theory using puzzles and applied reasoning.

## Research Grants

- **Collaborator**, QLab–IonQ Access Program (University of Maryland), *Research access to IonQ hardware and simulation credits*, 2025–present.

- **Principal Investigator**, C2PS (Khalifa University), *Enhancing the Cyber-Physical System with Quantum*, 2018–2022.
- **Investigator**, Khalifa University Level 2 Internal Research Award, *Towards a Quantum-Safe Security Infrastructure in the UAE*, 2016–2018.
- **Senior Researcher**, STINT (Sweden), *Gaming the Quantum for Constrained Optimization*, 2014–2015.

## Selected Talks and Presentations

- *When memory fails, quantum discord remembers*, Contributing Speaker, Annual Quantum Symposium, NC State University, May 2025.
- *Quantum advantage in trading: A game-theoretic approach*, Contributing Speaker, Quantum Applications in Economics and Finance, Penn Initiative for the Study of Markets, University of Pennsylvania, Apr 2025.
- *Is there a world market for five quantum computers, or will they be as common as flying cars?*, Invited Speaker and Panelist, National Academy of Sciences, 9th Arab–American Frontiers Symposium, Doha, Oct 2023.
- *Nash equilibrium as a quadratic optimization problem for quantum annealers*, MOP/GP, Dec 2021.
- *Information geometries and fault-tolerant qubits*, IEEE Quantum Week, 2020.

## Editorial and Professional Service

- **Guest Editor**, Special Issue on *Quantum Innovation and Technology Management*, *Technology Analysis & Strategic Management*, 2021.
- **Associate Editor**, *Quantum Information Processing*, 2020–2021.
- **Organizer/Program Committee**, IEEE Quantum Week (2020–2021); QTOP'19; SIAM Minisymposia (2020).

## Outreach and Engagement

- **Founder and author**, *QuantumSheikh.org* — Blog sharing accessible insights on quantum information, game theory, their interface, and applications in finance
- **Media features:** *PHYS.ORG*; *WIRED Middle East*; *Digitale Welt Magazine*; *Deep Tech Dive #2.*

## Professional Affiliations

- North Carolina Coalition for Global Competitiveness, Member (2023–present).
- Technology Adviser, Quantum Computing Inc., 2020–2021.