

Anupama Unnikrishnan

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Education

University of Oxford

DPhil (PhD) Physics, Quantum Information and Cryptography • 2015 - 2019

Thesis: Enforcing trust in quantum networks

Supervisors: Vlatko Vedral, Damian Markham

Collaboration: Laboratoire d'Informatique de Paris 6, Sorbonne Université

University of Leeds

MPhys + BSc Physics (International), 1st Class (Hons) • 2011 - 2015

Year abroad: University of California, Santa Cruz

Research Experience

Verification of graph states

University of Oxford, Sorbonne Université • 2018 - 2020

Developed protocol for verification of any graph state in a network

Proved security of protocol in presence of any number of dishonest parties

Anonymous quantum communication

University of Oxford, Sorbonne Université • 2017 - 2018

Developed protocol for verified anonymous quantum transmission

Proved security of protocol in realistic networks with any number of dishonest parties

Authenticated quantum communication

University of Oxford, Sorbonne Université • 2016 - 2018

Developed experimentally feasible protocols for authenticated transfer of quantum messages

Proved security of protocol despite untrusted devices using semidefinite programming methods

Classical post-processing of quantum key distribution

University of Leeds · 2014 - 2015

Examined security of classical post-processing algorithms for quantum key distribution

Computationally implemented combination of Advantage Distillation and Cascade
Demonstrated successful hacking by eavesdropper

Computational simulation of fluids

University of California, Los Angeles · 2014

Applied mathematics research for Walt Disney Animation Studios

Investigated efficient method for computational simulation of fluids by domain decomposition

Detection of exoplanets

University of California, Santa Cruz · 2014

Astrophysics research on detecting extra-solar planets

Analysed data from NASA Kepler telescope using transit method to find planetary candidates

Searching for dark matter candidates

University of Münster, Germany · 2013

Theoretical particle physics research on dark matter

Implemented efficient scanning of large parameter-space for dark matter candidates using computational methods and Monte-Carlo Markov chains

Other Experience ---

Recurse Center

New York City, USA · 2020

Self-directed programming projects in AI, machine learning, data analysis, web development, etc.

Built maze solver using reinforcement learning, minimax-based game AI, NLP movie plot generator, neural network from scratch, Lisp interpreter, Scrabble AI, hike recommendation web app, among other projects

Took courses and studied algorithms, machine learning, game theory, programming languages

Publications

Anonymity for practical quantum networks

A. Unnikrishnan, I. J. MacFarlane, R. Yi, E. Diamanti, D. Markham, I. Kerenidis
Physical Review Letters 122, 240501 (2019)

Authenticated teleportation with one-sided trust

A. Unnikrishnan, D. Markham
Physical Review A 100, 032314 (2019)

Authenticated teleportation and verification in a noisy network

A. Unnikrishnan, D. Markham
arXiv:1911.0700 (2019)

Verification of graph states in an untrusted network

A. Unnikrishnan, D. Markham
arXiv:2007.13126 (2020)

Conference Talks

Enthusiasticon • *Remote* (2020)

Edinburgh-Paris Quantum Workshop • *Edinburgh, Scotland* (2019)

Conference on Quantum Information and Quantum Control • *Toronto, Canada* (2019)

Quantum Internet Alliance Consortium Meeting • *Lisbon, Portugal* (2019)

Conference of the European Flagship for Quantum Technologies • *Grenoble, France* (2019)

Conference on Quantum Structures and Quantum Information Theory • *Cagliari, Italy* (2018)

Workshop at the Centre for Quantum Technologies • *Singapore* (2016)

Awards

EPSRC PhD Studentship • 2015 - 2019

Trinity College Graduate Prize, University of Oxford • 2016

Brotherton Science Scholarship • 2011 - 2014

Best Second Year Student Prize, University of Leeds • 2013

Scriven Bolton Prize in Astronomy, University of Leeds • 2012

Programming Experience

Languages

Python, C++ , C, Matlab, Javascript, Scheme, Mathematica, HTML, CSS, Bash

Libraries and Frameworks

NumPy, Pandas, Matplotlib, TensorFlow, Keras, Scikit-learn, Textgenrnn, Flask, D3.js, BeautifulSoup, Multiprocessing

Leadership Positions

Oxford Women in Physics Society • *Events Coordinator* • 2017 - 2018

Trinity College, University of Oxford • *Social Secretary* • 2016 - 2017

Department of Physics, University of Leeds • *Peer Mentor* • 2012 - 2013

Global Community, University of Leeds • *Intercultural Ambassador* • 2012 - 2013