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, under review at Physical Review A (2020)

Verification of graph states in an untrusted network
A. Unnikrishnan, D. Markham
arXiv:2007.13126, under review at Physical Review Letters (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

References

Dr. Damian Markham
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Prof. Vlatko Vedral
University of Oxford, National University of Singapore
vlatko.vedral@physics.ox.ac.uk

Prof. Elham Kashefi
University of Edinburgh, LIP6 Sorbonne Université
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Dr. Iordanis Kerenidis
IRIF Université Paris Diderot
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Dr. Eleni Diamanti
LIP6 Sorbonne Université
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