Narayanan Rengaswamy

May 15, 2024

Assistant Professor (Tenure-Track)
Department of Electrical and Computer Engineering
The University of Arizona, Tucson, AZ, USA
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PROFESSIONAL EXPERIENCE

Assistant Professor (Tenure-Track), Aug. 2022 – Present
Department of Electrical and Computer Engineering, The University of Arizona, Tucson, AZ, USA

Postdoctoral Research Associate, Sep. 2020 – Aug. 2022
Department of Electrical and Computer Engineering, The University of Arizona, Tucson, AZ, USA

Research Associate, Jun. 2020 – Sep. 2020
Department of Electrical and Computer Engineering, Duke University, Durham, NC, USA

Graduate Research Intern, Jun. 2015 – Aug. 2015
Alcatel-Lucent Bell Labs, Stuttgart, Germany

Undergraduate Summer Intern, Jun. 2012 – Jul. 2012
Ericsson India Global Services Private Limited, Chennai, India

EDUCATION

Ph.D. in Electrical Engineering, Jan. 2016 – May 2020   *Cumulative GPA: 3.912/4*
Duke University, Durham, NC, USA

Dissertation: Classical Coding Approaches to Quantum Applications
            (https://www.youtube.com/watch?v=cvAcaujp7Wo)
Advisors: Prof. Henry D. Pfister and Prof. Robert Calderbank

M.S. in Electrical Engineering, Aug. 2013 – Dec. 2015   *Cumulative GPA: 3.875/4*
Texas A&M University, College Station, TX, USA

Thesis: On Cyclic Polar Codes and the Burst Erasure Performance of Spatially-Coupled
      LDPC Codes
Advisors: Prof. Henry D. Pfister and Prof. Krishna R. Narayanan

B.Tech. in Electronics and Communication Engineering, Jun. 2009 – May 2013   *Cumulative GPA: 9.70/10*
Amrita University, Coimbatore, Tamilnadu, India

Project: Wireless Electrocardiogram Monitoring for Cardiac Patients on Android Platform
Advisor: Prof. E. P. Sumesh

HONORS and ACHIEVEMENTS

Long-Term Visitor, Simons Institute for the Theory of Computing   2024
– Participated in the following Spring 2024 programs of this prestigious institute:
   "Error-Correcting Codes: Theory and Practice" and "Quantum Algorithms, Complexity, and Fault Tolerance"

National Level Finalist, NSF-ERC Perfect Pitch Competition   2022
– Represented our Center for Quantum Networks (CQN) after winning the internal competition

– Recording of my Perfect Pitch in the national finals: `https://youtu.be/75YHhf0p5L8?t=1947`

Talk at Quantum Information Processing (QIP) Conference 2020
– Our paper "On Optimality of CSS Codes for Transversal T" was one of the 73 out of 283
submissions that were accepted as talks in the esteemed QIP (2020) conference;
Talk: `https://www.koushare.com/video/videoPreview/2001.0289`

DAAD RISE Professional Scholarship 2015
– One of the 34 scholarship recipients selected by the committee, among all the 184 applicants
– Funded 3-month summer research internship in Alcatel-Lucent Bell Labs, Stuttgart, Germany

Top Rank in Undergraduate Studies 2013
– Ranked first in the college, third in the university (among 3 engineering campuses)

Ericsson Excel Certification in Telecommunications 2012
– Attended leading Ericsson researcher's lectures, passed exam and completed an internship

Central Board of Secondary Education (CBSE) Merit Scholarship 2010-11, 2011-12

Amrita TIDE Best Innovation Award 2011 – 2012
– As a team, developed an Integrated Village Development System; created a web portal for a
job classifieds system
– Used Software Defined Radio (SDR) to demonstrate connectivity between places, with only
partial internet dependence

FUNDING

Research, Innovation & Impact (RII) George H. Davis Travel Fellowship 2024
– PI, *Fault-Tolerant Quantum Technologies Workshop, Benasque, Spain*
– Total Budget: $2,500

United States Army Research Office Grant No. W911NF2410080 2024 – 2026
– Co-PI, *Quantum Bayesian Estimation and Applications to Magnetometry*
– Total Budget: $1,400,000

NSF-ERC Center for Quantum Networks (CQN) Grant No. 1941583 2022 – 2025
– The goal of this Generation-4 Engineering Research Center is to lay the foundations of the
quantum internet and demonstrate high-speed quantum networking through quantum repeaters
– Co-PI, developing quantum error correction schemes for quantum repeaters
– Total Budget: $26,000,000

National Science Foundation (NSF) Grant No. 2106189 2022 – 2025
– Co-PI, *CIF: Medium: QODED: Quantum codes Optimized for the Dynamics between
Encoded Computation and Decoding using Classical Coding Techniques*
– Total Budget: $699,076

National Science Foundation (NSF) Grant No. 1908730 2019 – 2023
– Ph.D. student, major contribution to the proposal, *FET: Small: Improving Quantum Computing
and Classical Communication using Discrete Sets of Unitary Matrices*
– Total Budget: $476,456

TEACHING

Instructor, **ECE 455/555: Introduction to Quantum Mechanics and
Quantum Information Processing** Spring 2024

Instructor, **Error Correction for Quantum Networks, CQN Winter School** Jan. 2024

Co-Instructor, **Classical and Quantum Error Correction, CQN Winter School**	Jan. 2023
Instructor, **ECE 340A: Introduction to Communications**	Fall 2022, 2023
Lectures on Quantum Error Correction for **ECE 635: Error Correction Coding**	Spring 2021
Teaching Assistant, **ECE 590-09: Error Correcting Codes**	Fall 2017
Teaching Assistant, **ECE 485: Digital Audio Processing**	Spring 2017
Teaching Assistant, **ECE 403/404: Capstone (Senior) Design**	Spring, Fall 2015
Student Lectures, **Channel Coding**	Fall 2015

Several other one-off lectures, informal presentations, tutorial-type talks, and one-on-one teaching sessions at all institutions

SERVICE

Member, IEEE and IEEE Information Theory Society (ITSoc), since May 2020

Executive Committee, since Fall 2023, ECE Department
Graduate Recruitment and Awards Committee (GRAC), since Fall 2022, ECE Department
Hiring Committee, Fall 2022, ECE Department Faculty Position in Quantum Information Science

Organizer of Conferences and Workshops:

2024:
    Program Chair, Quantum Information Knowledge (QuIK) Workshop,
            International Symposium on Information Theory (ISIT 2024)
    TPC Member, QCom(p) Workshop: Workshop on Quantum Communication and Computing,
            16th International Conference on COMmunication Systems & NETworkS (COMSNETS 2024)
2023:
    TPC Member, 10th International Conference on Nanoscale Computing and Communication (ACM NanoCom)
    TPC Member, IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS 2023)
    Co-organizer, two special sessions on quantum codes in International Symposium on Topics in Coding (ISTC)
2022:
    Posters Program Committee, IEEE International Conference on Quantum Computing and Engineering (QCE)
    Organizing Committee, NSF-ERC Center for Quantum Networks (CQN) Summer Retreat Workshop

Reviewer for Grant Proposals:

2024:
    United States Department of Energy (DOE) BES (EPSCoR: FOA 0003201)
    United States Department of Energy (DOE) ASCR (EXPRESS: FOA 0003300)
2023:
    Natural Sciences and Engineering Research Council (NSERC) of Canada Alliance Quantum Grants

Reviewer for Journals (in **bold**) and Conferences (in *italics*):

    IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences
    Quantum Information Processing
    Physical Review X Quantum
    Designs, Codes and Cryptography
    IEEE BITS the Information Theory Magazine
    Physical Review A
    IEEE Transactions on Quantum Engineering
    IEEE Access
    IEEE Transactions on Communications

Proceedings of the Royal Society A
Quantum Science and Technology
Quantum
IEEE Transactions on Vehicular Technology
IEEE Transactions on Information Theory

2024:
IEEE Information Theory Workshop (ITW)
The Theory of Quantum Computation, Communication and Cryptography (TQC)
QCom(p): Workshop on Quantum Communication and Computing, 16th International Conference on COMmunication Systems & NETworkS (COMSNETS)

2023:
10th International Conference on Nanoscale Computing and Communication (ACM NanoCom)
IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)
International Symposium on Topics in Coding (ISTC)
IEEE International Symposium on Information Theory (ISIT)
The Theory of Quantum Computation, Communication and Cryptography (TQC)

2022:
IEEE Information Theory Workshop (ITW)
IEEE International Symposium on Information Theory (ISIT)

2021:
Quantum Information Processing (QIP)

2020:
IEEE Information Theory Workshop (ITW)
IEEE International Symposium on Information Theory (ISIT)

2018:
IEEE Information Theory Workshop (ITW)
IEEE International Symposium on Information Theory (ISIT)

PATENTS

1. **N. R.**, K. P. Seshadreesan, S. Guha, and H. D. Pfister, "Enhanced signal processing using quantum computation," April 25 2024, US Patent App. 18/273,344.

THESES

2. **N. R.**, "Classical Coding Approaches to Quantum Applications," Ph.D. Dissertation, Duke University, 2020. [Online]. Available: `http://arxiv.org/abs/2004.06834`.

1. **N. R.**, "On Cyclic Polar Codes and the Burst Erasure Performance of Spatially-Coupled LDPC Codes," Master's thesis, Texas A&M University, 2015. [Online]. Available: `http://arxiv.org/abs/2004.06875`.

PEER-REVIEWED JOURNAL PAPERS

15. **N. R.**, N. Raveendran, A. Raina, and B. Vasić, "Entanglement purification with quantum LDPC codes and iterative decoding," *Quantum*, vol. 8, p. 1233, 2024. [Online]. Available: `https://arxiv.org/abs/2210.14143`

14. N. Raveendran, J. Valls, A. K. Pradhan, **N. R.**, F. Garcia-Herrero, and B. Vasić, "Soft syndrome iterative decoding of quantum LDPC codes and hardware architectures," *EPJ Quantum Technology*, vol. 10, no. 1, p. 45, 2023.

13. H. D. Pfister, C. Piveteau, J. M. Renes, and **N. R.**, "Belief propagation for classical and quantum systems: Overview and recent results," *IEEE BITS the Information Theory Magazine*, pp. 1–14, 2023.

12. Y. Ouyang and **N. R.**, "Describing quantum metrology with erasure errors using weight distributions of classical codes," *Phys. Rev. A*, vol. 107, no. 2, p. 022620, 2023. [Online]. Available: `http://arxiv.org/abs/2007.02859`

11. N. Raveendran, **N. R.**, F. Rozpędek, A. Raina, L. Jiang, and B. Vasić, "Finite rate QLDPC-GKP coding scheme that surpasses the CSS Hamming bound," *Quantum*, vol. 6, p. 767, Jul. 2022. [Online]. Available: `https://arxiv.org/abs/2111.07029`

10. S. Brandsen, M. Lian, K. D. Stubbs, **N. R.**, and H. D. Pfister, "Adaptive procedures for discriminating between arbitrary tensor-product quantum states," *Phys. Rev. A*, vol. 106, no. 1, p. 012408, 2022. [Online]. Available: `https://arxiv.org/abs/1912.05087`

9. X. Tan, **N. R.**, and R. Calderbank, "Approximate unitary 3-designs from transvection Markov chains," *Designs, Codes and Cryptography*, pp. 1–24, 2022. [Online]. Available: `https://arxiv.org/abs/2011.00128`

8. J. Hu, Q. Liang, **N. R.**, and R. Calderbank, "Mitigating coherent noise by balancing weight-2 z-stabilizers," *IEEE Transactions on Information Theory*, vol. 68, no. 3, pp. 1795–1808, 2022. [Online]. Available: `https://arxiv.org/abs/2011.00197`

7. **N. R.**, K. P. Seshadreesan, S. Guha, and H. D. Pfister, "Belief propagation with quantum messages for quantum-enhanced classical communications," *npj Quantum Inf.*, vol. 7, no. 1, p. 97, 2021. [Online]. Available: `http://arxiv.org/abs/2003.04356`

6. T. Pllaha, **N. R.**, O. Tirkkonen, and R. Calderbank, "Un-Weyl-ing the Clifford Hierarchy," *Quantum*, vol. 4, p. 370, 2020. [Online]. Available: `http://arxiv.org/abs/2006.14040`

5. **N. R.**, R. Calderbank, M. Newman, and H. D. Pfister, "On optimality of CSS codes for transversal T," *IEEE J. Sel. Areas in Inf. Theory*, vol. 1, no. 2, pp. 499–514, 2020. [Online]. Available: `http://arxiv.org/abs/1910.09333`. Presented at *QIP 2020* as a talk.

4. **N. R.**, R. Calderbank, S. Kadhe, and H. D. Pfister, "Logical Clifford synthesis for stabilizer codes," *IEEE Trans. Quantum Engg.*, vol. 1, 2020. [Online]. Available: `http://arxiv.org/abs/1907.00310`

3. T. Can, **N. R.**, R. Calderbank, and H. D. Pfister, "Kerdock Codes Determine Unitary 2-Designs," *IEEE Trans. Inform. Theory*, vol. 66, no. 10, pp. 6104–6120, 2020. [Online]. Available: `http://arxiv.org/abs/1904.07842`

2. **N. R.**, R. Calderbank, and H. D. Pfister, "Unifying the Clifford hierarchy via symmetric matrices over rings," *Phys. Rev. A*, vol. 100, no. 2, p. 022304, 2019. [Online]. Available: `http://arxiv.org/abs/1902.04022`

1. V. Aref, **N. R.**, and L. Schmalen, "Finite-Length Analysis of Spatially-Coupled Regular LDPC Ensembles on Burst-Erasure Channels," *IEEE Trans. Inform. Theory*, vol. 64, no. 5, pp. 3431 – 3449, 2018. [Online]. Available: `https://arxiv.org/abs/1611.08267`.

PREPRINTS

6. A. Patil, M. Pacenti, B. Vasić, S. Guha, and **N. R.**, "Entanglement routing using quantum error correction for distillation," *arXiv preprint arXiv:2405.00849*, 2024. [Online]. Available: `https://arxiv.org/abs/2405.00849`

5. O. Novak, **N. R.**, "GNarsil: Splitting stabilizers into gauges," *arXiv preprint arXiv:2404.18302*, 2024. [Online]. Available: `https://arxiv.org/abs/2404.18302`

4. Z. Chen, **N. R.**, "Tailoring fault-tolerance to quantum algorithms," *arXiv preprint arXiv:2404.11953*, 2024. [Online]. Available: `https://arxiv.org/abs/2404.1195`

3. **N. R.**, A. Raina, N. Raveendran, and B. Vasić, "Distilling GHZ States using Stabilizer Codes," *arXiv preprint arXiv:2109.06248*, 2021. [Online]. Available: `https://arxiv.org/abs/2109.06248`

2. **N. R.** and H. D. Pfister, "A semiclassical proof of duality between the classical BSC and the quantum PSC," *arXiv preprint arXiv:2103.09225*, 2021. [Online]. Available: `http://arxiv.org/abs/2103.09225`

1. **N. R.**, R. Calderbank, S. Kadhe, and H. D. Pfister, "Synthesis of Logical Clifford Operators via Symplectic Geometry," *arXiv preprint arXiv:1803.06987*, 2018. [Online]. Available: `http://arxiv.org/abs/1803.06987`

PEER-REVIEWED CONFERENCE PAPERS

15. A. Kang, S. Guha, **N. R.**, and K. P. Seshadreesan, "Trapped ion quantum repeaters with entanglement distillation based on quantum LDPC codes," in *2023 IEEE International Conference on Quantum Computing and Engineering (QCE)*, vol. 1. IEEE, 2023, pp. 1165–1171.

14. A. K. Pradhan, N. Raveendran, **N. R.**, X. Xiao, and B. Vasić, "Learning to decode trapping sets in QLDPC codes," in *2023 12th International Symposium on Topics in Coding (ISTC)*. IEEE, 2023, pp. 1–5.

13. **N. R.**, A. Raina, N. Raveendran, and B. Vasić, "GHZ distillation using quantum LDPC codes," in *2023 12th International Symposium on Topics in Coding (ISTC)*. IEEE, 2023, pp. 1–5.

12. N. Raveendran, **N. R.**, A. K. Pradhan, and B. Vasić, "Soft syndrome decoding of quantum LDPC codes for joint correction of data and syndrome errors," in *IEEE International Conference on Quantum Computing and Engineering (QCE)*, Sep. 2022. [Online]. Available: `https://arxiv.org/abs/2205.02341`

11. J. Hu, Q. Liang, **N. R.**, and R. Calderbank, "CSS Codes that are Oblivious to Coherent Noise," in *Proc. IEEE Int. Symp. Inform. Theory*, 2021, pp. 1481–1486.

10. **N. R.** and H. D. Pfister, "On the Duality Between the BSC and Quantum PSC," in *Proc. IEEE Int. Symp. Inform. Theory*, 2021, pp. 2232–2237.

9. **N. R.**, K. P. Seshadreesan, S. Guha, and H. Pfister, "A Belief Propagation-based Quantum Joint-Detection Receiver for Superadditive Optical Communications," in *Conf. Lasers Electro-Optics*, 2021, p. FW3N.8. [Online]. Available: `https://www.osapublishing.org/abstract.cfm?uri=CLEO{_}QELS-2021-FW3N.8`

8. S. Brandsen, M. Lian, K. D. Stubbs, **N. R.**, and H. D. Pfister, "Adaptive procedures for discriminating between arbitrary tensor-product quantum states," in *Proc. IEEE Int. Symp. Inform. Theory*, 2020, pp. 1933–1938. [Online]. Available: `http://arxiv.org/abs/1912.05087`

7. **N. R.**, K. P. Seshadreesan, S. Guha, and H. D. Pfister, "Quantum advantage via qubit belief propagation," in *Proc. IEEE Int. Symp. Inform. Theory*, 2020, pp. 1824–1829. Video: `https://www.youtube.com/watch?v=L38YlINdnq0`

6. **N. R.**, R. Calderbank, M. Newman, and H. D. Pfister, "Classical coding problem from transversal T gates," in *Proc. IEEE Int. Symp. Inform. Theory*, 2020, pp. 1891–1896. [Online]. Available: `http://arxiv.org/abs/2001.04887`. Video: `https://www.youtube.com/watch?v=E7v1k6dWOgQ`

5. T. Can, **N. R.**, R. Calderbank, and H. D. Pfister, "Kerdock Codes Determine Unitary 2-Designs," in *Proc. IEEE Int. Symp. Inform. Theory*, pp. 2908–2912, July 2019.

4. **N. R.**, R. Calderbank, S. Kadhe, and H. D. Pfister, "Synthesis of Logical Clifford Operators via Symplectic Geometry," in *Proc. IEEE Int. Symp. Inform. Theory*, pp. 791–795, June 2018.

3. V. Aref, **N. R.**, and L. Schmalen, "Spatially Coupled LDPC Codes Affected by a Single Random Burst of Erasures," in *Proc. Int. Symp. on Turbo Codes & Iterative Inform. Process.*, pp. 166–170, Sep. 2016. [Online]. Available: `https://arxiv.org/abs/1607.00918`.

2. **N. R.**, L. Schmalen, and V. Aref, "On the Burst Erasure Correctability of Spatially Coupled LDPC Ensembles," in *Proc. IEEE Intl. Zurich Seminar on Commun.*, pp. 155–159, March 2016.

1. **N. R.** and H. D. Pfister, "Cyclic Polar Codes," in *Proc. IEEE Int. Symp. Inform. Theory*, pp. 1287–1291, June 2015.

VISITS, TALKS, POSTERS AND WORKSHOPS

45. **Invited Talk** – "Tailoring Fault-Tolerance to Quantum Algorithms," *QuICS Seminar*, Joint Center for Quantum Information and Computer Science (QuICS), University of Maryland, College Park, MD, May 2, 2024.

44. **Invited Talk** – "Quantum Error Correction for Fault-Tolerant Quantum Systems," *Mathematical Physics and Probability Seminar*, Department of Mathematics, University of Arizona, Tucson, AZ, April 17, 2024.

43. **Invited Talk** – "Algebraic Coding Problems from Quantum Fault Tolerance," *Application-Driven Coding Theory Workshop*, Simons Institute for the Theory of Computing, University of California Berkeley, CA, March 5, 2024. `https://www.youtube.com/watch?v=hhm6vYp5yRc`

42. **Invited Talk** – "Fault Tolerant Quantum Computing with Quantum LDPC Codes," *Information Theory and Applications (ITA) Workshop*, Bahia Resort, San Diego, CA, February 19, 2024.

41. Lightning Talk – "Tailoring QEC Codes for Target Algorithms," *Advances in Quantum Coding Theory Workshop*, Simons Institute for the Theory of Computing, University of California Berkeley, CA, February 16, 2024.

40. **Invited Talk** – "Algebraic Codes for Quantum Fault-Tolerance," *Joint Mathematics Meetings*, Moscone North/South Center, San Francisco, CA, January 4, 2024.

39. **Invited Talk** – "Towards Quantum LDPC code-based Networked Quantum Computing," *International Symposium on Topics in Coding (ISTC)*, Oceanopolis, Brest, France, September 5, 2023.

38. **Invited Talk** – "Quantum Error Correction based Entanglement Purification," *Optica Quantum 2.0*, Hyatt Regency Denver at Colorado Convention Center, Denver, CO, June 19, 2023.

37. **Invited Talk** – "Quantum Error Correction is Essential for Scalability," *Arizona Quantum Initiative (AQuI) Inaugural Workshop*, University of Arizona, April 12, 2023. [Online]. Available: `https://aqui.arizona.edu/events/inaugural-workshop`

36. Talk – "Entanglement Purification with Quantum LDPC Codes and Iterative Decoding", *APS March Meeting*, Caesars Forum Convention Center, Las Vegas, Mar. 8, 2023.

35. **Invited Talk** – "Quantum Error Correction for Quantum Computing and Networking", *Arizona Photonics Days*, UA Tech Park, Tucson, Jan. 27, 2023.

34. **Invited Talk** – "Entanglement Purification with Quantum LDPC Codes and Iterative Decoding", *Arizona Quantum Initiative (AQuI) Seminar*, University of Arizona, Dec. 2, 2022.

33. Poster – "Entanglement Purification with Quantum LDPC Codes and Iterative Decoding", *NSF-ERC Site Visit to Center for Quantum Networks (CQN)*, University of Arizona, Oct. 25, 2022.

32. Talk – "Entanglement Purification with Quantum LDPC Codes and Iterative Decoding", *Seminar*, University of Chicago, Oct. 20, 2022.

31. **Invited Talk** – "Error Correction for Quantum Applications", *ECE Departmental Seminar*, University of Arizona, Sep. 8, 2022.

30. Talk – "NSF-ERC Center for Quantum Networks: An Overview", *Joint Meeting with Quantinuum and the United States Air Force Academy*, Denver, CO, Aug. 11, 2022.

29. **Invited Talk** – "Entanglement Purification Protocols from Stabilizer Codes", *QNT Quantum Network Architecture Workshop*, Quantum Network Technologies, July 15, 2022.

28. **Invited Talk** (jointly with Nithin Raveendran) – "Tutorial on Quantum Error Correction and Recent Developments in Quantum LDPC Codes", *Information Theory and Applications (ITA) Workshop*, May 23, 2022.

27. **Invited Talk** (jointly with Nithin Raveendran and Filip Rozpędek) – "Finite Rate QLDPC-GKP Coding Scheme that Surpasses the CSS Hamming Bound", *IBM Quantum Network Colloquium*, Apr. 14, 2022.

26. Talk – "Distilling GHZ States using Stabilizer Codes", *Beyond IID in Information Theory Workshop*, Sep. 27 – Oct. 1, 2021. Video: `https://www.youtube.com/watch?v=Bl8BKnuntTA`

25. Talk – "Distilling GHZ States using Stabilizer Codes", *Quantum Error Correction Meeting*, Duke University, Sep. 16, 2021.

24. **Invited Talk** – "Mitigating Coherent Noise in Quantum Computing using the Classical MacWilliams Identities", *CCSP Seminar*, University of Maryland, Apr. 8, 2021. Video: `https://www.youtube.com/watch?v=PFr6Ux1GMbg`

23. **Invited Talk** – "Error Correction for Quantum Computing and Communications", *Modeling, Computation, Nonlinearity, Randomness and Waves Seminar*, University of Arizona, Apr. 1, 2021. Video: `https://arizona.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=d759cd00-b0c0-4068-bc90-ad08012c18d6`

22. **Invited Talk** – "What is Quantum Computing and How does Quantum Error Correction Work?", *Math/Stat Virtual Tea*, Mount Holyoke College, Sep. 17, 2020. Video: `https://www.youtube.com/watch?v=XmsgxawVceQ`

21. **Invited Talk** – "Quantum Error Correction: Overview and Connections to Classical Coding Theory", *Seminar*, Indian Institute of Technology Hyderabad and International Institute of Information Technology Hyderabad, Jun. 17-18, 2020. Videos: `https://www.youtube.com/watch?v=dAVUA2iiyK0` , `https://www.youtube.com/watch?v=1LysQ_h8pgg`

20. **Ph.D. Defense Talk** – "Classical Coding Approaches to Quantum Applications", *Department of Electrical and Computer Engineering*, Duke University, Mar. 18, 2020. Video: `https://www.youtube.com/watch?v=cvAcaujp7Wo`

19. Talk – "Classical Coding Approaches to Quantum Applications", *Institute for Quantum Information (IQI) Seminar*, California Institute of Technology (Host: Prof. John Preskill), Feb. 11, 2020, and *Quantum Information Seminar*, Google Quantum AI, Venice, CA (Host: Dr. Jarrod McClean), Feb. 12, 2020.

18. **Invited Talk and Poster** – Graduation Day Talk and Poster at the *Information Theory and Applications Workshop (ITA)*, San Diego, USA, Feb. 2-7, 2020.

17. **Contributed Talk** – "On Optimality of CSS Codes for Transversal T", *23rd Annual Conference on Quantum Information Processing (QIP)*, Shenzhen, China, Jan. 7, 2020. Video: `https://www.koushare.com/video/videoPreview/2001.0289`

16. Talk – "On Optimality of CSS Codes for Transversal T", *Institut Quantique Seminar*, Université de Sherbrooke (Host: Prof. David Poulin), Oct. 28, 2019, and *Institute for Quantum Computing (IQC) Seminar*, University of Waterloo (Host: Prof. David Gosset), Nov. 5, 2019.

15. Visit – Prof. Jean-Pierre Tillich, *INRIA Research Center*, Paris, July 22-25, 2019.

14. Talk – "Integer Symmetric Diagonal (ISD) Gates and Codes that Support Physical T Gates", *Quantum Information Seminar*, Technical University of Delft (Host: Prof. Barbara Terhal), July 16, 2019, and University of Sheffield (Host: Prof. Earl Campbell), Aug. 5, 2019.

13. Poster – "Unifying the Clifford Hierarchy via Symmetric Matrices over Rings", *14th Conference on the Theory of Quantum Computation, Communication and Cryptography*, University of Maryland, Jun. 3-7, 2019, and *5th International Conference on Quantum Error Correction*, Senate House, London, July 29 – Aug. 2, 2019.

12. Poster – "Kerdock Codes Determine Unitary 2-Designs", *22nd Annual Conference on Quantum Information Processing*, University of Colorado Boulder, Jan. 14-18, 2019, and *14th Conference on the Theory of Quantum Computation, Communication and Cryptography*, University of Maryland, Jun. 3-7, 2019.

11. Poster – "Symplectic Matrices for Logical Clifford Synthesis and Diagonal Unitaries in the Clifford Hierarchy", *22nd Annual Conference on Quantum Information Processing*, University of Colorado Boulder, Jan. 14-18, 2019.

10. Poster – "Synthesis of Logical Clifford Operators via Symplectic Geometry", *13th Conference on the Theory of Quantum Computation, Communication and Cryptography*, University of Technology Sydney, Jul. 14-20, 2018.

9. Poster – "Synthesis of Logical Operators for Quantum Computers using Stabilizer Codes", *North American School of Information Theory*, Texas A&M University, May 20-23, 2018.

8. Talk – "Synthesis of Logical Operators for Quantum Computers using Stabilizer Codes", *Seminar, Department of Electrical Engineering*, Indian Institute of Technology Madras (Host: Prof. Pradeep Sarvepalli), Apr. 26, 2018.

7. Poster – "Logical Operators for CSS Codes: A Binary Perspective", *Duke IBM Day*, Duke University, Oct. 31, 2017.

6. Workshop – *Beyond I.I.D. in Information Theory*, National University of Singapore, Jul. 24-28, 2017.

5. Poster – "Deterministic Compressed Sensing and Recovery of Large Supports", *North American School of Information Theory*, Georgia Institute of Technology, Jun. 6-9, 2017.

4. Workshop – *Communications, Inference, and Computing in Molecular and Biological Systems*, University of Southern California, Dec. 3-4, 2015.

3. Talk – "The Burst Erasure Correctability of Spatially Coupled LDPC Ensembles", *Information Sciences and Systems Seminar*, Texas A&M University, Nov. 4, 2015.

2. Talk – "Cyclic Polar Codes", *Information Sciences and Systems Symposium*, Texas A&M University, Oct. 19, 2015.

1. Poster – "Cyclic Polar Codes: How to Achieve Higher Rates than Binary Polar Codes at Finite Blocklengths?", *Eighth Annual Winedale Workshop*, Round Top, Texas, Oct. 9, 2015.

REFERENCES

1. **Prof. Hongyi "Michael" Wu**, Department Head of ECE, University of Arizona, `wu.static.arizona.edu/`

2. **Prof. Bane Vasić**, Department of ECE, University of Arizona, `ecl.silicon-studio.com/`

3. **Prof. Liang Jiang**, Pritzker School of Molecular Engineering, University of Chicago, `pme.uchicago.edu/group/jiang-group`

4. **Prof. Saikat Guha**, College of Optical Sciences, University of Arizona, `sites.google.com/site/saikatguha/`