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CURRENT POSITION

Associate Professor, Department of Information Engineering ([IE](#))
Associate Director, Institute of Theoretical Computer Science and Communication ([ITCSC](#))
Programme Director, Mathematics and Information Engineering ([MIE](#))

RESEARCH INTERESTS

Network information theory, discrete optimization, probability, combinatorics

WORK EXPERIENCE

2005-2007 Post-doctoral Researcher, Microsoft Research (Theory Group), Redmond, USA
2007-2013 Assistant Professor, Department of Information Engineering, CUHK, Hong Kong
2013- Associate Professor, Department of Information Engineering, CUHK, Hong Kong

EDUCATION

1995-1999 Nurture Programme in Mathematics, Institute of Mathematical Sciences, Madras, India
1995-1999 B.TECH in Electrical Engineering, Indian Institute of Technology, Madras, India
1999-2002 M.S. in Electrical Engineering, Stanford University, Stanford, USA
2000-2005 PhD in Electrical Engineering, Stanford University, Stanford, USA

HONORS & AWARDS

1994 *First*, Indian National Mathematics Olympiad
1994-1999 National Talent Scholarship, Government of India
1995-1999 *First*, EE dept, I.I.T. Madras
1999 Siemens(India) and Phillips(India) prize for best academic record (EE dept, class of 99)
2000-2004 Stanford Graduate Fellowship
2004-2005 Microsoft Graduate Fellowship

PHD THESIS

Proofs of the Parisi and Coppersmith-Sorkin conjectures in the finite random assignment problem, June 2005, Stanford University.

LIST OF PUBLICATIONS

JOURNAL

- [1] C. Nair, B. Prabhakar, and M. Sharma, “Proofs of the Parisi and Coppersmith-Sorkin random assignment conjectures,” *Random Structures and Algorithms*, vol. 27(4), pp. 413–444, 2005.
- [2] C. Nair and A. El Gamal, “An outer bound to the capacity region of the broadcast channel,” *IEEE Trans. Info. Theory*, vol. IT-53, pp. 350–355, January, 2007.
- [3] C. Nair and A. El Gamal, “The capacity region of a class of three-receiver broadcast channels with degraded message sets,” *Information Theory, IEEE Transactions on*, vol. 55, pp. 4479–4493, Oct. 2009.
- [4] C. Borgs, J. T. Chayes, S. Mertens, and C. Nair, “Proof of the local rem conjecture for number partitioning I: Constant energy scales,” *Random Structures and Algorithms*, vol. 34(2), pp. 217–240, 2009.
- [5] C. Borgs, J. T. Chayes, S. Mertens, and C. Nair, “Proof of the local rem conjecture for number partitioning II: Growing energy scales,” *Random Structures and Algorithms*, vol. 34(2), pp. 241–284, 2009.
- [6] C. Nair, “Capacity regions of two new classes of two-receiver broadcast channels,” *Information Theory, IEEE Transactions on*, vol. 56, pp. 4207–4214, sep. 2010.
- [7] Y. Geng, V. Jog, C. Nair, and Z. V. Wang, “An information inequality and evaluation of marton’s inner bound for binary input broadcast channels,” *IEEE Transactions on Information Theory*, vol. 59, no. 7, pp. 4095–4105, 2013.
- [8] Y. Geng, C. Nair, S. Shamai Shitz, and Z. Wang, “On broadcast channels with binary inputs and symmetric outputs,” *Information Theory, IEEE Transactions on*, vol. 59, no. 11, pp. 6980–6989, 2013.
- [9] C. Nair, “Upper concave envelopes and auxiliary random variables,” *International Journal of Advances in Engineering Sciences and Applied Mathematics*, vol. 5, no. 1, pp. 12–20, 2013.
- [10] Y. Geng, A. Gohari, C. Nair, and Y. Yu, “On marton’s inner bound and its optimality for classes of product broadcast channels,” *Information Theory, IEEE Transactions on*, vol. 60, no. 1, pp. 22–41, 2014.

- [11] Y. Geng and C. Nair, “The capacity region of the two-receiver gaussian vector broadcast channel with private and common messages,” *Information Theory, IEEE Transactions on*, vol. 60, pp. 2087–2104, April 2014.

CONFERENCE PAPERS (INVITED AND UNREFEREED)

- [12] C. Nair, B. Prabhakar, and D. Shah, “The randomness in randomized load balancing,” *Proceedings of the 39th Annual Allerton Conference on Communication, Control and Computing*, pp. 912–921, 2001.
- [13] C. Nair and Z. V. Wang, “On the inner and outer bounds for 2-receiver discrete memoryless broadcast channels,” *Proceedings of the ITA Workshop*, 2008.
- [14] C. Nair, “An achievable rate region for the 2-receiver broadcast channel obtained by viewing it as an interference channel,” in *International Conference on Wireless Communications & Signal Processing*, (Nanjing, P.R. China), 2009.
- [15] V. Jog and C. Nair, “An information inequality for the bssc channel,” *Proceedings of the ITA Workshop*, 2010.
- [16] Y. Geng, A. Gohari, C. Nair, and Y. Yu, “On Marton’s inner bound for two receiver broadcast channels,” *Presented at ITA Workshop*, 2011.
- [17] C. Nair, “A note on outer bounds for broadcast channel,” *Presented at International Zurich Seminar*, 2010.
- [18] M. H. M. Costa and C. Nair, “On the achievable rate sum for symmetric Gaussian interference channels,” *Information Theory and Applications Workshop (ITA)*, 2012.
- [19] V. Anantharam, A. A. Gohari, S. Kamath, and C. Nair, “On hypercontractivity and the mutual information between boolean functions,” in *Allerton*, pp. 13–19, 2013.
- [20] C. Nair, “An extremal inequality related to hypercontractivity of gaussian random variables,” *Information Theory and Applications Workshop*, 2014.
- [21] C. Nair, “Equivalent formulations of hypercontractivity using information measures,” *International Zurich Seminar*, 2014.
- [22] S. Liu, C. Nair, and L. Xia, “An enhanced genie-based outer bound for interference channels,” *Information Theory and Applications Workshop*, 2015.
- [23] M. H. M. Costa and C. Nair, “Gaussian z-interference channel: around the corner,” *Information Theory and Applications Workshop (ITA)*, 2016.

CONFERENCE PAPERS (REFEREED)

- [24] R. Pan, C. Nair, B. Prabhakar, and B. Yang, “Packet dropping schemes: some examples and analysis,” *Proceedings of the 39th Annual Allerton Conference on Communication, Control and Computing*, pp. 563–572, 2001.

- [25] A. El Gamal, C. Nair, B. Prabhakar, E. Uysal, and S. Zahedi, "Energy-efficient scheduling of packet transmissions over wireless networks," *Proceedings of the IEEE Infocom Conference*, vol. 3, pp. 1773–1782, June, 2002.
- [26] C. Nair, "Towards the resolution of Coppersmith-Sorkin conjectures," *Proceedings of the 40th Annual Allerton Conference on Communication, Control and Computing*, pp. 667–673, 2002.
- [27] C. Nair, B. Prabhakar, and M. Sharma, "Proofs of the Parisi and Coppersmith-Sorkin conjectures for the finite random assignment problem," *IEEE Foundations of Computer Science (FOCS)*, pp. 168–178, 2003.
- [28] C. Nair, B. Prabhakar, and M. Sharma, "A new proof of the Parisi's conjecture for the random assignment problem," *International Symposium on Information Theory*, p. 61, 2004.
- [29] C. Nair, E. Ordentlich, and T. Weissman, "Asymptotic filtering and entropy rate of a hidden Markov process in the rare transitions regime," *International Symposium on Information Theory*, pp. 1838–1842, 2005.
- [30] C. Nair and A. El Gamal, "An outer bound to the capacity region of the broadcast channel," *International Symposium on Information Theory*, pp. 2205–2209, 2006.
- [31] M. Bayati and C. Nair, "A rigorous proof of the cavity method for counting matchings," *Proceedings of the 44th Annual Allerton Conference on Communication, Control and Computing*, 2006.
- [32] N. J. A. Harvey, K. Jain, L. C. Lau, C. Nair, and Y. Wu, "Conservative network coding," *Proceedings of the 44th Annual Allerton Conference on Communication, Control and Computing*, 2006.
- [33] N. J. A. Harvey, R. Klienber, C. Nair, and Y. Wu, "A 'chicken & egg' network coding problem," *Proceedings of the International symposium on Information Theory*, 2007.
- [34] M. Bayati, D. Gamarnik, D. Katz, C. Nair, and P. Tetali, "Simple deterministic approximation algorithms for counting matchings," *Proceedings of the Symposium on Theory of Computation(STOC)*, pp. 122–127, 2007.
- [35] C. Nair and A. El Gamal, "The capacity of a class of 3-receiver broadcast channels with degraded message sets," *International Symposium on Information Theory*, pp. 1706–1710, 2008.
- [36] C. Nair and Z. V. Wang, "On the inner and outer bounds of 3-receiver broadcast channels with 2-degraded message sets," *International Symposium on Information Theory*, pp. 1844–1848, 2009.
- [37] C. Nair, "Capacity regions of two new classes of 2-receiver broadcast channels," *International Symposium on Information Theory*, pp. 1839–1843, 2009.

- [38] G. Kramer and C. Nair, “Comments on: Broadcast channels with arbitrarily correlated sources,” *International Symposium on Information Theory*, pp. 2777–2779, 2009.
- [39] Y. Geng, C. Nair, S. Shamai, and Z. V. Wang, “On broadcast channels with binary inputs and symmetric outputs,” *International Symposium on Information Theory*, 2010.
- [40] C. Nair and Z. V. Wang, “The capacity region of a class of broadcast channels with a sequence of less noisy receivers,” *International Symposium on Information Theory*, 2010.
- [41] C. Nair, Z. V. Wang, and Y. Geng, “An information inequality and evaluation of Marton’s inner bound for binary input broadcast channels,” *International Symposium on Information Theory*, 2010.
- [42] Y. Geng, A. Gohari, C. Nair, and Y. Yu, “The capacity region of classes of product broadcast channels,” *International Symposium on Information Theory*, pp. 1549–1553, 2011.
- [43] C. Nair and Z. Wang, “The capacity region of the three receiver less noisy broadcast channel,” *Information Theory, IEEE Transactions on*, vol. 57, pp. 4058–4062, July 2011.
- [44] Y. Geng and C. Nair, “The capacity region of the two-receiver vector gaussian broadcast channel with private and common messages,” in *2012 IEEE International Symposium on Information Theory (ISIT’2012)*, (Cambridge, Massachusetts, USA), pp. 591–595, July 2012.
- [45] A. A. Gohari, C. Nair, and V. Anantharam, “On Marton’s inner bound for broadcast channels,” in *International Symposium on Information Theory*, (Cambridge, Massachusetts, USA), pp. 586–590, July 2012.
- [46] C. Nair and L. Xia, “On Three-Receiver more capable channels,” in *2012 IEEE International Symposium on Information Theory (ISIT’2012)*, (Cambridge, Massachusetts, USA), pp. 383–387, July 2012.
- [47] V. Anantharam, A. A. Gohari, and C. Nair, “Improved cardinality bounds on the auxiliary random variables in Marton’s inner bound,” in *International Symposium on Information Theory*, (Istanbul, Turkey), pp. 1272–1276, July 2013.
- [48] V. Anantharam, A. Gohari, S. Kamath, and C. Nair, “On hypercontractivity and a data processing inequality,” in *2014 IEEE International Symposium on Information Theory (ISIT’2014)*, (Honolulu, USA), pp. 3022–3026, June 2014.
- [49] S. Liu, C. Nair, and L. Xia, “Interference channels with very weak interference,” in *2014 IEEE International Symposium on Information Theory (ISIT’2014)*, (Honolulu, USA), pp. 1031–1035, June 2014.
- [50] S. Kamath and C. Nair, “The strong data processing constant for sums of i.i.d. random variables,” in *Information Theory (ISIT), 2015 IEEE International Symposium on*, pp. 2550–2552, June 2015.

- [51] C. Nair, L. Xia, and M. Yazdanpanah, "Sub-optimality of Han-Kobayashi achievable region for interference channels," in *Information Theory (ISIT), 2015 IEEE International Symposium on*, pp. 2416–2420, June 2015.
- [52] S. Beigi, S. Liu, C. Nair, and M. Yazdanpanah, "Some results on the scalar gaussian interference channel," in *2016 IEEE International Symposium on Information Theory (ISIT'2016)*, (Barcelona, Spain), July 2016.
- [53] S. Beigi and C. Nair, "Equivalent characterization of reverse brascamp-lieb type inequalities using information measures," in *2016 IEEE International Symposium on Information Theory (ISIT'2016)*, (Barcelona, Spain), July 2016.
- [54] C. Nair and Y. N. Wang, "Evaluating hypercontractivity parameters using information measures," in *2016 IEEE International Symposium on Information Theory (ISIT'2016)*, (Barcelona, Spain), July 2016.

UPLOADS TO ARXIV (UNREFEREED)

- [55] C. Nair, "An outer bound for 2-receiver discrete memoryless broadcast channels," *CoRR*, vol. abs/0807.3593, 2008.
- [56] C. Nair, A. El Gamal, and Y.-K. Chia, "An achievability scheme for the compound channel with state noncausally available at the encoder," *CoRR*, vol. abs/1004.3427, 2010.

RECENT TALKS (WORKSHOPS AND UNIVERSITIES)

1. Information Theory and Distributed Communication Workshop, Institut Henri Poincare, February 2016
2. Stanford - Feb 2015, May 2015
3. University of California, Berkeley - February 2015 (Probability Seminar)
4. SP Coding School, Unicamp, Brazil, January 2015
5. Princeton University (William Pierson Field Lecture), October 2014

MISCELLANEOUS

Services to Conferences

- Technical Program Committee
 - International Symposium on Information Theory (ISIT): St. Petersburg - 2011, Boston - 2012, Istanbul - 2013, Hawai - 2014, Hong Kong - 2015, Barcelona - 2016

- List (partial) of conferences for which I have served as reviewer
 - International Symposium on Information Theory (ISIT)
 - Information Theory Workshop (ITW)
 - Foundations of Computer Science (FOCS)
 - Symposium on Theory of Computation (STOC)

Services to Journals

- Associate Editor (Shannon Theory) - IEEE Transactions on Information Theory. Jan 2014-
- List (partial) of journals for which I have served as reviewer
 - IEEE Transactions on Information Theory
 - IEEE Transactions on Networking
 - Random Structures and Algorithms
 - Annals of Applied Probability