List of Publications

Remark: In certain communities it is common that the order in which co-authors appear is related to their contribution and seniority, in others it is common that co-authors appear in alphabetical order. I have added the sign ‘ after the number associated with each paper marking the entries of papers in which co-authors do not appear in alphabetical order.

Updated April 2019.

Peer-Reviewed Journals (published/to appear)


A previous version under the name “Oblivious channels” appeared in IEEE International Symposium on Information Theory (ISIT) 2006, 2739-2743.

Error-correction for Byzantine Adversaries in Networks: A Distributed Network Coding Approach.
IEEE Transactions on Information Theory (special issue on information-theoretic security) 54(6), 2008, 2596 - 2603.
Also appeared in proceedings of 26th Annual IEEE Conference on Computer Communications (INFOCOM), 616-624, 2007; and in 3rd Workshop on Network Coding, Theory, and Applications (NetCod) 2007 (invited talk).

10’. M. Langberg, A. Sprintson and J. Bruck.
Optimal Universal Schedules for Discrete Broadcast.

Analysis of Incomplete Data and an Intrinsic-Dimension Helly Theorem.

12’. M. Langberg, A. Sprintson and J. Bruck.
Network Coding: A Computational Perspective.
Also in 40th Annual Conference on Information Sciences and Systems (CISS) 2006 (invited paper).

Contraction and expansion of convex sets.

Approximating Maximum Subgraphs Without Short Cycles.

Fault-Tolerant Spanners for General Graphs.

Clustering lines: classification of incomplete data.

17. M. Langberg and A. Sprintson.
On the Hardness of Approximating the Network Coding Capacity.

Constant-Weight Gray Codes for Local Rank Modulation.
   f-Sensitivity Distance Oracles and Routing Schemes.
   Also in proceedings of 18th Annual European Symposium on Algorithms (ESA) 2010, 84-96.

   Codes Against Online Adversaries: Large Alphabets.
   Also in proceedings of the Forty-Seventh Annual Allerton Conference on Communication, Control, and Computing, 2009, 1169-1176.

   Upper Bounds on the Capacity of Binary Channels with Causal Adversaries.
   This journal submission merges two conference papers:
   • M. Langberg, S. Jaggi and B. K. Dey.
     Binary Causal-Adversary Channels.
     In proc. of IEEE International Symposium on Information Theory (ISIT) 2009, 2723 - 2727.
     Improved Upper Bounds on the Capacity of Binary Channels with Causal Adversaries.

   Trajectory Codes for Flash Memory.
   Also in proceedings of IEEE International Symposium on Information Theory (ISIT) 2009, 1219 - 1223.

23'. A. Ramamoorthy and M. Langberg.
   Communicating the sum of sources over a network.
   IEEE Journal on Selected Areas of Communications 31(4): 655-665 (Special Issue on In-Network Computation: Exploring the Fundamental Limits) 2013.
   This journal submission merges two conference papers:
   • M. Langberg and A. Ramamoorthy.
     Communicating the sum of sources in a 3-sources/3-terminals network.
     In proc. of IEEE International Symposium on Information Theory (ISIT) 2009, 2121-2125.
   • A. Ramamoorthy and M. Langberg.
     Communicating the sum of sources in a 3-sources/3-terminals network; revisited.

   Generalized Gray Codes for Local Rank Modulation.

   Network Codes Resilient to Jamming and Eavesdropping.
   IEEE/ACM Transactions on Networking, 22(6), 2014.
   This journal submission merges two conference papers:
   • S. Jaggi and M. Langberg.
     Resilient network codes in the presence of eavesdropping Byzantine adversaries.
     In proceedings of IEEE International Symposium on Information Theory (ISIT) 2007, 541-545.
• H. Yao, D. Silva, S. Jaggi and M. Langberg.
  Network Codes Resilient to Jamming and Eavesdropping.
  In proceedings of IEEE International Symposium on Network Coding (NetCod) 2010.

An Equivalence between Network Coding and Index Coding.
Also in proceedings of IEEE International Symposium on Information Theory (ISIT) 2013, 967-971.

27'. Y. Liron and M. Langberg.
A characterization of the number of subsequences obtained via the deletion channel.
Also in proceedings of IEEE International Symposium on Information Theory (ISIT) 2012, 508-512.

28'. M. Gonen and M. Langberg.
The coded cooperative data exchange problem for general topologies.
Also in proceedings of IEEE International Symposium on Information Theory (ISIT) 2012, 2616-2620.

Asymmetric Error Correction and Flash-Memory Rewriting using Polar Codes.
This journal submission merges two conference papers:
• E. En Gad, Y. Li, J. Kliewer, M. Langberg, A. Jiang, and J. Bruck.
Polar coding for noisy Write-Once memories.
  In proceedings of IEEE International Symposium on Information Theory (ISIT), 2014, 1638-1642.
• A. Jiang, Y. Li, E. En Gad, M. Langberg, J. Bruck.
Joint Rewriting and Error Correction in Write-Once Memories.

30'. W. Huang, M. Langberg, J. Kliewer and J. Bruck.
Communication Efficient Secret Sharing.

Coding for the $\ell_{\infty}$-Limited Permutation Channel.
Also in proceedings of IEEE International Symposium on Information Theory (ISIT) 2015, 1936-1940.

32'. P. Noorzad, M. Effros, and M. Langberg.
The Unbounded Benefit of Encoder Cooperation for the $k$-user MAC.
This journal submission merges two conference papers:
• P. Noorzad, M. Effros, and M. Langberg.
  On the cost and benefit of cooperation.
  In proceedings of IEEE International Symposium on Information Theory (ISIT), 2015, 36-40.
• P. Noorzad, M. Effros, and M. Langberg.
The Unbounded Benefit of Encoder Cooperation for the \( k \)-User MAC.

33'. P. Noorzad, M. Effros, and M. Langberg.
Can Negligible Rate Increase Network Reliability?
Also in proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 1784-1788.

34. M. Langberg and D. Vilenchik.
Constructing cospectral graphs via a new form of graph product.
Also in 13th Haifa Workshop on Interdisciplinary Applications of Graph Theory, Combinatorics, and Algorithms, 2013.

35'. W. Huang, Tracey Ho, M. Langberg, J. Kliewer.
Single-Unicast Secure Network Coding and Network Error Correction are as Hard as Multiple-Unicast Network Coding.
This journal submission merges three conference papers:
• W. Huang, T. Ho, M. Langberg, and J. Kliewer.
  On secure network coding with uniform wiretap sets.
  *In proceedings of IEEE International Symposium on Network Coding (NetCod), 2013.*
• W. Huang, T. Ho, M. Langberg, and J. Kliewer.
  Single Source/Sink Network Error Correction Is As Hard As Multiple Unicast.
  *In proceedings of the Fifty-Second Annual Allerton Conference on Communication, Control, and Computing, 2014.*
• W. Huang, M. Langberg, and J. Kliewer.
  Connecting multiple-unicast and network error correction: reduction and unachievability.
  *In proceedings of IEEE International Symposium on Information Theory (ISIT), 2015, 361-365.*

The Capacity of Online (Causal) \( q \)-ary Error-Erasure Channels.
This journal submission merges two conference papers:
• Z. Chen, S. Jaggi and M. Langberg.
  A characterization of the capacity of online (causal) binary channels.
• Z. Chen, S. Jaggi and M. Langberg.
  The Capacity of Online (Causal) \( q \)-ary Error-Erasuer Channels.
  *In proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 915-919.*

Sufficiently myopic adversaries are blind.
Also in proceedings of IEEE International Symposium on Information Theory (ISIT), 2015, 1164-1168.*
Peer-Reviewed Journals (submitted)

38. M. Langberg and M. Effros.
The edge removal problem as a canonical problem in network coding.
Submitted for journal publication (IEEE Transactions on Information Theory). In second round of review process.
This journal submission merges two conference papers:

- M. Langberg and M. Effros.
  Network Coding: Is zero error always possible?
- M. Langberg and M. Effros.
  Source coding for dependent sources.
  In proceedings of IEEE Information Theory Workshop (ITW), 2012.

$H$-wise Independence.
Submitted for journal publication (Chicago Journal of Theoretical Computer Science).
Also in proceedings of Innovations in Theoretical Computer Science (ITCS), 2013, 541-551.

Peer-Reviewed Conference Proceedings (appeared/to appear)

   On the hardness of approximating NP witnesses.

   The $RPR^2$ rounding technique for semidefinite programs.
   In proceedings of 28th International Colloquium on Automata, Languages and Programming (ICALP), 213-224, 2001.

   Graphs with tiny vector chromatic numbers and huge chromatic numbers.

   The ROBDD size of simple CNF formulas.

   Testing the independence number of hypergraphs.
   In proceedings of 8th International Workshop on Randomization and Computation (RANDOM), 405-416, 2004.

   Private codes or Succinct random codes that are (almost) perfect.
7'. M. Langberg, A. Sprintson and J. Bruck.
The Multi-Multiway Cut Problem.

9'. M. Langberg, A. Sprintson and J. Bruck.
Staleness vs. Waiting Time in Universal Discrete Broadcast.
In proceedings of IEEE International Symposium on Information Theory (ISIT) 2005, 2124-2128.

10'. M. Langberg, A. Sprintson and J. Bruck.
The encoding complexity of network coding.

Correction of Adversarial Errors in Networks.

Approximation Algorithms for Graph Homomorphism Problems.

Analysis of Incomplete Data and an Intrinsic-Dimension Helly Theorem.

Oblivious channels.
In proceedings of IEEE International Symposium on Information Theory (ISIT) 2006, 2739-2743.

Resilient network codes in the presence of eavesdropping Byzantine adversaries.
In proceedings of IEEE International Symposium on Information Theory (ISIT) 2007, 541-545.

Contraction and expansion of convex sets.

Error-correction for Byzantine Adversaries in Networks: A Distributed Network Coding Approach.
In proceedings of 26th Annual IEEE Conference on Computer Communications (INFOCOM), 2007, 616-624.

“Real” Slepian-Wolf coding using Random (1,-1) Matrices.

19'. L. Nutman and M. Langberg.
Adversarial Models and Resilient Schemes for Network Coding.
In proceedings of IEEE International Symposium on Information Theory (ISIT) 2008, 171-175.
On the Hardness of Approximating the Network Coding Capacity.  

Approximating Maximum Subgraphs Without Short Cycles.  

Communicating the sum of sources in a 3-sources/3-terminals network.  
*In proceedings of IEEE International Symposium on Information Theory (ISIT) 2009, 2121-2125.*

Trajectory Codes for Flash Memory.  
*In proceedings of IEEE International Symposium on Information Theory (ISIT) 2009, 1219 - 1223.*

Binary Causal-Adversary Channels.  
*In proceedings of IEEE International Symposium on Information Theory (ISIT) 2009, 2723 - 2727.*

25. M. Langberg and M. Méard.  
On the Multiple Unicast Network Coding Conjecture.  
*In proceedings of the Forty-Seventh Annual Allerton Conference on Communication, Control, and Computing, 2009, 222 - 227.*

Codes against online adversaries, Part I: Large alphabets.  
*In proceedings of the Forty-Seventh Annual Allerton Conference on Communication, Control, and Computing, 2009, 1169-1176.*

Data Movement in Flash Memories.  
*In proceedings of the Forty-Seventh Annual Allerton Conference on Communication, Control, and Computing, 2009, 1031 - 1038.*

Fault-Tolerant Spanners for General Graphs.  

Network Codes Resilient to Jamming and Eavesdropping.  
*In proceedings of IEEE International Symposium on Network Coding (NetCod), 2010, 1-6.*

Universal ε-approximators for integrals.  
*In proceedings of ACM-SIAM Symposium on Discrete Algorithms (SODA) 2010, 598-607.*

Realtime Classification for Encrypted traffic.  
*In proceedings of 9th International Symposium on Experimental Algorithms (SEA) 2010, 373-385.*

32'. A. Ramamoorthy and M. Langberg.  
Communicating the sum of sources in a 3-sources/3-terminals network; revisited.  
33'. A. Jiang, M. Langberg, R. Mateescu and J. Bruck. 
Data movement and aggregation in flash memories. 
*In proceedings of IEEE International Symposium on Information Theory (ISIT) 2010, 1918 - 1922.*

Codes against Delayed Adversaries. 

35'. R. A. Costa, M. Langberg, and J. Barros 
One-Shot Capacity of Discrete Channels. 

f-Sensitivity Distance Oracles and Routing Schemes. 
*In proceedings of 18th Annual European Symposium on Algorithms (ESA) 2010, 84-96.*

A Unified Framework for Approximating and Clustering Data. 

38. I. Haviv and M. Langberg. 
Beating the Gilbert-Varshamov Bound for Online Channels. 
*In proceedings of IEEE International Symposium on Information Theory (ISIT), 2011, 1297-1301.*

Generalized Gray Codes for Local Rank Modulation. 
*In proceedings of IEEE International Symposium on Information Theory (ISIT), 2011, 839-843.*

40'. M. A. R. Chaudhry, Z. Asad, A. Sprintson, and M. Langberg. 
On the Complementary Index Coding Problem. 

41. Y. Berliner and M. Langberg. 
Index coding with outerplanar side information. 

42'. M. A. R. Chaudhry, Z. Asad, A. Sprintson, and M. Langberg. 
Finding Sparse Solutions for the Index Coding Problem. 
*In proceedings of IEEE GLOBECOM - Wireless Communications Symposium, 2011, 1-5.*

43'. M. Langberg and M. Effros. 
Network Coding: Is zero error always possible? 

44'. Y. Liron and M. Langberg. 
A characterization of the number of subsequences obtained via the deletion channel. 

Improved Upper Bounds on the Capacity of Binary Channels with Causal Adversaries. 

46. M. Gonen and M. Langberg. 
The coded cooperative data exchange problem for general topologies. 
*In proceedings of IEEE International Symposium on Information Theory (ISIT) 2012, 2616-2620.*
47. I. Haviv and M. Langberg.
On Linear Index Coding for Random Graphs.
In proceedings of IEEE International Symposium on Information Theory (ISIT) 2012, 2241-2245.

48'. M. Langberg and M. Effros.
Source coding for dependent sources.
In proceedings of IEEE Information Theory Workshop (ITW), 2012.

49. I. Haviv and M. Langberg.
$H$-wise independent distributions.
In proceedings of Innovations in Theoretical Computer Science (ITCS), 2013, 541-551.

Routing for Security in Networks with Adversarial Nodes.
In proceedings of IEEE International Symposium on Network Coding (NetCod), 2013.

51'. W. Huang, T. Ho, M. Langberg, and J. Kliwer.
On secure network coding with uniform wiretap sets.
In proceedings of IEEE International Symposium on Network Coding (NetCod), 2013.

52'. M. F. Wong, M. Langberg, and M. Effros.
On a Capacity Equivalence between Network and Index Coding and the Edge Removal Problem.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2013, 972-976.

Sequence Reconstruction for Grassmann Graphs and Permutations.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2013, 874-878.

An Equivalence between Network Coding and Index Coding.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2013, 967-971.

Local Graph Coloring and Index Coding.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2013, 1152-1156.

56'. E. Yaakobi, M. Langberg, and J. Bruck.
Information-Theoretic Study of Voting Systems.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2013, 1087-1091.

57'. A. Jiang, Y. Li, E. En Gad, M. Langberg, J. Bruck.
Joint Rewriting and Error Correction in Write-Once Memories.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2013, 1067-1071.
Also in 2014 Non-Volatile Memories Workshop (NVMW 2014).

Zero vs. epsilon error in interference channels.
In proceedings of IEEE Information Theory Workshop (ITW), 2013.

59'. E. J. Lee, M. Langberg, and M. Effros.
Outer bounds and functional study of the edge removal problem.
In proceedings of IEEE Information Theory Workshop (ITW), 2013.

60'. M. F. Wong, M. Langberg, and M. Effros.
On an Equivalence between Multiple Multicast and Multiple Unicast Index Coding.
61'. W. Huang, T. Ho, M. Langberg, and J. Kliewer.
Reverse Edge Cut-Set Bounds for Secure Network Coding.

Polar coding for noisy Write-Once memories.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2014, 1638 - 1642.

Graph Theory versus Minimum Rank for Index Coding.

64'. P. Noorzad, M. Effros, M. Langberg, and T. Ho.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2014, 3132 - 3136.

65'. M. F. Wong, M. Langberg, and M. Effros.
Linear Capacity Equivalence Between Multiple Multicast and Multiple Unicast.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2014, 2152 - 2156.

66'. W. Huang, T. Ho, M. Langberg, and J. Kliewer.
Single Source/Sink Network Error Correction Is As Hard As Multiple Unicast.
In proceedings of the Fifty-Second Annual Allerton Conference on Communication, Control, and Computing, 2014.

67'. M. Effros and M. Langberg.
Is there a canonical network for network information theory?
In proceedings of IEEE Information Theory Workshop (ITW), 2014, 82-26.

68. M. Langberg, M. Schwartz, and E. Yaakobi.
Coding for the $\ell_\infty$-Limited Permutation Channel.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2015, 1936-1940.

69'. W. Huang, M. Langberg, and J. Kliewer.
Connecting multiple-unicast and network error correction: reduction and unachievability.

70'. M. F. Wong, M. Effros, and M. Langberg.
On an equivalence of the reduction of $k$-unicast to 2-unicast capacity and the edge removal property.

71'. P. Noorzad, M. Effros, and M. Langberg.
On the cost and benefit of cooperation.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2015, 36-40.

Sufficiently myopic adversaries are blind.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2015, 1164-1168.

73. Z. Chen, S. Jaggi and M. Langberg.
A characterization of the capacity of online (causal) binary channels.

On the Fundamental Limits of Caching in Combination Networks.
In IEEE 16th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), 2015.
75'. P. Noorzad, M. Effros, and M. Langberg.
The Unbounded Benefit of Encoder Cooperation for the k-User MAC.

76'. P. Noorzad, M. Effros, and M. Langberg.
Can Negligible Cooperation Increase Network Reliability?
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 1784-1788.

77'. W. Kim, M. Langberg, and M. Effros.
A Characterization of the Capacity Region for Network Coding with Dependent Sources.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 1764-1768.

78'. M. F. Wong, M. Effros, and M. Langberg.
On Tightness of an Entropic Region Outer Bound for Network Coding and the Edge Removal Property.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 1769-1773.

The Capacity of Online (Causal) q-ary Error-Erasure Channels.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 915-919.

A bit of delay is sufficient and stochastic encoding is necessary to overcome online adversarial erasures.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2016, 880-884.

81'. M. Langberg and M. Effros.
On the Capacity Advantage of a Single Bit.
In proceedings of Workshop on Network Coding and Applications (NetCod), 2016.

82. A. Chattopadhyay, M. Langberg, S. Li, A. Rudra.
Tight Network Topology Dependent Bounds on Rounds of Communication.
In proceedings of ACM-SIAM Symposium on Discrete Algorithms (SODA), 2017, 2524-2539.

Non-linear Cyclic Codes that Attain the Gilbert-Varshamov Bound.

84'. Panos P. Markopoulos, Dimitris A. Pados, George N. Karystinos, and Michael Langberg.
L_1-norm principal-component analysis in L_2-norm-reduced-rank data subspaces.
In SPIE DCS, Compressive Sensing VI: From Diverse Modalities to Big Data Analytics, 2017.

85. S. Jaggi and M. Langberg.
Two-way Interference Channels with Jammers.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2017, 491-495.

86'. P. Noorzad, M. Effros, M. Langberg and V. Kostina.
The Birthday Problem and Zero-Error Channel Coding.

87'. P. Noorzad, M. Effros, and M. Langberg.
The Benefit of Encoder Cooperation in the Presence of State Information.
88'. M. F. Wong, M. Effros, and M. Langberg.
A Code Equivalence between Streaming Network Coding and Streaming Index Coding.
In proceedings of IEEE International Symposium on Information Theory (ISIT), 2017, 1638-1642.

89'. F. Wei and M. Langberg.
The Effect of Removing a Network Communication Edge: Group Network Codes.

90'. D. Chaudhuri and M. Langberg.
Trade-offs between Rate and Security in Linear Multicast Network Coding.

91'. P. Noorzad, M. Effros, and M. Langberg.
Can Negligible Cooperation Increase Capacity? The Average-Error Case.

92'. T. Li, B. K. Dey, S. Jaggi, M. Langberg, and A. Sarwate.
Quadratically Constrained Channels with Causal Adversaries.

Latency and Alphabet Size in the Context of Multicast Network Coding.

Topology Dependent Bounds for (Some) FAQs.

95'. F. Wei, M. Langberg, and M. Effros.
A local perspective on the edge removal problem.

96'. D. Chaudhuri, M. Langberg, and M. Effros.
Secure Network Coding in the Setting in Which a Non-Source Node May Generate Random Keys.

The Interplay of Causality and Myopia in Adversarial Channel Models.

Book Chapters and Tutorials

   Graph Coloring, (1994, 1998; Karger, Motwani, Sudan).

   Reliable and Secure Communication using Network Coding.
Recent Results on the Algorithmic Complexity of Network Coding.
*Tutorial appearing in proceedings of 2009 Workshop on Network Coding, Theory, and Applications (NetCod 2009).*

Short papers and posters

Broadcast and Label Assignment in Directed Anonymous Networks.
*In proceedings of 26th Annual ACM SIGACT-SIGOPS Symposium on Principles of Distributed Computing (PODC), 382-383, 2007 as a brief 2 page announcement.*

2'. M. A. R. Chaudhry, Z. Asad, A. Sprintson and M. Langberg.
An Efficient Algorithm for Complementary Index Coding Problem (poster).
*Poster at IEEE International Symposium on Information Theory (ISIT) 2010.*

Patents and Patent applications

Data Transmission System and Method.

2. A. Jiang, J. Bruck, E. En Gad, M. Langberg, Y. Li.
Joint rewriting and error correction in write-once memories.

Communication Systems and Methods of Communicating Utilizing Cooperation Facilitators.

Communication Efficient Secret Sharing.
*Provisional application, 2015.*