

## **William E. Ryan, Professor**

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### ◆ Chronology of Education ◆

#### **Ph.D. (E.E.), University of Virginia, May 1988.**

*Dissertation title:* "Two Classes of Convolutional Codes over GF(q) with Applications to Frequency-Hopping Channels"

*Major Field:* Electrical Engineering

#### **M.S.E.E., University of Virginia, August 1984.**

*Thesis title:* "Generalized Cross-Correlation Performance with Spread Spectrum Signals"

#### **B.S.E.E., Case Western Reserve University, January 1981.**

*Senior thesis title:* "A Novel Design and Implementation of Weaver's Single-Sideband Modulator"

### ◆ Chronology of Employment ◆

#### **Professor (July 2005 - Present), Assoc. Professor (August 1998 - July 2005)**

**Dept. of Electrical and Computer Engineering, University of Arizona**

*Research* – Please see list of publications for details on research areas.

- turbo codes, (generalized) LDPC codes
- coding for wireless communication channels
- coding and signal processing for magnetic recording
- low-floor LDPC decoder design
- ensemble enumerators for generalized LDPC codes
- receiver design for clipped OFDM fading channels
- capacity calculations for clipped OFDM channel and the magnetic storage channel
- compressive sensing, connections to channel coding

#### *Courses Taught (at UA and at NMSU)*

- Electronic Circuits
- Signals and Systems
- Introduction to Communications
- Random Signals (grad)
- Linear Systems (grad)
- Digital Communications I (grad)
- Digital Communications II (grad)
- Channel Coding (grad)
- Detection and Estimation (grad)
- Information Theory (grad)

### ***Professional Service***

- Assoc. Editor for Coding, *IEEE Trans. on Communications*, 1998-2005
- General Chair of the 2007 IEEE Information Theory Workshop, Lake Tahoe, CA.
- General Chair of the 2003 IEEE Comm. Theory Workshop, Superstition Springs, AZ.
- Technical Program Committee, Session Organizer, and Session Chair for numerous IEEE conferences and workshops
- Paper reviewer for the following journals
  - IEEE Trans. Communications
  - IEEE Trans. Information Theory
  - IEEE Trans. Magnetics
  - IEEE Journal Selected Areas in Communications
  - IEEE Trans. Wireless Communications
  - IEEE Trans. Vehicular Technology
- Paper reviewer for the following conferences
  - IEEE Int. Conf. on Comm.
  - IEEE Global Telecom. Conf.
  - IEEE Int. Symp. Inf. Theory
  - IEEE Int. Conf. on Magnetics
- Book reviewer for
  - Cambridge University Press
  - McGraw-Hill
  - Kluwer (now Springer)

### ***Consulting***

- Ampex
- Seagate
- Raytheon
- IBM
- Alcatel-Lucent

**Assoc. Professor and Assoc. Director of the Center for Telemetry and Space Telecommunications, New Mexico State University, August 1997 - August 1998.**

**Assistant Professor, New Mexico State University, August 1993 - August 1997.**

Research and teaching interests same as those outlined for University of Arizona above.

**Engineer III, Applied Signal Technology, February 1993 - August 1993.**

Responsibilities included simulating adaptive beam forming algorithms for the rejection of interfering signals and implementing the algorithms in Motorola 68040 firmware.

**Staff Engineer, Ampex Recording Systems Corp., October 1990 - February 1993.**

Responsibilities included performing analytical and simulation studies in the areas of digital signaling for bandwidth-limited channels, error-control coding, and digital magnetic recorder channel modeling.

**Member Technical Staff, The Analytic Sciences Corp. (TASC), January 1988 - August 1990.** Responsibilities included performing studies on various topics (some classified) within the areas of signal processing, communications, and coding.

**Fairchild Fellow, American Satellite Co. / University of Maryland, May 1984 - August 1985.** Fairchild Fellowship Program. Tasks included C-band and Ku-band link analyses and software development for testing and monitoring earth stations. Completed 12 credit hours of graduate course work at the University of Maryland.

**Associate Engineer, General Dynamics, Convair Division, February 1981 - August 1982.** Tasks included the design and implementation of a digital angular position controller and supervision of production testing of avionics hardware.

**Cadet, U. S. Coast Guard Academy, June 1976 - December 1977.**  
Major: Electrical Engineering.

### ◆ Honors and Awards ◆

Nominated for the NSF Presidential Faculty Fellowship Award in 1996 while at New Mexico State University

Fairchild Fellowship for Ph.D. program, 1984-1985

Elected member of Tau Beta Pi, National Engineering Honorary Society

### ◆ Publications ◆

#### Graduate Textbook

W. E. Ryan and S. Lin, *Channel Codes: Classical and Modern*, Cambridge University Press, 2009.

#### Chapters in Scholarly Books

W. E. Ryan, "An Introduction to LDPC Codes," in *CRC Handbook for Coding and Signal Processing for Recording Systems* (B. Vasic, ed.) CRC Press.

W. E. Ryan, "Concatenated Codes and Iterative Decoding," in *Wiley Encyclopedia of Telecommunications* (J. G. Proakis, ed.) New York:Wiley and Sons, 2003.

#### Refereed Journal Articles

[1] W. E. Ryan, "Comments on 'Orthogonal convolutional coding for the PPM optical channel'," *IEEE J. Lightwave Tech.*, Vol. 8, p. 1007, June 1990.

[2] W. E. Ryan and S. G. Wilson, "Two classes of convolutional codes over GF(q) for q-ary orthogonal signaling," *IEEE Trans. Comm.*, Vol. 39, pp. 30-40, Jan. 1991.

- [3] W. E. Ryan, "Comparative performance between drop-out detection and Viterbi reliability metric erasure flagging," *IEEE Trans. Magnetics*, Vol. 28, pp. 2898-2900, Sept. 1992.
- [4] W. E. Ryan and P. Conoval, "A method of analysis for interleaved Reed-Solomon coding with erasure decoding on burst-error channels," *IEEE Trans. Comm.*, Vol. 41, pp. 430-434, March 1993.
- [5] W. E. Ryan and A. Gutierrez, "Performance of adaptive Volterra equalizers on nonlinear magnetic recording channels," *IEEE Trans. Magnetics*, Vol. 31, pp. 3054-3056, Nov. 1995.
- [6] W. E. Ryan and N. Yeh, "MLSD detector for PR4-equalized magnetic recording channels with transition-shift and partial-erasure nonlinearities," *IEEE Trans. Magnetics*, Vol. 32, pp. 3950-3952, Sept. 1996.
- [7] W. E. Ryan, "Optimal signaling for meteor burst channels," *IEEE Trans. Comm.*, Vol. 45, pp. 489-496, May 1997.
- [8] W. Ryan and B. Zafer, "A study of class I partial response signaling for magnetic recording," *IEEE Trans. Magnetics*, Vol. 33, pp. 4543-4550, Nov. 1997.
- [9] W. Ryan, Li Han, and P. Quintana, "Design of a low-orbit to geostationary satellite link for maximal throughput," *IEEE Trans. Comm.*, Vol. 45, pp. 988-996, August 1997.
- [10] O. Acikel and W. E. Ryan, "Punctured turbo codes for BPSK/QPSK channels," *IEEE Trans. Comm.*, Vol. 47, pp. 1315-1323, Sept. 1999.
- [11] A. Gutierrez and W. Ryan, "Performance of Volterra and MLSD Receivers for Nonlinear Bandlimited Satellite Systems," *IEEE Trans. Comm.*, Vol. 48, pp. 1171-1177, July 2000.
- [12] W. Ryan, A. Ghayeb, and N. Yeh, "Performance of random-access-memory-based equalizers in magnetic recording," *IEEE Trans. Magnetics*, Vol. 36, pp. 4028-4035, Nov. 2000.
- [13] W. Ryan, "Optimal code rates for concatenated codes on a PR4-equalized magnetic recording channel," *IEEE Trans. Magnetics*, Vol. 36, pp. 4044-4049, Nov. 2000.
- [14] W. Ryan, "Concatenated codes for class IV partial response channels," *IEEE Trans. Comm.*, Vol. 49, pp. 445-454, March 2001.
- [15] R. Ramamurthy and W. Ryan, "Convolutional Double Accumulate Codes (or Double Turbo DPSK)," *IEEE Comm. Letters*, Vol. 5, pp. 157-159, April 2001.

- [16] A. Ghayeb and W. Ryan, "Concatenated code system design for storage channels," *IEEE J. Selected Areas in Comm.*, Vol. 19, pp. 709-718, April 2001.
- [17] S. Yang, A. Kavcic, and W. E. Ryan, "Optimizing the Bit Aspect Ratio of a Recording System Using an Information-Theoretic Criterion," *IEEE Trans. Magnetics*, Vol. 39, pp. 2228-2230, Sept. 2003.
- [18] A. Muqattash, M. Krunz, and W. E. Ryan, "Solving the Near-Far Problem in CDMA-Based Ad Hoc Networks," *Elsevier Ad Hoc Networks Journal*, pp. 435-453, Nov. 2003.
- [19] M. Yang and W. E. Ryan, "Performance of efficiently encodable LDPC codes in noise bursts on the EPR4 channel," *IEEE Trans. Magn.*, pp. 507-512, March, 2004.
- [20] M. Yang, W. E. Ryan, and Y. Li, "Design of efficiently encodable moderate-length high-rate irregular LDPC codes," *IEEE Trans. Comm.*, pp. 564-571, April, 2004.
- [21] W. E. Ryan and Z. Tang, "Reduced-complexity error state diagrams in TCM and ISI channel performance evaluation," *IEEE Trans. Comm.*, pp. 2047-2051, Dec. 2004.
- [22] Y. Li and W. E. Ryan, "Bit-reliability mapping in LDPC-coded modulation systems," *IEEE Comm. Letters*, pp. 1-3, Jan. 2005.
- [23] W. E. Ryan, F. Wang, R. Wood, and Y. Li, "Optimal code rates for the Lorentzian channel: Shannon codes and LDPC codes," *IEEE Trans. Magn.*, pp. 3559-3565, Nov. 2004.
- [24] Y. Han and W. E. Ryan, "Packet-LDPC codes for tape drives," *IEEE Trans. Magnetics*, pp. 1340-1347, April 2005.
- [25] B. Xia and W. E. Ryan, "Importance sampling for tanner trees," *IEEE Trans. Info. Theory*, Vol. 51, No. 6, pp. 2183-2189, June 2005.
- [26] Z. Tang and W. E. Ryan, "Achievable information rates and the coding-spreading tradeoff in finite-sized synchronous CDMA systems," *IEEE Trans. on Wireless Comm.*, pp. 1432-1437, Sept. 2005.
- [27] F. Peng, M. Yang, and W. E. Ryan, "Simplified eIRA code design and performance analysis for correlated Rayleigh fading channels," *IEEE Trans. on Wireless Comm.*, pp. 720-725, April 2006.
- [28] F. Peng, W. E. Ryan, and R. D. Wesel, "Surrogate-channel design of universal LDPC codes," *IEEE Comm. Letters*, pp. 480-482, June 2006.

- [29] L. H. Miles, J. W. Gambles, G. K. Maki, W. E. Ryan, S. R. Whitaker, "An 860-Mb/s (8158,7136) Low-Density Parity-Check Encoder," *IEEE J. Solid-State Circuits*, pp. 1686-1691, Aug. 2006.
- [30] G. Liva, S. Song, L. Lan, Y. Zhang, S. Lin, W. E. Ryan, "Design of LDPC Codes: A Survey and New Results," *Journal of Communications Software and Systems - Special Issue on Channel Coding in Wireless Systems*, pp. 191-211, Sept. 2006. **(invited)**
- [31] Y. Han and W. E. Ryan, "Concatenating a Structured LDPC Code and a Constrained Code to Preserve Soft-Decoding, Structure, and Burst Correction," *IEEE Trans. Magnetics*, pp. 2558-2560, Oct. 2006.
- [32] Y. Zhang and W. E. Ryan, "Structured IRA Codes: Performance Analysis and Construction," *IEEE Trans. Communications*, pp. 837-844, May 2007.
- [33] Y. Li and W. E. Ryan, "Mutual-information-based adaptive bit-loading algorithms for LDPC-coded OFDM," *IEEE Trans. Wireless Comm.*, pp. 1670-1680, May 2007.
- [34] G. Liva, W. E. Ryan, and M Chiani, "Quasi-cyclic generalized ldpc codes with low error floors," *IEEE Trans. Communications*, pp. 49-57, Jan. 2008.
- [35] F. Peng and W. E. Ryan, "MLSD Bounds and Receiver Designs for Clipped OFDM Channels," *IEEE Trans. Wireless Communications*, pp. 3568-3578, Sept. 2008.
- [36] Y. Zhang and W. E. Ryan, "Toward low error floors in LDPC decoders," *IEEE Trans. Comm.*, 2009.
- [37] Y. Han and W. E. Ryan, "LDPC decoder design techniques for low error floors," *IEEE Trans. Comm.*, 2009.
- [38] Y. Zhang and W. E. Ryan, "Toward low LDPC-code floors: a case study," *IEEE Trans. Comm.*, pp. 1566-1573, June 2009.
- [39] Y. Han and W. E. Ryan, "Low-floor decoders for LDPC codes," *IEEE Trans. Comm.*, pp. 1663-1673, June 2009.
- [40] A. R. Krishnan, R. Radhakrishnan, B. Vasic, A. Kavcic, W. Ryan, and F. Erden, "2-D Magnetic Recording: Read Channel Modeling and Detection," *IEEE Trans. Magn.*, pp. 3830-3836, Oct. 2009.

## Refereed Conference Papers

- [1] W. E. Ryan and J. M. Schumpert, "Time Delay Estimation for Spread Spectrum Signals Using Generalized Cross Correlation," *Proc. 1985 ICASSP*, Vol. 10, pp. 168-171, April 1985.
- [2] W. E. Ryan and S. G. Wilson, "Convolutional Coding over GF(q) with Application to Frequency-Hopping Channels," *Proc. 1987 Conf. Inf. Sys. and Sci.*
- [3] W. E. Ryan and S. G. Wilson, "Convolutional Coding over GF(q) with Application to Frequency-Hopping Channels," *1987 IEEE MILCOM Conf. Rec.*
- [4] W. E. Ryan, "Comparative performance between drop-out detection and Viterbi reliability metric erasure flagging," *IEEE International Magnetics Conference, Digests of Intermag'92*, p. 325, April 1992.
- [5] W. E. Ryan and Li Han, "Modulation and Coding for Short-Duration Deterministically Time-Varying Channels," *Proc. 1995 IEEE Int. Conf. on Comm.*, Vol. 3, pp. 1790-1794, June 1995.
- [6] P. Quintana and W. E. Ryan, "Optimal parameters for a low orbit to geostationary satellite link," *Proc. 1995 IEEE Int. Conf. on Comm.*, Vol. 3, pp. 1870-1874, June 1995.
- [7] A. Gutierrez and W. E. Ryan, "Performance of adaptive Volterra equalizers on nonlinear satellite channels," *Proc. 1995 IEEE Int. Conf. on Comm.*, Vol., 1, pp. 488-492, June 1995.
- [8] W. Ryan and B. Zafer, "Performance comparison between PR1 and PR4 signaling on high-density magnetic recording channels," *Proc. 1996 IEEE Int. Conf. on Comm.*, Vol. 1, pp. 587-591, June 1996.
- [9] A. Gutierrez and W. Ryan, "The performance of MLSD receivers on nonlinear satellite channels," *Proc. 1996 IEEE Int. Conf. on Comm.*, Vol. 2, pp. 921-925, June 1996.
- [10] O. Acikel and W. Ryan, "Lossless compression of telemetry data," *Int. Conf. Telemetry*, San Diego, Oct. 1996.
- [11] B. Zafer and W. Ryan, "Performance Comparison of Selected DC-Free Codes for PR1-Equalized Magnetic Recording Channels," *Proc. 1997 IEEE Int. Conf. on Comm.*, Vol. 3, pp. 1638-1643, June 1997.
- [12] W. Ryan, "Performance of high rate turbo codes on a PR4-equalized magnetic recording channel," *Proc. 1998 Int. Conf. on Comm.* Vol. 2, pp. 947-951, June 1998.

- [13] O. Acikel and W. Ryan, "High rate turbo codes for BPSK/QPSK channels," *Proc. 1998 Int. Conf. on Comm.* Vol. 1, pp. 422-427, June 1998.
- [14] W. Ryan, L. McPheters, and S. McLaughlin, "Combined turbo coding and turbo equalization for PR4-equalized Lorentzian channels," *1998 Conf. on Inf. Sciences and Systems*, Princeton University.
- [15] J. LeBlanc, R. Kennedy, and W. Ryan, "Pre-cursor extended RAM-DFE canceller (PERC) nonlinear equalizer for nonlinear ISI channels," *The Eighth Digital Signal Processing Workshop*, Bryce Canyon, Utah, Aug. 1998.
- [16] A. Ghayeb and W. Ryan, "RAM-Search algorithms for nonlinear ISI cancellation in magnetic recording," *Proc. IEEE 1998 GlobeCom Conf.*, Vol. 6, pp. 3368-3373, Nov. 1998.
- [17] W. Ryan, "Optimal code rates for concatenated codes on a PR4-equalized channel," *1999 Conf. on Inf. Sciences and Systems*, Johns Hopkins University.
- [18] W. Ryan, J. LeBlanc, and R. Kennedy, "Performance study of RAM-based decision feedback equalizers with application to nonlinear satellite channels," *Proceedings of the Fifth International Symposium on Signal Processing and Its Applications*, Vol. 1, pp. 407-410, Aug. 1999, Brisbane, Australia.
- [19] W. Ryan, "Design considerations for concatenating convolutional codes with partial response channels," *Proc. 37th Allerton Conf.*, pp. 1324-1333, Sept. 1999. **(invited)**
- [20] A. Ghayeb and W. Ryan, "Performance of high rate turbo codes employing the soft-output Viterbi algorithm (SOVA)," *1999 Conference Record of the Thirty-Third Asilomar Conference on Signals, Systems, and Computers*, Vol., 2, pp. 1665-1669, Oct. 1999.
- [21] D. Goeckel, W. Ryan, and P. Ormeci, "On iterative adaptive signaling for wideband wireless channels," *SPIE's 14th Annual Int. Symp. on Aerospace/Defense Sensing, Simulations, and Controls (Proc. of SPIE 4045, May 2000)*. **(invited)**
- [22] O. Acikel and W. Ryan, "Punctured high rate SCCCs for BPSK/QPSK channels," *Proc. 2000 IEEE International Conference on Comm.*, Vol. 1, pp. 434-439, June 2000.
- [23] A. Ghayeb and W. Ryan, "Concatenated coding and iterative SOVA decoding with PR4 signaling," *Proc. 2000 IEEE International Conference on Comm.*, Vol. 2, pp. 597 - 601, June 2000.
- [24] W. Ryan, S. McLaughlin, K. Anim-Appiah, M. Yang, "Turbo, LDPC, and RLL codes in magnetic recording," *Proc. 2nd Int. Symp. on Turbo Codes and Related Topics*, Sept. 2000.

- [25] W. Ryan and A. Ghrayeb, "Precoder design for concatenating convolutional codes with intersymbol interference channels," *Proc. 2000 Wireless Communications and Networking Conference*, Vol. 3, pp. 1013 -1018, Sept. 2000. **(invited)**
- [26] A. Ghrayeb and W. E. Ryan, "Precoder design for concatenating convolutional codes with generalized partial response channels," *Proc. 2000 IEEE Global Telecommunications Conference*, Vol. 3, pp. 1859 -1864, Nov/Dec 2000.
- [27] R. Ramamurthy and W. E. Ryan, "Convolutional double accumulate codes (or double turbo DPSK)," *Proc. 2000 IEEE Global Telecommunications Conference*, Vol. 2, pp. 795 -800, Nov/Dec 2000.
- [28] M. Yang and W. E. Ryan, "Performance of (quasi-)cyclic LDPC codes in noise bursts on the EPR4 channel," *Proc. 2001 Global Telecommunications Conference*, Vol. 5, pp. 2961 -2965, Nov. 2001.
- [29] B. Xia and W. E. Ryan, "Near-optimal convolutionally coded synchronous CDMA with iterative multiuser detection/decoding," *Proc. 2001 Global Telecommunications Conference*, Vol. 2, pp. 767 -771, Nov. 2001.
- [30] A. L. Perez and W. E. Ryan, "Iterative detection and decoding on nonlinear ISI channels," *Proc. 2002 IEEE International Conference on Communications*, Vol. 3, pp. 1501 -1505, April/May 2002.
- [31] B. Xia and W. E. Ryan, "Near-optimal convolutionally coded asynchronous CDMA with iterative multiuser detection/decoding," *Proc. 2002 IEEE International Conference on Communications*, Vol. 3, pp. 1521 -1525, April/May 2002.
- [32] K. L. Virga, C. L. Hammond, D. Beauvarlet, and W. E. Ryan, "Indoor propagation measurements using low profile and directional dual exponentially tapered slot antennas," *The 5th International Symposium on Wireless Personal Multimedia Communications*, Vol. 1, pp. 193-197, Oct. 2002.
- [33] M. Yang and W. E. Ryan, "Design of LDPC codes for two-state fading channel models," *The 5th International Symposium on Wireless Personal Multimedia Communications*, Vol. 3, pp. 986 -990, Oct. 2002.
- [34] M. Yang, Y. Li, and W. E. Ryan, "Design of efficiently encodable moderate-length high-rate irregular LDPC codes," *Proc. 41st Allerton Conf.*, Oct. 2002.
- [35] B. Xia and W. E. Ryan, "On importance sampling for linear block codes," *Proc. 2003 IEEE International Conference on Communications*, Vol. 4, pp. 2904 -2908, May 2003.

- [36] B. Xia and W. E. Ryan, "Importance sampling for loop-free decoding trees with application to low-density parity-check codes," *Proc. 2003 Int. Symp. on Information Theory*, p. 120, Yokohama, Japan, July 2003.
- [37] M. Yang and W. E. Ryan, "Lowering the error-rate floors of moderate-length high-rate irregular LDPC codes," *Proc. 2003 Int. Symp. on Information Theory*, p. 237, Yokohama, Japan, July 2003.
- [38] Y. Li and W. E. Ryan, "Design of LDPC-coded modulation schemes," *Proc. 3rd Int. Symp. on Turbo Codes and Related Topics*, Sept. 2003.
- [39] W. E. Ryan, "Optimal code rates for Lorentzian channel models," *Proc. 2003 IEEE Global Telecommunications Conference*, pp. 3386 - 3391, Dec. 2003.
- [40] Z. Tang and W. E. Ryan, "Achievable information rates and the coding-spreading tradeoff in synchronous CDMA systems," *Proc. 2003 IEEE Global Telecommunications Conference*, pp. 1877-1881, Dec. 2003.
- [41] B. Xia and W. E. Ryan, "Estimating LDPC codeword error rates via importance sampling," *2004 IEEE Int. Symp. Inf. Theory*, p. 473, June-July, 2004.
- [42] Fei Peng and W. E. Ryan, "A novel ICI suppression technique for LDPC-coded OFDM," *Proc. 2004 Wireless Networking Symposium*, UT Austin, Oct. 2004.
- [43] Yan Li and W. E. Ryan, "Mutual-Information-Based Adaptive Bit-Loading Algorithms for LDPC-Coded OFDM," *Proc. 2004 Wireless Networking Symposium*, UT Austin, Oct. 2004.
- [44] F. Peng, M. Yang, and W. E. Ryan, "Design and Analysis of eIRA codes on Correlated Fading Channels," *IEEE GlobeCom Conference*, pp. 503-508, Nov.-Dec. 2004.
- [45] Y. Zhang, W. E. Ryan, and Y. Li, "Structured eIRA codes," *38th Asilomar Conference on Signals, Systems, and Computers*, pp. 2005-2009, Nov. 2004. **(invited)**
- [46] Y. Zhang, W. E. Ryan, and Y. Li, "Structured eIRA codes with low floors," *IEEE International Symp. on Inf. Theory*, pp. 174-178, Sept. 2005.
- [47] L. Miles, J. Gamble, G. Maki, W. Ryan, and S. Whitaker, "An (8158, 7136) Low-density parity-check encoder", 2005 IEEE Custom Integrated Circuits Conference., Sept. 2005.
- [48] G. Liva and W. E. Ryan, "Short low-error-floor Tanner codes with Hamming nodes," *IEEE MilCom Conf.*, pp. 208-213, Oct. 2005.

- [49] F. Peng and W. E. Ryan, "New approaches to clipped OFDM channels: modeling and receiver design," *IEEE GlobeCom Conference*, pp. 1490-1494, Nov.-Dec. 2005.
- [50] Y. Han, W. E. Ryan, and R. D. Wesel, "Dual-mode decoding of product codes with application to tape storage," *IEEE GlobeCom Conference*, pp. 1255-1260, Nov.-Dec. 2005.
- [51] S. Abu-Surra, G. Liva, and W. E. Ryan, "Design and performance of selected classes of Tanner codes," UCSD Workshop on Information Theory and Its Applications, February 2006, <http://ita.ucsd.edu/workshop/06/talks/papers/129.pdf>. **(invited)**
- [52] S. Abu-Surra, G. Liva, and W. E. Ryan, "Low-floor Tanner codes via Hamming-node or RSCC-node doping," *Lecture Notes in Computer Science, (Proc. of the 16th AAECC Symposium)*, vol. 3857, pp. 245--254, February 2006. **(invited)**
- [53] Y. Han and W. E. Ryan, "Concatenating a structured LDPC code and an RLL code to preserve soft-decoding, structure, and burst correction," to be presented at the *2006 Int. Conf. on Magnetics*, April 2006.
- [54] F. Peng and W. E. Ryan, "A new low-complexity ICI suppression technique for OFDM fading channels," *2006 IEEE Wireless Communications and Networking Conference*, April 2006.
- [55] Y. Zhang, W. E. Ryan, and F. Peng, "Design of structured eIRA codes with applications to wireless channels," *2006 IEEE Wireless Communications and Networking Conference*, April 2006.
- [56] G. Liva, W. E. Ryan, and M. Chiani, "Design of quasi-cyclic Tanner codes with low error floors," *4th Int. Symp. on Turbo Codes, ISTC-2006*, April 2006.
- [57] G. Liva, S. Abu-Surra, W. E. Ryan, and M. Chiani, "Tanner codes for high data-rate space applications," *AIAA 9th International Conference on Space Operations*. 19-23 June 2006, Rome, Italy.
- [58] F. Peng and W. E. Ryan, "On the capacity of clipped OFDM channels," *2006 IEEE Int. Symp. Inf. Theory*, pp. 1866-1870, July 2006.
- [59] G. Liva, S. Abu-Surra, W. E. Ryan, and M. Chiani, "Tanner codes for high data-rate space applications," *AIAA 9th International Conference on Space Operations*, 6 pages, June 2006, Rome, Italy.
- [60] F. Peng and W. E. Ryan, "Low-complexity soft demapper for OFDM fading channels with ICI," *2006 IEEE Wireless Communications and Networking Conference*, pp. 1549-1554, April 2006.

- [61] Y. Zhang, W. E. Ryan, and F. Peng, "Design of structured eIRA codes with applications to wireless channels," *2006 IEEE Wireless Communications and Networking Conf.*, pp. 1390–1395, April 2006.
- [62] G. Liva and W. E. Ryan, "Quasi-cyclic Tanner codes with low error floors," *2006 Int. Symp. Turbo Codes*, 6 pages, Munich, April 2006.
- [63] S. Abu Surra, G. Liva, and W. E. Ryan, "Low-floor Tanner codes via Hamming-node or RSCC-node doping," *2006 16th AAECC Symposium*, 10 single-column pages, Las Vegas, Feb. 2006. **(invited)**
- [64] S. Abu-Surra, W. E. Ryan, and D. Divsalar, "Ensemble Weight Enumerators for Protograph-Based Generalized LDPC Codes," *2007 UCSD Information Theory and Applications Workshop*, pp. 342-348, Jan.-Feb. 2007. **(invited)**
- [65] F. Peng, J. Zhang, and W. E. Ryan, "Adaptive Modulation and Coding for IEEE 802.11," *2007 IEEE Wireless Communications and Networking Conf.*, pp. 656-661, March 2007.
- [66] Shadi Abu-Surra, G. Liva, and W. E. Ryan, "On Generalized LDPC codes and their decoders," *2007 IEEE Communication Theory Workshop*, (poster presentation) 2 pages, May 2007.
- [67] Jones, C.; Dolinar, S.; Andrews, K.; Divsalar, D.; Zhang, Y.; Ryan, W.; "Functions and Architectures for LDPC Decoding," *2007 IEEE Information Theory Workshop*, pp. 577-583, Sept. 2007. **(invited)**
- [68] Y. Han and W. E. Ryan, "Low-Floor Decoders for LDPC Codes," *2007 Allerton Conference on Communications, Control, and Computing*, 6 pages, Sept. 2007.
- [69] S. Abu-Surra, W. E. Ryan, and D. Divsalar, "Ensemble Trapping Enumerators for Protograph-Based LDPC Codes," *2007 Allerton Conference on Communications, Control, and Computing*, 6 pages, Sept. 2007.
- [70] Y. Han and W. E. Ryan, "Performance of a Structured IRA Code on a Perpendicular Recording Channel with Media Noise," *2007 IEEE Global Telecommunications Conference (GlobeCom'07)*, pp. 271-276, Nov. 2007.
- [71] F. Peng, W. E. Ryan, J. Zhang, "MLSD Bounds for Clipped OFDM Systems Over Frequency-Selective Quasi-Static Fading Channels," *2007 IEEE Global Telecommunications Conference (GlobeCom'07)*, pp. 1693-1698, Nov. 2007.
- [72] F. Peng and W. E. Ryan, "MLSD Bounds and Near-Optimum Receiver Designs for Clipped OFDM Channels," *2007 IEEE Global Telecommunications Conference (GlobeCom'07)*, pp. 1688-1692, Nov. 2007.

[73] S. Abu-Surra, W. E. Ryan, and D. Divsalar, "Ensemble Enumerators for Protograph-Based Generalized LDPC Codes," *2007 IEEE Global Telecommunications Conference (GlobeCom'07)*, pp. 1492-1497, Nov. 2007.

[74] W. E. Ryan and Y. Han, ""Turbo equalization and iterative decoding for the storage channel," *2007 IEEE GlobeCom Workshop*, pp. 1-2, Nov. 2007. **(invited)**

[75] Yang Han and W.E. Ryan, "Pinning techniques for low-floor detection/decoding of LDPC-Coded partial response channels," *2008 5th International Symposium on Turbo Codes and Related Topics*, pp. 49-54, 1-5 Sept. 2008.

[76] M. Viens and W.E. Ryan, "A reduced-complexity box-plus decoder for LDPC codes," *2008 5th International Symposium on Turbo Codes and Related Topics*, pp. 151-156, 1-5 Sept. 2008.

[77] Y. Han and W. E. Ryan, "LDPC decoder strategies for achieving low floors," *2008 UCSD Information Theory and Applications Workshop*, pp. 277-286, 27 Jan. 27-1 Feb. 2008. **(invited)**

[78] Shadi Abu-Surra, W. E. Ryan, and Dariush Divsalar, "Asymptotic ensemble enumerators for protograph-based generalized LDPC codes: computational complexity ," *2008 UCSD Information Theory and Applications Workshop*, pp 63-65, 27 Jan. - 1 Feb. 2008.

[79] K. Jagiello, Z. Aydin, W.-R. Ng, W. E. Ryan, M. W. Marcellin, A. Bilgin, "Joint JPEG2000/LDPC Code System Design for Image Telemetry," *Proc. of 2008 International Telemetry Conference*, Las Vegas, NV, 28 Oct. 2008.

[80] K. Jagiello, W. E. Ryan, and M. Marcellin, "Convolutional versus LDPC and turbo codes on the Rayleigh fading channel," *2009 Int. Conf. on Telemetry*, Oct. 2009.

[81] S. Abu-Surra, W. E. Ryan, and D. Divsalar, "Ensemble pseudo-codeword weight enumerators for protograph-based generalized LDPC codes," *2009 IEEE GlobeCom Conf.*

## ◆ Patents ◆

W. E. Ryan, "Viterbi detector for class II partial response equalized Miller-squared signals," U.S. patent 5916315, June 29, 1999.

W. E. Ryan and A. Ghayeb, "RAM-search processor for intersymbol interference cancellation," U.S. patent 6532272, March 11, 2003.

## ◆ Unpublished Invited Talks ◆

"Low-Floor Decoders for LDPC Codes with Application to Magnetic Storage," Carleton University (Ottawa), May 2008

"Low-Density Parity-Check Codes: An Introduction and Recent Results," Rincon Corp. (Tucson), Feb. 2007.

Mitre Corp., McLean, VA , " Selected Research Activities in Coding for Wireless Communications at the University of Arizona", Jan. 2007

Communication Theory Workshop, Sedona, AZ, May 2007, "Toward low error floors in LDPC and G-LDPC codes"

2007 GlobeComm Conference Data Storage Workshop, "Turbo equalization and iterative decoding for the storage channel", Nov. 2007.

Zeta Associates Inc. Fairfax, VA , "Recent results on coding and signal processing for OFDM channels"

Jet Propulsion Laboratory, "Low-Floor Generalized LDPC Codes with Hamming or RSC Nodes", April 2006.

CCSDS standards meeting, Athens, Greece, April 12, 2005, "RS Codes as Erasure Codes"

University of Leeds (U.K.), April 18, 2005, "Modern Error-Control Codes for Data Communication and Storage"

Broadcom Corp., Longmont, CO, December 9, 2005, "Advances in the Application of LDPC Codes to Data Storage"

"Simplified eIRA Code Design for Correlated and Uncorrelated Fading Channels," Concordia University, Montreal, Quebec, May 2004.

" Towards the Optimal Bit Aspect Ratio in Magnetic Recording," DIMACS Workshop On Theoretical Advances In Information Recording, DIMACS Center, Rutgers University, March, 2004.

"An Introduction to LDPC Codes," University of New Mexico, April 2003.

"LDPC Codes for High-Density Tape Recorders," IBM, Tucson, Sept. 2003.

"LDPC Codes with Application to Multi-Antenna Communication Systems - Part I: On the Universality of LDPC Codes," General Dynamics, Scottsdale, AZ, Oct. 2003.

" On the Universality of LDPC Codes," University College, Dublin, Ireland, May 2003.

"An Introduction to LDPC Codes with Applications to Magnetic Storage," Seagate Technologies, San Jose, CA, June 21, 2002.

"Design and Performance Analysis of LDPC Codes in Burst-Erasure Channels," Univ. of Calif. at Davis, June 17, 2002.

"A Low-Density Parity-Check Code Tutorial," Lulea University of Technology, Lulea, Sweden, April 8, 2002.

***Invited 2-day short course:*** "LDPC codes and Their Applications," Intel, Chandler, AZ, Feb. 2002.

"Near-Optimal Convolutionally Coded Asynchronous CDMA with Iterative Multiuser Detection and Decoding," University of California, Los Angeles, Oct. 2001.

"An Introduction to Low-density Parity-Check Codes," New Mexico State University, April 2001.

"Performance of Low-Density Parity-Check Codes in Noise-Burst Channels," University of Nebraska, March 2001.

"Demonstration of a Simulink Turbo-Coded PR2 Channel Simulator," Seagate University Research Conclave, Dec. 2000.

"An Overview of Codes and Iterative Decoding for Data Storage," The Optical Data Storage Center Industry Advisory Board Meeting, Oct. 2000.

***Invited 3-day short course:*** "Turbo Codes," at IBM, San Jose, CA, Sept. 1999.

"Concatenated Codes for PR4 Signaling," at Lucent Bell Laboratories, Allentown, PA, Aug. 1999.

"A Turbo Code Tutorial," The Analytic Science Corporation, Reston, VA Summer 1998.

"Performance of Turbo Codes on Magnetic Recording Channels," National Storage Industry Consortium Annual Meeting, Monterey, CA, Summer 1998.

"Turbo Codes for Magnetic Data Storage," Quantum Corporation, Milpitas, CA, Summer 1998.

"Turbo Codes and Their Application to Magnetic Data Storage," Cirrus Logic, Broomfield, CO, Summer 1998.

***International Storage Industry Consortium (INSIC) Quarterly Meetings:*** I have given approximately **20 talks** related to research on coding for magnetic storage at the INSIC quarterly meetings in the past six years.

***NASA/CCSDS Standards Meeting:*** I have given over 12 talks related to research on coding for near-earth satellite communications channels in the past eight years.

◆ **Short Courses** ◆

UCLA Extension Short Course on Channel Codes – LDPC Codes:  
2003, 2004, 2005, 2006, 2007

◆ **Research Funding Sources -- Present and Past** ◆

National Science Foundation (NSF)  
National Aeronautics and Space Administration (NASA-Goddard, NASA-JPL)  
Sandia National Laboratories  
Information Storage Industry Consortium (INSIC-EHDR, INSIC-Tape)  
Intel Corporation  
Seagate Technologies  
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Broadcom  
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