



CMRR

Center for Memory and Recording Research

University of California – San Diego
La Jolla, California 92093-0401

35th Anniversary & Research Review

March 14 & 15, 2018

Website: <http://cmrr.ucsd.edu>



35th Anniversary Schedule

Wednesday, March 14, 2018

8:00 AM – Breakfast / All day Poster Session at CMRR Lobby

8:45 AM - Opening Remarks
Associate Vice Chancellor Miroslav Krstic

9:00 AM – Opening Remarks
Associate Dean George Tynan

9:10 AM – Welcome
CMRR Director Eric Fullerton

9:30 AM – Talks from Distinguished CMRR Alumni

Magnetic Skyrmions at Room Temperature Spintronics With a Twist

Geoff Beach, MIT

From Magnets to VR and How It All Started at CMRR

Erik Shipton, Facebook

The Science of Becoming a Code STAR

Eitan Yaakobi, Technion

11:00 AM – 10 Minute Break

The Wolf Pack & STAR Group: Over 3 Decades of SNR Improvement

*Kelly & Jim Fitzpatrick,
Broadcom & Western
Digital*

Applied Physics-based Design for Biomedical Device and Materials Processing Applications

*Bart Raeymaekers,
University of Utah*

Guns, Dogs, CMRR and Money

*Joshua Harrison
Barcelo, Harrison &
Walker, LLP*

CMRR and the Digital Universe

*Kaizhong Gao, Argonne
National Lab*

12:30 PM – Lunch – CMRR Lobby

1:30 PM – Special Session

Data Storage at the Edge & Beyond

*Mark Re, Seagate
Technology*

2:10 PM – CMRR Research Highlights

Synthesis of Nanoporous Metal Through Conversion Reactions

*Ping Liu,
NanoEngineering*

	Memcomputing: Leveraging Memory and Physics to Compute Efficiently	<i>Max Di Ventra, Physics</i>
	First-Principles Design of “d0” Magnetism and Interfacial Magnetic Anisotropy	<i>Kesong Yang, ECE</i>
	Nanoscale Heat Transfer	<i>Renkun Chen, MAE</i>
	Nanometer Scale Light Sources	<i>Zhaowei Liu, ECE</i>
	Design, Mechanics and Materials Problems in Medical Device Technology and Information Storage	<i>Frank Talke, MAE</i>
	35 Years of CMRR and Where the Future Leads	<i>Eric Fullerton, CMRR Director</i>
	Coding with the STARS	<i>Paul H. Siegel, ECE</i>
	NOVA: A High-Performance, Fault-Tolerant File System for Non-Volatile Main Memories	<i>Steve Swanson, CSE</i>
	Ultrafast Dynamics in Quantum Antiferromagnets	<i>Oleg Shpyrko, Physics</i>
	Secure Erasure of Magnetic Storage Devices at Product End of Life	<i>Fred Spada, CMRR</i>
	Merging the Best of Nanomaterials: Hybrid Graphene/Quantum Dot Photodetectors	<i>Oscar Vasquez Mena, NanoEngineering</i>
	High-Performance Micromagnetics for Nanomagnetic Materials and Devices	<i>Vitaliy Lomakin, ECE</i>
5:30 PM – Reception at the Faculty Club, Announcement		
6:30 PM – Dinner at the Faculty Club		

Thursday, March 15, 2018		
8:00 AM – Continental Breakfast at CMRR		
8:20 AM – Welcome and Introduction		
8:30 AM – Signal Processing & Coding <i>Professor Paul H. Siegel</i>		
1	On the Capacity of 2-Dimensional Channels	<i>Yonglong Li</i>
1	Universal Polar Codes for Binary Asymmetric Channels	<i>Karthik Nagarjuna</i>
2	Ladder Codes: A Class of Error-Correcting Codes with Multi-Level Shared Redundancy	<i>Pengfei Huang</i>
2	Optimal Data Shaping Code Design	<i>Alex Bergman</i>
3	Using Machine Learning Algorithms to Map Out Bad Pages in NAND Flash Memory	<i>Yi Liu</i>
10:00 AM - 10 Minute Break		
10:10 AM – Non-Volatile State Memory <i>Professor Steve Swanson</i>		
4	A Fault-tolerant User-space Library for Building Persistent Objects	<i>Lu Zhang</i>
10:30 AM – Tribology & Mechanics <i>Professor Frank Talke</i>		
5	Modeling of Pulsed Laser Heating in HAMR Using Molecular Dynamics	<i>Young Woo Seo to be presented by F. Talke</i>
6	Tip Enhanced Raman Spectroscopy Studies of Carbon Coated Hard Disk Surfaces	<i>Benjamin Suen</i>
7	Voltage Biasing and Tribochemistry of the Head Disk Interface	<i>Tan Trinh</i>
8	<i>In vivo</i> Investigation of an Interferometric Pressure Measurement System for Glaucoma Management	<i>Alex Phan</i>
9	Development of a Function Augmented Keratoprosthesis for Pressure Monitoring in Corneal Transplant Patients	<i>Phuong Truong</i>
10	3D Printing Endoscopes: The Esophageal Deflection Device	<i>Karcher Morris</i>
11	Luminal Esophageal Temperature Monitoring During Treatment for Atrial Fibrillation	<i>Scott Garner</i>

12:15 PM – Lunch – CMRR Lobby		
1:10 PM Special Session		
12	Functional Topological Light Sources	<i>Boubacar Kante</i>
1:40 PM – Magnetic Films and Nanostructures <i>Professor Eric Fullerton</i>		
13	Tracking the Nucleation and Motion of Magnetic Skyrmions in Pt/Co/Os/Pt	<i>Jeffrey Brock</i>
14	Near-infrared Light Emission and Electronic Properties of Au/Si Ultrathin Hyperbolic Metamaterials	<i>Mohammed Salah El Hadri</i>
15	Helicity-dependent THz-emission in Thin Film Co/Pt Bilayers	<i>Rajasekhar Medapalli</i>
16	Interplay of Ferromagnetics and Superconductivity in Ni Nanowires with Nb Contacts	<i>Haowen Ren</i>
2:40 PM – Micromagnetic Modeling and Recording Physics <i>Professor Vitaliy Lomakin</i>		
17	Micromagnetic Modeling of Non-uniformities in Magnetic Tunnel Junctions for MRAM	<i>Iana Volvach</i>
17	Micromagnetic - SPICE Modeling of Magnetic Devices	<i>Iana Volvach</i>
18	Numerical Framework for All-Optical Switching in Magnetic Nano-Structures	<i>Marco Menarini</i>
3:30 PM – 10 Minute Break		
18	Modeling Magnetization - Eddy Current Dynamics in Micromagnetic Systems	<i>Simon Couture to be presented by V. Lomakin</i>
19	Implementing Valet - Fert Theory of Spin Diffusion in a Micromagnetic Code	<i>Xueyang Wang</i>
19	Spin Dynamics in Nanomagnetic Structures	<i>Shihao Zhuang</i>
20	Computing Resonant Modes in Micromagnetic Systems	<i>Zhounan Lin</i>
5:00 PM – Advisory Council meeting		