

CMRR Report

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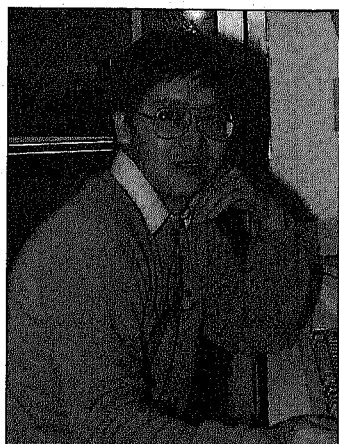
Center for Magnetic Recording Research

Number 13

Summer 1990

Yufeng Li to Seagate

In April 1990 postdoctoral student Yufeng Li joined Seagate Technology, Minneapolis as a senior engineer after spending eighteen months at the Center working closely with Professor Frank Talke.



Yufeng Li, Seagate

Li graduated from Xian Jiaotong University, China, with a bachelor of engineering degree in 1981. Continuing his studies at the University of Wisconsin, Madison, he completed his master's degree in mechanical engineering in 1984 and his Ph.D. in 1988. His doctoral thesis topic was "Generalized Formula to Predict the Coefficient of Friction in Sliding/Rolling Contacts."

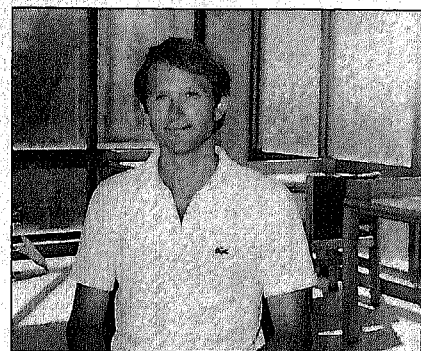
While at the Center, Yufeng Li worked with Professor Talke on tribology of the head/disk interface. As well as a number of presentations for the technical meetings for CMRR sponsors, he presented a paper at the ASME/STLE meeting in Fort Lauderdale, Florida. Published papers since coming to the Center include a January 1990 article in *IEEE Transactions on Magnetism*, an Intermag paper from the Brighton meeting to be published in the September issue of *IEEE Transactions on Magnetism*, and a submission to the *Journal of Tribology*.

Recent CMRR Graduate to Honeywell

Dr. Manfred E. Schabes received his Ph.D. in physics at the University of California, San Diego, in June 1989. His thesis research was carried out at CMRR, supervised by Professor H. Neal Bertram. His dissertation, "Micromagnetics of Small Ferromagnetic Particles" is available to CMRR sponsors through CMRR's Information Center. While at CMRR Schabes published several papers in the *Journal of Applied Physics* and the *IEEE Transactions on Magnetism*. He also gave a number of presentations at the CMRR micromagnetics workshops, as well as at international conferences.

Schabes received his degree Diplom-Ingenieur in physics from the Technical University of Vienna in 1982. From 1982 until 1984 he was a Fulbright scholar at the University of Texas studying condensed matter physics.

Since joining Honeywell, Inc. Test Instruments Division, in Littleton, CO as a senior design engineer, Dr. Schabes has worked in the Data Storage Engineering Department where he is working on improved head performance to achieve higher recording densities and data rates. He expresses a strong interest in continued close collaboration with CMRR on magnetic recording physics.



Manfred Schabes, Honeywell

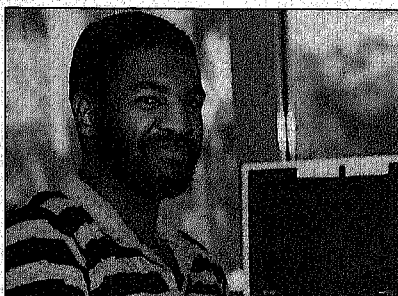
Graduate to Georgia Tech

Recent CMRR graduate Anthony D. Weathers has accepted an assistant professorship at Georgia Institute of Technology effective June 25, 1990.

No stranger to that institution, Tony completed his B.S. in electrical engineering there in 1984 and his M.S. in 1985. His undergraduate speciality was computer engineering and his master's specialization covered digital signal processing.

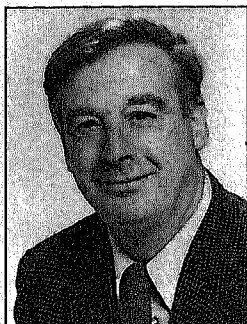
Weathers enrolled in the doctoral program at UCSD's Department of Electrical and Computer Engineering in 1986. In 1987 he came to study with Professor Jack Wolf at the Center for Magnetic Recording Research. His thesis is entitled "Modulation Techniques for Digital Magnetic Recording."

During his three years at the Center, Weathers developed a number of new modulation and coding systems including a new (1,7) code at rate 2/3rds with only 4 states. This work is included as a chapter of his thesis.



Anthony D. Weathers to Georgia Institute of Technology

Other chapters include AC Bias recording and controlled polarity modulation. He also presented two Intermag papers, one at the Vancouver, B.C. 1988 meeting and the other in Washington D.C. in 1989.



John C. Mallinson

FROM THE DIRECTOR

Several years ago, upon joining the University of California, I was told that CMRR had made a great mistake in choosing its name because, as everyone then knew, magnetic recording was old fashioned and virtually certain to be displaced by optical techniques within a few years. Indeed, a talk I gave on campus in November 1984 upon "The Next Decade in Magnetic Recording" drew, by a factor of five, a smaller audience than a talk the following week entitled

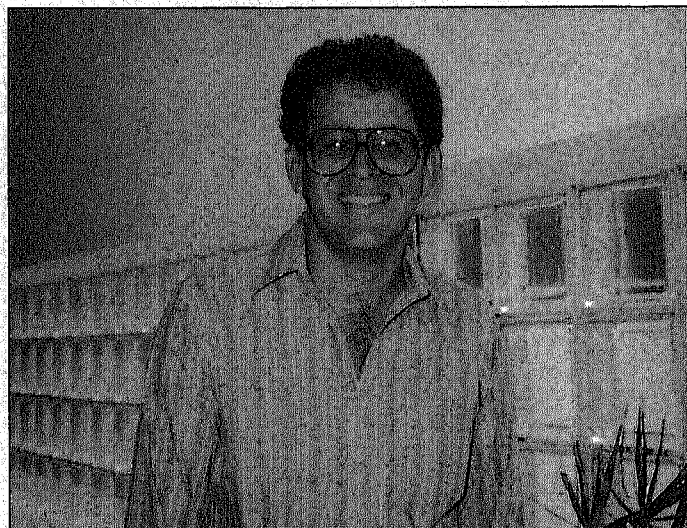
"Three Dimensional Holographic Storage in (I forget what) Single Crystals." Now in 1990, it is clear that the faith in magnetic recording shown by CMRR's founders was indeed not misplaced. Today magnetic recording has exceeded all other rival recording techniques in both data capacity and data rate. In the high-end small disc drive world, at least five U.S. companies now make 5 1/4" drives with capacities exceeding 1.5 Gigabytes — a factor of two greater than that offered in magneto-optical drives of similar physical form factor. In the professional digital video recorder world, off-the-shelf production hardware, which operates at almost 250 megabits per second and stores the equivalent of tens of 14" optical discs, is now being shipped. I am rapidly becoming of the opinion that optical recorders are best considered, like Ga-As semiconductor-devices, as belonging in a category where "they have been, are now and will always be the future technology of choice!"

Balanson Sabbatical at CMRR

Dr. Richard Balanson has recently joined the Center for Magnetic Recording Research as a visiting scholar. Balanson was previously the laboratory director of the high end storage business unit at IBM, San Jose. He has taken a sabbatical, and will be at the Center for the next eighteen months.

Balanson is a materials scientist by training, and will be working with both Professors Talke and Berkowitz on a series of projects related to head/disk and head/tape interface issues.

Rich is also working with various industrial concerns on increasing the amount of government work and funding for the magnetic recording industry.



Richard D. Balanson

Industrial Visitors to Berkowitz Lab

Earlier this year, John Slonczewski, a theorist from IBM, Yorktown Heights spent several weeks working with Professor Ami Berkowitz and his graduate students. Slonczewski looked at modeling exchange anisotropy and came up with a suggested model which will be implemented by the Berkowitz lab when enough data has been gathered. Mathew Carey, a doctoral student of Professor Berkowitz has been conducting the experimental work on using exchange anisotropy for biasing MR heads. His work has produced new types of exchange coupled materials which look very promising at this time. While at the Center, Slonczewski also helped model surface en-

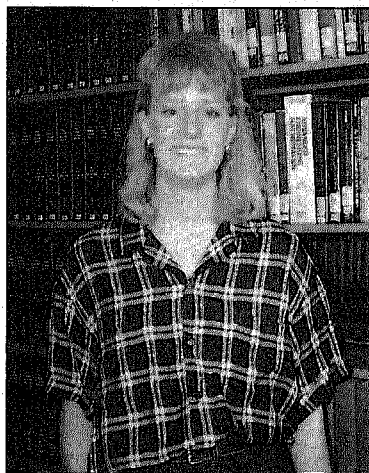
hanced anisotropy, another area of interest to the Berkowitz group.

Michael Gyorgy of AT&T Bell Laboratories is the current industrial visitor to the Berkowitz lab. An experimentalist, Gyorgy will be interacting with the students and assessing the experimental techniques being employed in the lab.

Of particular interest is the new magnetic long-range ordering in Fe-SiO₂ granular films, an exciting new phenomenon with potential for recording media and MR heads. Gyorgy will also work with Mathew Carey on the new anti-ferromagnetic multi layers, which are being used in the exchange coupling project.

IBM Fellowship Awarded

Doctoral student Kelly Knudson has been awarded an IBM graduate fellowship for the 1990-91 academic year. Paul Siegel of IBM, who is currently resident at CMRR as an IBM industrial visitor, will act as technical liaison to Kelly. The competitive fellowship will cover fees and a stipend.



Kelly Knudson

Knudson completed her undergraduate studies in 1988 at the University of California, Los Angeles majoring in physics. Earlier this year she was awarded her M.S. from UCSD's Department of Electrical and Computer Engineering in communications theory and systems. In the spring quarter of 1990, Kelly joined CMRR working with Professors Jack Wolf and Larry Milstein on soft decision Viterbi detection. She plans to

work further on error correction codes for magnetic recording and digital communication systems.

Viterbi Receives Marconi Fellowship

Dr. Andrew Viterbi, an adjunct professor in the Department of Electrical and Computer Engineering at UCSD was presented with the Marconi International Fellowship on April 25 at the National Portrait Gallery, Washington, D.C. In the United States, the Marconi Fellowship is administered by the Polytechnic University, New York under the auspices of the Smithsonian Institution. Dr. Viterbi delivered the keynote address on the subject of his commission at the award dinner.

Dr. Viterbi was selected for this prestigious award "for his achievements in the field of digital communications in many adverse environments, particularly through his widely used algorithm." The Marconi International Fellowship was first awarded in 1974, 100 years after the birth of Guglielmo Marconi. In 1901, Marconi successfully transmitted the Morse Code letter "S" from Poldhu, England to St. John's Signal Hill, Newfoundland, thereby turning the revolutionary idea of transmitting Hertzian waves across thousands of miles, without wires, into practice. The fellowship commemorates Marconi's contributions to scientific invention, engineering and technology and his commitment to their use for peaceful ends. The Marconi Fellowship is awarded annually to recognize an individual who has made a significant contribution to communications technology through scientific and engineering discoveries, inventions or innovations and carries an award of \$50,000.

Guest Editorship

Professor Ami Berkowitz of CMRR was the guest editor of the most recent issue of the Materials Research Society's *MRS Bulletin*. The Volume XV, Number 3 issue is devoted to magnetic materials. For non-subscribers, this issue is available from the Society for \$10. Members of CMRR's sponsoring companies can obtain a free copy by contacting CMRR's Information Center at (619) 534-6199.

CMRR STUDENT THESES

In order to disseminate the research of CMRR's students, a copy of each master's and doctoral thesis will be distributed to the Advisory Council member from each of the Center's sponsoring companies. When the company also supports a research library, a copy will be sent to the library.

Persons not affiliated with CMRR's sponsoring companies are advised to contact the following commercial supplier for copies of theses.

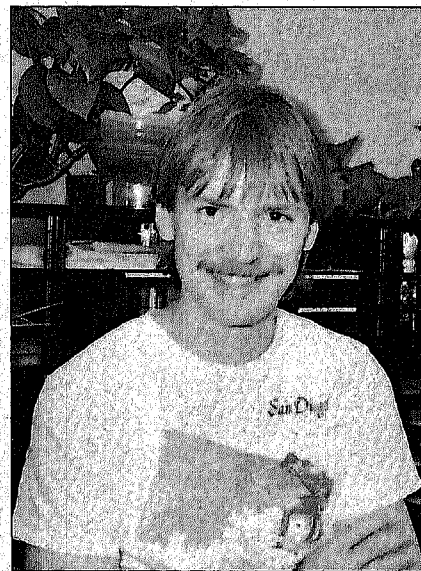
University Microfilms Inc. (UMI)
300 N. Zeeb Road
Ann Arbor, MI 48106
(800) 233-6901

It should be noted that it generally takes ten to twelve months after submission of the thesis before it becomes available through UMI.

German Student Studies at CMRR

Michael Wahl, an aeronautics and aerospace student from the University of Stuttgart is continuing his studies in the United States under a scholarship from the German government. He spent a year at the University of Arizona where he completed the requirements for his degree in aerospace engineering. Working under Professor Heinrich, Department of Aerospace and Mechanical Engineering, he completed his thesis entitled "Finite Element Modelling."

Currently, he is studying at CMRR with Professor Frank Talke, and completing course work in preparation for admission to the Ph.D. program at UCSD. During the summer, Wahl will be spending a month at Iomega in Roy, Utah, a CMRR-sponsoring company.



Michael Wahl

Future Conferences

July 23-26, 1990

The Magnetic Recording Conference, San Diego, CA. For info.: K. G. Ashar, IBM Corp., P06/625, 5600 Cottle Road, San Jose, CA 95193, (408) 256-3541.

October 1-3, 1990

Euroensors IV, in combination with Sensors, Technology and Applications V, Karlsruhe, FRG. For info.: P. Stilke, VDE Zentralstelle Tagungen, Stresemannallee 15, D-6000 Frankfurt (Main) 70, FRG.

October 2-3, 1990

5th Workshop on Vertical Bloch Lines and Micro-magnetic Memories, Tokyo. For info.: Ryo Suzuki, Central Research Lab., Hitachi Ltd., Kokubunji, Tokyo 185, Japan.

October 21-24, 1990

11th International Workshop on Rare-Earth Magnets, Pittsburgh, PA. For info.: S. G. Sankar, Carnegie Mellon University, 4400 Fifth Avenue, Pittsburgh, PA, (412) 268-5649.

October 25, 1990

International Symposium on Magnetic Anisotropy and Coercivity in Rare-Earth Transition Metal Alloys, Pittsburgh, PA. For info.: Same as above.

October 29 - November 1, 1990

35th Conference on Magnetism and Magnetic Materials (MMM), San Diego, CA. For info.: Courtesy Associates, 655 15th St., N.W., Suite 300, Washington, DC 20005, (202) 639-5088.

October 29 - November 1, 1990

Japan International Tribology Conference (ITC) Nagoya '90, Nagoya, Japan. For info.: c/o Toyota Technological Institute, 2 Hisakata, Tempaku, Nagoya 488, Japan.

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