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1982 GORDON RESEARCH CONFERENCE ON HOLOGRAPHY AND
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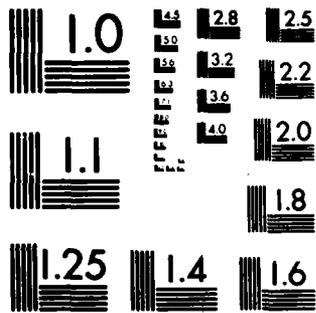
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FINAL REPORT

1982 GORDON RESEARCH CONFERENCE

ON

HOLOGRAPHY AND OPTICAL INFORMATION PROCESSING

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JUN 10 1983

Prepared for

Dr. John Neff
Electronic and Material Sciences
Air Force Office of Scientific Research (AFSC)
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Submitted by

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Chairman
1982 Gordon Research Conference
Holography & Optical Information
Processing

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July 1982

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The conference was considered a major success by the majority of those who attended. The presentations were excellent and the personal interactions and knowledge interchange were very rewarding.		

FINAL REPORT

1982 Gordon Research Conference
on
Holography and Optical Information Processing

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1. Technical Statement

The field of Holography and Optical Information Processing is an important and active one with many significant advances during the past twenty years. A family tree showing only the major interrelations is shown in Figure 1. It is adapted somewhat from a recent presentation by Professor Joseph Goodman of Stanford University.* This field is one with intense research activity at many universities, complemented by device research and high technology activities in industrial laboratories.

For the traditional part of the conference, twenty-one speakers were invited representing essentially all major sub-groups shown in Figure 1. A complete list of speakers is included in Appendix A with corrections to reflect last-minute cancellations and additions. An effort was made to attract a strong industrial component to this conference, so that there would be up-to-date presentations from scientists who are making the technology advancements. It will be interesting to study the conference evaluation forms in order to assess whether this unusual mixture of theoretical and practical types was well received by the audience. My general impression was that the invited talks were stimulating and that the speakers were subjected to much lively discussion.

* Winter Workshop on Optical Information Processing, Cuernavaca, Mexico, January 1982.

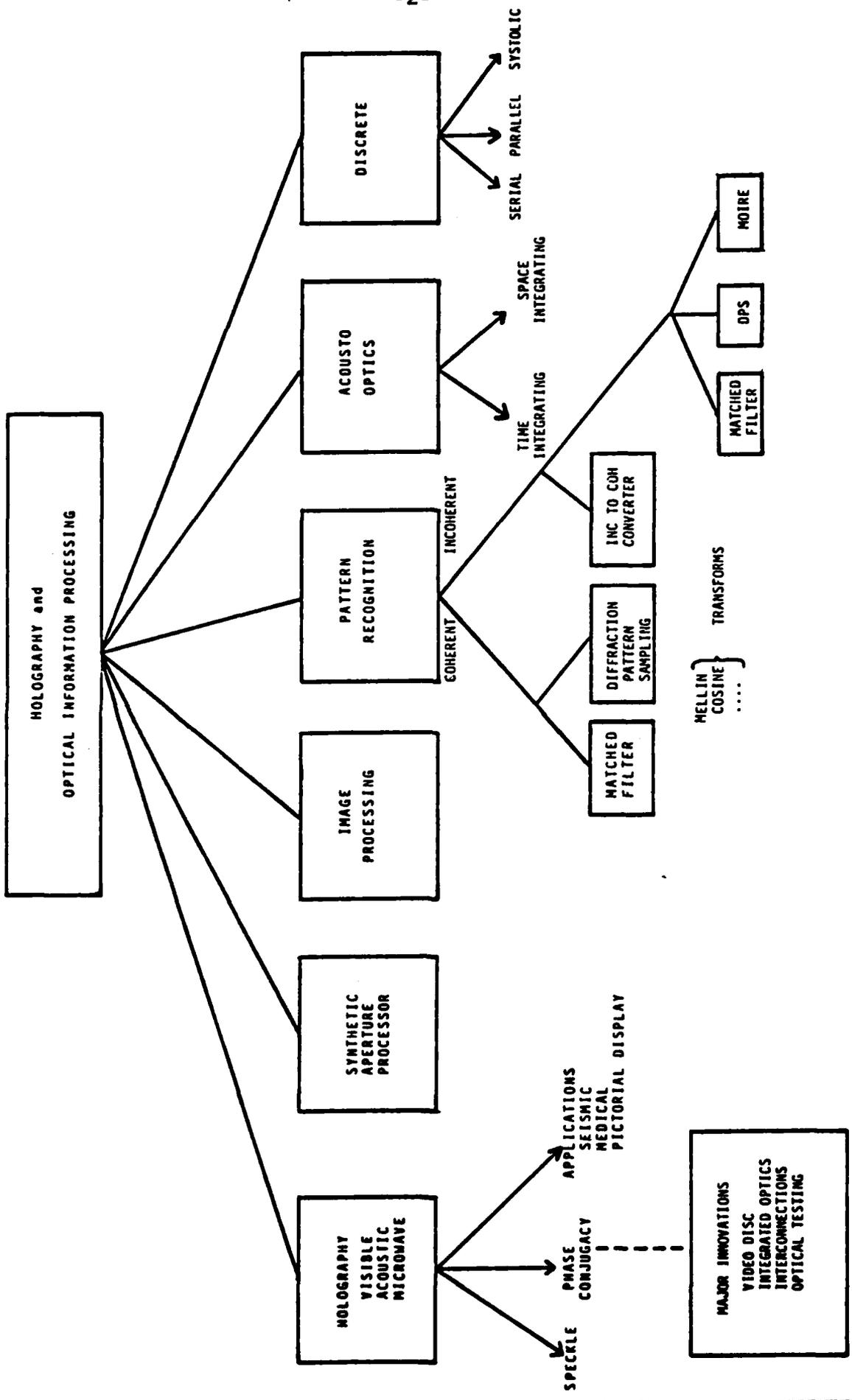


Fig. 1. Family Tree of Holography and Optical Information Processing. Many of the major developments in this field have occurred since the early sixties.

In the evening sessions, while Wednesday was devoted to invited speakers, some variety was provided as follows. On Monday, a Workshop Panel discussion was held on the topic "Diffraction Pattern Sampling and Optical Spatial Filtering." Here the concept was to promote discussion of a relatively mature field. By having several highly qualified speakers present short statements across the field, it was possible by means of audience participation to gain a good overview of a complex field. It also provided a good opportunity to hear the pros and cons of different approaches to the same problem in optical processing. All in all this discussion was very worthwhile. The outgoing chairman wishes he had scheduled two Workshop Panel sessions. The other topic would have been "Speckle."

Tuesday and Thursday evenings were used for discussions of Poster Papers. These papers were accepted as offered by the authors. In this regard, the conference facilities were excellent. The papers were posted early in the conference social rooms, so that it was relatively easy to have a short or lengthy session with a given author any time over a two-day period. The titles of poster papers are listed in Appendix A. Also on Thursday evening an ad-hoc group put together an informal, very lively discussion of pictorial holography. This discussion was led by Steven Benton who did a very able job on a topic to which he is dedicated.

2. Funding

The purpose of this document is to report on the expenditure of funds received from the Air Force Office of Scientific Research. Funding of \$4,000.00 was granted in response to an unsolicited proposal. In the

proposal it was indicated that these funds would be spent to promote attendance of younger scholars in the field. They are listed in the following table:

<u>Name</u>	<u>University</u>	<u>AFOSR Fund</u>	<u>GRC Special Fund</u>
Robert Akins	UC San Diego	\$ 210.00	
Brian Brames	The Institute of Optics	250.00	
Chris Brophy	The Institute of Optics	250.00	
T.H. Chao	Pennsylvania State Univ.	110.00	
Y.S. Cheng	University of Michigan	150.00	\$ 55.00
Roger Easton	Optical Sciences Center	300.00	
Art Gmitro	Optical Sciences Center	300.00	
Paul Haugen	University of Minnesota	250.00	
Y.G. Jiang	University of Michigan	150.00	50.00
Chris Koliopoulos	Optical Sciences Center	250.00	
Phillip Lam	Optical Sciences Center	300.00	
Kevin O'Donnell	The Institute of Optics	250.00	
Rick Paxman	Optical Sciences Center	300.00	
Thomas Stone	The Institute of Optics	250.00	
Mark A. Title	U.C. San Diego	210.00	
Moshe Tur	Stanford		400.00
Dennis Venable	The Institute of Optics	250.00	
N. Wang	Pennsylvania State Univ.	110.00	
S.L. Zhuang	Pennsylvania State Univ.	110.00	
	TOTAL AFOSR FUNDS	\$4,000.00	

GORDON RESEARCH CONFERENCE SPECIAL FUND:*

Name	University	AFOSR Fund	GRC Special Fund
H.H. Barrett	Optical Sciences Center		\$300.00
Hartmut Bartelt	University of Minnesota		350.00
John C. Bortz	The Institute of Optics		250.00
W.T. Cathey	University of Colorado		300.00
Nicholas George	The Institute of Optics		400.00
Y. Ichioka	University of Osaka		600.00
Sing H. Lee	UC San Diego		300.00
Emmett Leith	University of Michigan		500.00
Matt Lehmann	Stanford Research		450.00
Adolf Lohmann	Universitat Erlangen		600.00
Phillip H. Malyak	The Institute of Optics		250.00
G.M. Morris	The Institute of Optics		325.00
Bahaa E.A. Saleh	University of Wisconsin		300.00
Shenge Wang	The Institute of Optics		250.00
Emil Wolf	The Institute of Optics		500.00
Jim Wyant	Optical Sciences Center		300.00
Seiji Yonezawa	Hitachi Central Research Labs		600.00
F.T.S. Yu	Pennsylvania State University		300.00
	GRC Fund Total		\$7,380.00
	GRC Balance		\$ 120.00

* These figures are as submitted in the final recommendation of this conference Chairman on June 23, 1982. However, they are subject to final review and actual disbursement by the GRC Director and his personnel. Hence there may be slight discrepancies in the actual sums paid.

3. Conference Attendance

There were approximately 115 people attending this conference. A complete address list is included in Appendix B. The breakdown of attendees is as follows:

52 attendees from industry

63 attendees from universities, 26 of whom were doctoral students.

Participants came from every geographic area of the United States and from eight foreign countries: Canada, People's Republic of China, Germany, Israel, Japan, Mexico, The Netherlands, and Sweden.

PROGRAM

GORDON RESEARCH CONFERENCE

HOLOGRAPHY AND OPTICAL INFORMATION PROCESSING

JUNE 21-25, 1982

PLYMOUTH, NEW HAMPSHIRE

CHAIRMAN: NICHOLAS GEORGE

VICE-CHAIRMAN: JAMES C. WYANT

MONDAY 21 JUNE, MORNING SESSION

NICHOLAS GEORGE--Welcome

EMMETT N. LEITH--Presider

"The Role of Higher Order Correlations in Optical Information Processing"

ADOLF W. LOHMANN, Universitat Erlangen.

"An Overview of Titanium Diffused Lithium Niobate Integrated Optics Devices"

ROD C. ALFERNESS, Bell Laboratories.

COFFEE BREAK

"Facts and Myths Regarding the Usefulness of the Technique of Phase Conjugation"

EMIL WOLF, University of Rochester.

EVENING SESSION

WORKSHOP PANEL

"Diffraction Pattern Sampling and Optical Spatial Filtering"

BRIAN J. THOMPSON--Chairman*

College of Engineering and Applied Science, University of Rochester

KEITH BROMLEY, Naval Ocean Systems Center

SING H. LEE, University of California San Diego

ROBERT D. LEIGHTY, U.S. Army Engineer Topographic Laboratories

G. MICHAEL MORRIS, The Institute of Optics

FRANCIS T. S. YU, Pennsylvania State University

*Adolf W. Lohmann presided in the absence of Brian J. Thompson.

TUESDAY 22 JUNE, MORNING SESSION

BOB D. GUENTHER--Presider

"The Total Internal Reflection Spatial Light Modulator"
ROBERT A. SPRAGUE, WILLIAM D. TURNER, LARRY N. FLORES,
RICHARD V. JOHNSON, DAVID L. HECHT, and ANTONIO NAFARRATE.
Xerox Palo Alto Research Center.

"Image Design"
BAHAA E. A. SALEH, University of Wisconsin.

COFFEE BREAK

"Optical Systolic Array Processors and Their Close Relatives"
H. JOHN CAULFIELD, Aerodyne Research.

EVENING SESSION

POSTER SESSION I

JAMES C. WYANT--Presider

"Incorporation of Gain Into a Coherent Optical Processor with
Feedback"
ROBERT P. AKINS, University of California San Diego.

"Real-Time Generation of Wigner Distribution Functions for
One-Dimensional Signals"
RAVINDRA A. ATHALE, JOHN LEE, and HAROLD H. SZU, Naval Research Lab.

"Phase Retrieval by Optical Phase Differentiation"
JOHN C. BORTZ and BRIAN J. THOMPSON, The Institute of Optics.

"Detection of Ampule Contaminants Using Far-Field Holography"
JOE S. CRANE, PAUL DUNN, and BRIAN J. THOMPSON, The Institute of Optics.

"Cycloramic Display"
WOLFGANG DULTZ, University of Regensburg.

"Projection Theorems and Their Applications in 3-D Tomographic
Image Reconstruction and Display"
NABIL H. FARHAT, University of Pennsylvania.

"Near Infrared Holography by Two-Photon Scheme"
VOLKER G. GERBIG, IBM Research Laboratory.

POSTER SESSION I--Continued

"Medical Imaging"

GENE GINDI, Yale University; RICK PAXMAN and HARISON H. BARRETT,
Optical Sciences Center.

"Moire Deflectometry"

ODED KAFRY, Nuclear Research Center of the Negev.

"Particle Velocity Measurements Using Holographic and Diffraction
Pattern Sampling"

PHILLIP MALYAK, The Institute of Optics.

"Realization of Optical Transfer Functions by Means of Random
Multi-Aperture Filters"

LEIF A. OSTLUND, Royal Institute of Technology.

"Bandwidth of Holographic Optical Elements"

THOMAS W. STONE and NICHOLAS GEORGE, The Institute of Optics.

"Optical Signal Processing of Raster Formatted Data Related
to the Projection-Slice Theorem"

WILLIAM W. STONER, Science Applications.

"2-D Optical Processing of 1-D Acoustic Data"

HAROLD H. SZU, Naval Research Laboratory.

"Polarization Properties of Birefringent Phase Gratings"

ARMAND R. TANGUAY, JR., University of Southern California.

"Digital Optical Processing"

MARK A. TITLE, HOWARD BARR, and SING H. LEE, University of
California San Diego.

"White Light Information Processing"

FRANCIS T. S. YU, TIEN-HSIN CHAO, and SONGLIN ZHUANG, Pennsylvania
State University.

WEDNESDAY 23 JUNE, MORNING SESSION

STEPHEN A. BENTON--Presider

"Acousto-Optic Devices in Numerical Algebraic Processing"
WILLIAM T. RHODES, Georgia Institute of Technology.

"Iterative Phase Retrieval"
JAMES R. FIENUP, Environmental Research Institute of Michigan.

COFFEE BREAK

"Optical Logic Array Processor for an Optical Digital Computer"
YOSHIKI ICHIOKA, Osaka University.

EVENING SESSION

JOHN A. NEFF--Presider

"Recent Progress in Spatial Light Modulators for Coherent
Optical Processing Applications"
ARMAND R. TANGUAY, JR., University of Southern California.

"Deformable Mirror Displays"
LARRY J. HORNBECK, Texas Instruments.

"2-D Magneto-Optic Spatial Light Modulator"
WILLIAM E. ROSS, Litton Systems.

THURSDAY 24 JUNE, MORNING SESSION

KEITH BROMLEY--Presider

"Laser Diode for the Optical Disk"
SEIJI YONEZAWA, Hitachi Central Research Laboratory.

"Integrated Optical Approaches to Numerical Processing"
CARL M. VERBER, Battelle Columbus Laboratories.

COFFEE BREAK

"Phase Conjugation in Optics and Electronics"
ADRIANUS KORPEL, The University of Iowa.

EVENING SESSION

MATT LEHMANN--Presider

CONFERENCE SOCIAL & POSTERS REVISITED

FRIDAY 25 JUNE, MORNING SESSION

ROBERT E. BROOKS--Presider

"Advances in the CCD-Liquid Crystal Light Valve"
UZI EFRON, Hughes Research Laboratories.

"Optical Processing in Radon Space"
HARRISON H. BARRETT, Optical Sciences Center.

COFFEE BREAK

"Partitioned Holographic Optical Elements"
STEVEN K. CASE, University of Minnesota.

APPENDIX B

1982 GORDON RESEARCH CONFERENCE
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