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Tribute to Joseph W. Goodman

H. John Caulfield
Henri H. Arsenault
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A Tribute to
Joseph W. Goodman

Professor Joseph W. Goodman's contributions celebrated by this conference extend not only to his writing, but also to his outstanding teaching and training of students who now range from academics through industry leaders to astronauts. His work has inspired contributions to this conference that range from applications in astrophysics to nanometer-scale devices, from theoretical developments to medical diagnostics.

Of course his best-known work is his book on Fourier optics, which has remained the standard bible on the subject for over 40 years. His seminal paper on speckle launched a whole new field and eventually led to his book on statistical optics, a field in which he is still active despite being retired from Stanford University. Many of his publications with his students were either major theoretical advances or the invention of devices or methods.

Most of the speakers at this symposium were former students of Goodman's, or people who worked with him for a period of time. Certainly all claim to have been strongly influenced by Goodman's work.

Most of the publications of this symposium have a common thread which is Fourier optics. The application areas of Fourier optics seem surprisingly wide; after all, who would have predicted that Fourier optics would have applications in medical diagnostics and in aircraft black boxes?

This collection of articles should be a gold mine not only for researchers interested in the applications of Fourier Optics and Statistical Optics, but also for those interested in finding and understanding the relationships between seemingly widely separated areas of knowledge.

H. John Caulfield
Henri Arsenault

Preface from Joseph W. Goodman

It has become a custom to mark certain birthdays as being especially significant, and I would like to thank SPIE for taking note of my 75th and honoring me with a special symposium. The presentations at this symposium are printed in this volume; they are contributions from many people, some of whom I have worked with when they were students, and some of whom I have simply admired and drawn inspiration from during my career. I would like to express my sincere thanks to all the participants for taking the time, not only to attend the symposium but also to prepare the written versions of their papers.

I first entered the field of optics after the completion of my Ph.D. in 1962. My thesis had dealt with microwave radar countermeasures using what at that time was called "communication theory." (The thesis ended up being classified from late 1962 through the year 2003.) The new commercial availability of HeNe lasers in 1962/63 raised questions about what they could be used for, and I was fortunate to have the opportunity to start research in optics at Stanford in 1963, motivated by this question. I soon discovered the classic papers of Leith and Upatnieks on a new type of holography, explanations for which usually invoked modulated high-frequency carriers, a subject with which I felt very much at home. I also soon discovered the work of Emil Wolf on coherence theory and Leonard Mandel on photoelectron counting statistics, both of which matched my background in statistical treatment of signals and noise. It was the previous work of all these individuals which aided me immensely in changing my field of research to optics.

There is no better way to learn a new subject than to try to teach it others. Fortunately, Stanford allowed me to define and teach a new graduate course, starting in about 1965, even though I was not a member of the faculty at that time (I was appointed to the faculty in 1967). I named that course "Introduction to Fourier Optics," and it was quite well attended. No textbook on the subject existed, so I wrote lecture notes for the class, and after two or three years of corrections of errors by the students in the class, I was able to turn those notes into a textbook with the same title as the class. Publication of this book had a major impact on my career.

One of the great advantages of being a faculty member at a first rate institution such as Stanford is the extremely high quality of the students that attend. Indeed I was fortunate to have a large number of excellent Ph.D. students (49 in all), many of whom went on to have outstanding careers in academia, industry, and

government. I owe a great deal to those students, and I thank them for the fine work they have done and the friendships we have maintained over the years.

Finally, I owe special thanks to Henri Arsenault and John Caulfield, who organized the meeting, as well as to the SPIE staff who helped make it happen. I hope the reader will enjoy these papers.

Joseph W. Goodman