Introduction to the Series

The concept of the Institutes for Advanced Optical Technologies developed out of SPIE's desire to foster increased interaction and collaboration among researchers working in emerging optical technologies. The Institutes provide a forum for experts in these areas to analyze and document the state of the art and to point toward future trends and applications. Institute topics are selected for their timeliness as well as for their significance to future progress in the application of optics. Institute organizers invite selected experts to participate as paper contributors and discussion participants. It is intended that the interaction generated by the small-group structure in a retreatlike setting will foster productive discussions that are beyond the scope and possibility of a regular conference format.

Each Institute has two primary objectives: first, that the interactions and dialogue stimulate technical advancement, and second, that the publication of the Institute volume results in an authoritative collection of significant papers covering key topics in the field. While each editor and committee has unique criteria for determining the acceptability of contributions, it is intended that the Institute process itself will establish the worth and appropriateness of the individual contributions. Each contributor is asked to prepare a draft manuscript and circulate it to the other participants in advance of the Institute. The editor/chair organizes an agenda for discussing critical technical issues. The interactions and congenial discussions by the Institute members are the basis for the ensuing Institute volume. The final action of the Institute is to decide the scope of the volume and what material is to be included and what other material is to be added and by whom.

At this Institute on Holography held in Tatabánya, Hungary, 2-5 June 1990, technical issues relating to holography as an interdisciplinary technical field were addressed. Among the discussed topics were those on the relationship of holography to other fundamental sciences as well as practical applications in industrial technologies. Imagery becomes more evident in today's world, and holography has important contributions to make in fields such as art, video, archeology, and security. The participants at Tatabánya were representative of this broad spread of interests, and the papers in this volume will introduce the reader to the interdisciplinary aspects of modern holography and its potential for the future.

Roy F. Potter
General Editor, SPIE Institutes for Advanced Optical Technologies

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Holography

Commemorating the 90th Anniversary of the Birth of Dennis Gabor

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Introduction

"Where freedom is the order, I always feel infinity."

In 1973, on the occasion of the 25th anniversary of the first publication on holography, I organized an international symposium at the New York Medical College, where Dennis Gabor was the guest of honor. At the closing party, while chatting about various topics, I mentioned to him that we were about to celebrate the 85th birthday of my father, whom he knew, and who was professor of paleo-botany at the University of Szeged. Although he was retired, my father was still actively working in his lab, in excellent spiritual and physical condition. Dennis Gabor made the remark that he would not expect himself to reach such an old age. My reply was, why not? And on the occasion of that birthday, I wanted to organize another conference on holography, in Budapest rather than in New York, and again he would be the guest of honor.

I remembered this conversation at the 1989 SPIE conference in San Diego, when I mentioned to some of SPIE's officials that Dennis Gabor would have been 90 years old the following year, and that we wished to commemorate this event with conferences and exhibitions in Hungary. At the time, I already had the support of the Technical University of Budapest, the OFOTERT Optical, Fine-Mechanical and Photographic Supplies Company, the FORTE Photochemical Company, and the TUNGSRAM Company. Therefore, I suggested that the first step of the commemoration series be to organize an SPIE Institute of Advanced Optical Technologies with the topic "Holography as Science and Technology."

The Institute was originally planned to take place in Budapest, but in the meantime, we found out that Dennis's father, Mr. Bertalan Gabor, was managing director of the Hungarian General Mines Company at Tatabánya in the early twenties and that Tatabánya offered to give place to the Institute. The members of the Dennis Gabor Laser and Holography Laboratory of the Tatabánya Chapter of the Society for the Dissemination of Sciences could act as the local organizers; thus, it was decided to hold it there.

The scope of the Institute was to demonstrate that holography is more than a fascinating new display technique and that Dennis Gabor was not only an ingenious "engineer and inventor," as he often spoke of himself, but also a real humanist in the Renaissance sense. As one of the founding fathers of the Club of Rome, Gabor fertilized and enriched with his method of approach not only the physical and technical, but also the economical and environmental sciences, and even philosophy. My hope is that this book adequately mirrors the spectrum of his activities and their impact on current and future trends in holography.

A workshop on dichromated gelatine holography held by Alex B. Coblijn at the Institute of Physics of the Technical University Budapest, where the participants made their own holograms, was a practical part of the commemoration series.

Thanks to the support of the Hungarian National Museum, the Interdisciplinary Society for Arts, Science and Education INTART, and the Institut Francais in

Proc. of SPIE Vol. 10308 1030801-6

Budapest, an international exhibition entitled "Holograms from Four Continents: Space in Plane" was organized at the Hungarian National Museum with the participation of the Musée d'Holographie de Paris, the Deutsche Gesellschaft für Holographie e.V., Osnabrück, Holographic Research PTY Ltd. of Australia, and several individual holographers from around the world, showing more than 200 holograms. A highlight of the exhibition was the multiplex hologram of the original Hungarian St. Stephen's crown, produced in Hungarian-Japanese cooperation (J. Tsujiuchi, M. Suzuki, P. Greguss, A. Kollányi) with the generous support of the Fuji Optical Company.

Feelings about holography were well expressed in a poem of the Hungarian poet Mihály Simai, illustrated with holograms, which was seen at the entrance of the exhibition, the English version of which follows here in the translation of Adrianus Korpel of the University of Iowa:

Hologram World

With my hologram money I buy hologram bread by the pound. Then, grasping my hologram knife, I cut slices of hologram meat.

As an encore, I even cut my knife in slices, eat it and watch your watching my illusion's illusions.

I will build a hologram house near a hologram lake where, all around me, hologram woods whisper-wander in us through us.

Orchids and parrots will be there — all holograms. My heaving chest bears an inscription: "You'll never catch me — I am a hologram."

I weave this dazzling dream that keeps on weaving me: Listen, one day I will build a sea-washed settlement. On top of cloud-cutting cliffs will be my urban hologram — my wondertown.

To lighten loneliness I'll need a hologram companion switched on and off at will. "Friday" I shall name him and he will call me "Robinson."

So shall we live and one day die as even hope itself is — how shall I put it? —is but a kind of strutting show-off, a hologram.

At the commemoration session held in Tatabánya, the foundation of a Dennis Gabor Award was announced, consisting of two parts: (1) a *national* (Hungarian) award, where a bronze medal, designed by myself (see illustration) and executed by Mihály Fritz, a Hungarian silversmith, containing a portrait hologram of Dennis Gabor made by Alex B. Coblijn, will be given away every year for creative achievements in technology (for the first time in December 1990), and (2) an *international* award, a silver version of the same medal, presented every three years to one foreign and one Hungarian scientist under 35 years, for achievements in

modern optics related in some sense to holography. This will be donated by an International Curatorium (in alphabetical order): Nils Abramson, H. John Caulfield, Yuri N. Denisyuk, Gabor Garamszegi, Pál Greguss (chairman), Zoltan Hegedus, Jumpei Tsujiuchi, and Tibor Vámos. This will be presented for the first time in 1993, when the International Commission for Optics will hold its 16th Congress, ICO-16, in Budapest. The amount of the prize accompanying the medal will depend upon the funds we can raise for this purpose (NOVOFER Foundation for Technical and Intellectual Creation, International Dennis Gabor Award, Budapest) in the next few years.

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Design of the Dennis Gabor Award medal (diameter: 5 in.) (The portrait hologram of Dennis Gabor is inserted in the empty circle.)