PROCEEDINGS OF SPIE

15th Czech-Polish-Slovak Conference on

Wave and Quantum Aspects of Contemporary Optics

Miroslav Miler
Dagmar Senderáková
Miroslav Hrabovský
Editors

11–15 September 2006
Liberec, Czech Republic

Organized by
Czech and Slovak Society for Photonics (Czech Republic)
Faculty of Mechanical Engineering, Technical University of Liberec (Czech Republic)
Agency Action M (Czech Republic)

In Cooperation With
SPIE Czech and Slovak Chapter
Palacky University, Faculty of Natural Sciences (Czech Republic)

Published by
SPIE—The International Society for Optical Engineering

Volume 6609

The International Society for Optical Engineering

Proceedings of SPIE—The International Society for Optical Engineering, 9780819467485, v. 6609

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:
Author(s), "Title of Paper," in *15th Czech-Polish-Slovak Conference on Wave and Quantum Aspects of Contemporary Optics*, edited by Miroslav Miler, Dagmar Senderáková, Miroslav Hrabovský, Proceedings of SPIE Vol. 6609 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X
ISBN 9780819467485

Published by
SPIE—The International Society for Optical Engineering
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone 1 360/676-3290 (Pacific Time) · Fax 1 360/647-1445
http://www.spie.org

Printed in the United States of America.

Contents

Pagination: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication.

SPIE uses a six-digit CID article numbering system in which:
• The first four digits correspond to the SPIE volume number.
• The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B … 0Z, followed by 10-1Z, 20-2Z, etc.

The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

WAVE OPTICS

GUIDED WAVE OPTICS

OPTICAL DEVICES

OPTICAL MEASUREMENTS

OPTICAL IMAGING

VARIA

Conference Committees

Conference Chair

Miroslav Miler, Academy of Sciences (Czech Republic)

Conference Honorary Chair

Miron Gaj, Wrocław University of Technology (Poland)

Conference Vice-Chairs

Jerzy Nowak, Wrocław University of Technology (Poland)
Jan Peřina, Palacky University Olomouc and Academy of Sciences (Czech Republic)
Anton Štrba, Comenius University (Slovak Republic)

International Scientific Board

Ján Bartl, Slovak Academy of Sciences (Slovak Republic)
Miron Gaj, Wrocław University of Technology (Poland)
Ivan Glesk, Comenius University (Slovak Republic) and Princeton University (USA)
Petr Hlubina, Technical University Ostrava (Czech Republic)
Miroslav Hrabovský, Academy of Sciences (Czech Rupublic)
Zdenek Hradil, Palacky University Olomouc (Czech Republic)
Romuald Jóźwicki, Warsaw University of Technology (Poland)
Henryk Kasprzak, Wrocław University of Technology (Poland)
Miloš Klíma, Czech Technical University in Prague (Czech Republic)
Jiří Komrska, Brno University of Technology (Czech Republic)
Václav Kopecký, Technical University of Liberec (Czech Republic)
Miroslav Miler, Academy of Sciences (Czech Republic)
Jerzy Nowak, Wrocław University of Technology (Poland)
Jan Peřina, Palacky University Olomouc (Czech Republic) and Academy of Sciences (Czech Republic)
Dagmar Senderáková, Comenius University (Slovak Republic)
Przemyslaw Szlachetka, Adam Mickiewicz University (Poland)
Tomasz Szoplik, Warsaw University (Poland)
Anton Štrba, Comenius University (Slovak Republic)
Miroslav Šulc, Technical University of Liberec (Czech Republic)
František Uherek, Slovak University of Technology (Slovak Republic) and International Laser Centre (Slovak Republic)
Wacław Urbanczyk, Wrocław University of Technology (Poland)
Marek Zając, Wrocław University of Technology (Poland)

Session Chairs

Miroslav Jedlička, Czech and Slovak Society for Photonics (Czech Republic)
Petr Hlubina, Technical University Ostrava (Czech Republic)
Marek Jasiorski, Wrocław University of Technology (Poland)
Miloslav Dušek, Palacky University Olomouc (Czech Republic)
Dagmar Senderáková, Comenius University (Slovak Republic)
Ivan Glesk, Comenius University (Slovak Republic) and Princeton University (USA)
Wacław Urbanczyk, Wrocław University of Technology (Poland)
Czeslaw Radzewicz, Warsaw University (Poland)
Pavel Zemánek, Academy of Sciences (Czech Republic)
Jan Soubusta, Palacky University Olomouc (Czech Republic)
Miroslav Miler, Academy of Sciences (Czech Republic)

Organizing Committee

Miroslav Jedlička, Czech and Slovak Society for Photonics (Czech Republic)
Maciej Kucharski, Czech and Slovak Society for Photonics (Czech Republic)
Miloš Klíma, Czech Technical University in Prague (Czech Republic)
Miroslav Miler, Academy of Sciences (Czech Republic)
Dagmar Senderáková, Comenius University (Slovak Republic)
Miroslav Svoboda, Technical University of Liberec (Czech Republic)
Milena Zeithamlová, Agency Action M (Czech Republic)

Introduction

The 15th Czech-Polish-Slovak Optical Conference (XV CPS OC) was held 11-15 September 2006 in the Northern Bohemian university town Liberec. It was one of the series of regular meetings of the optical communities of the Czech, Polish and Slovak optical communities. The country where the conference takes place and organizer change every two years. Since the conference in Karpacz in 1996 the events have been known as the Conferences on Wave and Quantum Aspects of Contemporary Optics. The selected papers were published in the SPIE Proceedings.

This last Conference was organized for the first time by a new organizer, The Czech and Slovak Society for Photonics, in cooperation with the Faculty of Mechanical Engineering of the Technical University of Liberec. Until now, the conferences in the Czech lands had been organized by the Department of Optics of Palacky University in Olomouc.

The Conference was devoted to the actual achievements in the field of optics that had been reached in participating countries. Participants had the opportunity to attend 9 invited lectures of a planned 10, which covered a wide field of pure and applied modern optics. Five of them are involved in the Proceedings. During two full days and two half days of the Conference, 35 oral contributions were presented, and 27 posters displayed during one poster session. The structure of participants was as follows: 58 from the Czech Republic, 19 from Poland, and 13 from Slovak Republic. This Proceedings volume includes 58 Conference contributions selected by representatives of the International Program Committee Scientific Board.

Unlike the previous conferences of this series, the most contributions were devoted to the field of wave optics. Problems of unusual optical beams, manipulations with objects using optical fields, optical vortex effects, and other similar tasks were discussed. Optical measurements and devices were also in the scope of the contributions.

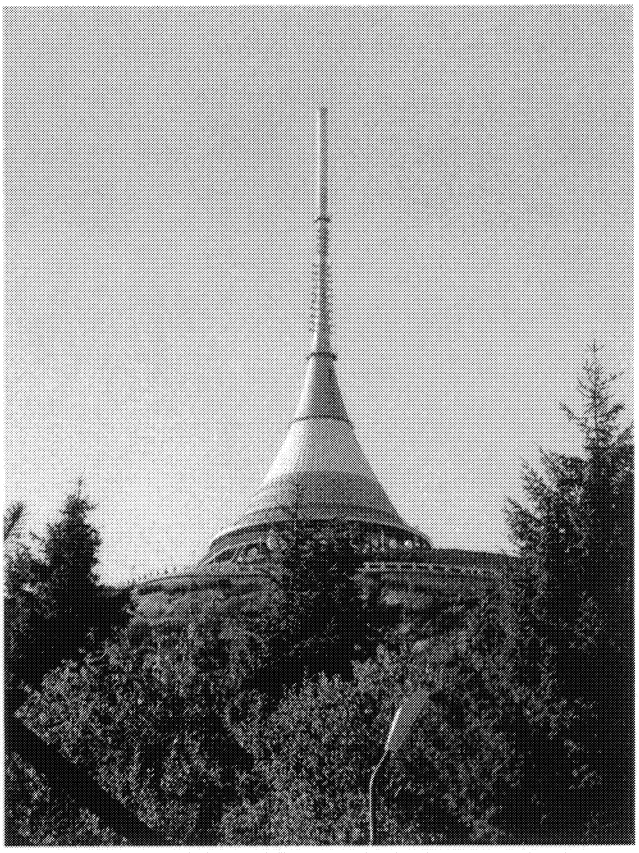
Evaluating the scientific level of this 15th Czech-Polish-Slovak Conference the International Scientific Board singled out the presence of mostly young participants and their outstanding scientific contributions. Young people with their older colleagues and supervisors constituted the largest portion of contributors.

Thanks for the success of the conference should be expressed to the Technical University of Liberec and the Organizing Committee, and especially to the Members of the International Scientific Board, invited lecturers, session chairs, and to all the participants.

The next conferences, the 16th Polish-Slovak-Czech Optical Conference on Wave and Quantum Aspects of Contemporary Optics, will be organized by the Wroclaw University of Technology and held in Poland in 2008. We would like to wish our younger colleagues, who continually replace the older generation, great future success.

Miroslav Miler
Dagmar Senderáková
Miroslav Hrabovský

... contrast of one century



Neoclassical **Liberec town hall** was designed by the Viennese architect ***Franz von Neumann*** and built in 1893. It has been the home of Liberec authority ever since.

Liberec is the administrative, educational, cultural, and economic center of northern Bohemia (western part of the Czech Republic), a true metropolis of the **Liberec region** and a city of importance of the meeting-point of three regions embodied by the **Euroregion Nisa**.

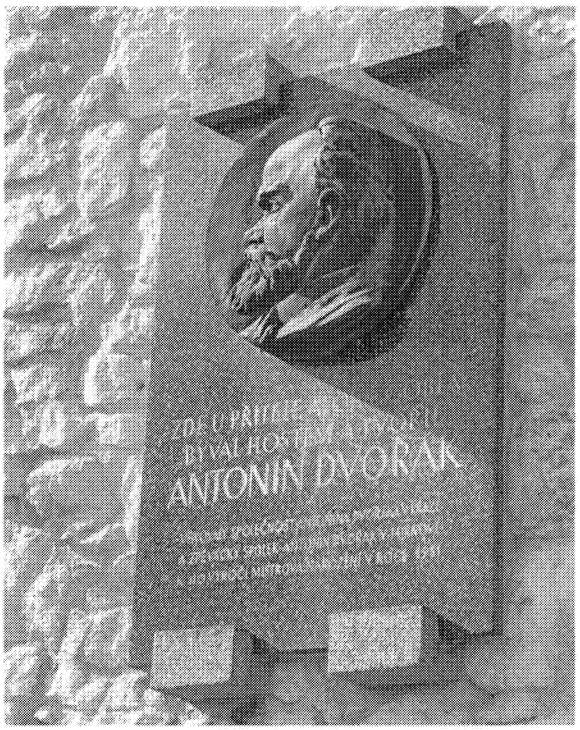
Ever since the interwar years Liberec has been known as a center of learning and in 1953 the **Liberec College of Mechanical Engineering** was founded. In 1960 the Faculty of Textile Engineering was appended. Since political changes in 1989 the College expanded with four new faculties: Education (1990), Economics (1992), Architecture (1994), and Mechatronics and Interdisciplinary Engineering Studies (1995). That year the new University name - **Technical University of Liberec**, was accepted.

Ještěd Tower is a 100 meter high tower used to transmit television signal. It is built on the top of Ještěd, 1,012-meter high mountain near Liberec. Ještěd Tower is a reinforced concrete construction with a shape of rotational hyperboloid, erected between 1963 and 1968. The shape is intended to resemble a cosmic ship. ***Karel Hubáček***, the architect of the tower, was awarded by the Perret prize. In its lowest sections a hotel and a tower restaurant are located. The tower serves as a dominant attraction in the city and as a place to oversee much of Bohemia and parts of Poland and Germany, too..

The authorities are applying for Ještěd Tower to be included into the UNESCO list of cultural monuments.

... excursion to Sychrov Chateau

The **Sychrov Chateau**, a fine example of the so-called romantic Gothic style, is located not far from Liberec. It owes its current appearance to a French aristocratic family Rohans who settled in Bohemia (1820) after the French Revolution. The owners first had the original small Baroque chateau (built in 1690-1693) converted by K.A. Rohan into an Empire-style structure (1822-1834) and then, around the mid 19th century, remodeled in the **neo-Gothic style** (1847-1852). Czech artists, including woodcarver Petr Bušek, glass painter Jan Zacharias Quast and sculptor Emmanuel Max, took part in the implementation of the chateau decoration. The splendidly carved Chateau interiors contain more than 200 highly valuable oil paintings, portraits of the ancestors of the ancient French family. Sychrov thus became a unique treasury of French portrait painting. The chateau complex is surrounded by an **English park** that, at the time of its heyday, served as a model for remarkable arboretums at the Konopiště Chateau and in Průhonice. Sychrov has also been associated with the great Czech composer **Antonín Dvořák**. He visited it frequently (1977, 1878-1880, 1892, 1894, and 1896) at the invitation of Alois Gőbel, steward of the Sychrov estate and his friend, to seek recreation and inspiration here (e.g. violin concert A minor, opus 53).

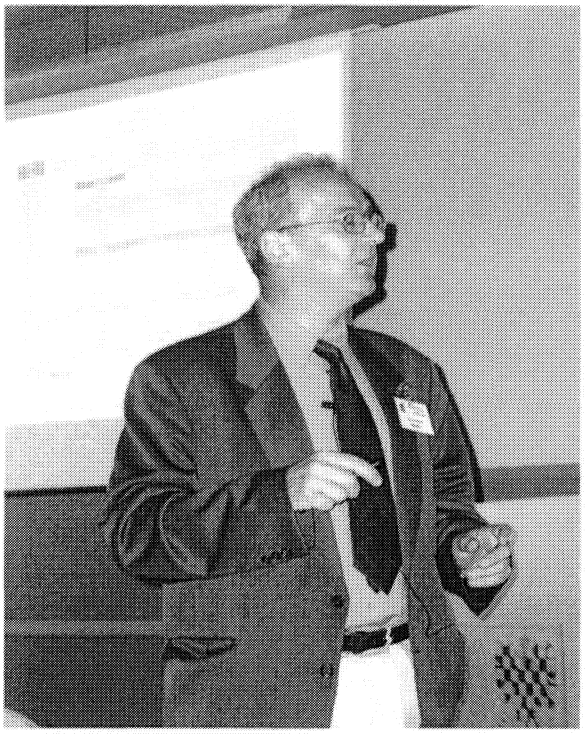


Here, by his friend Alois Gőbel used to be here as a guest and used to compose
ANTONÍN DVOŘÁK.
Dedicated by the Antonín Dvořák Society in Prague and the Antonín Dvořák Choir in Turnov on the 110th artist's birth anniversary in 1951.

... from the opening ceremony

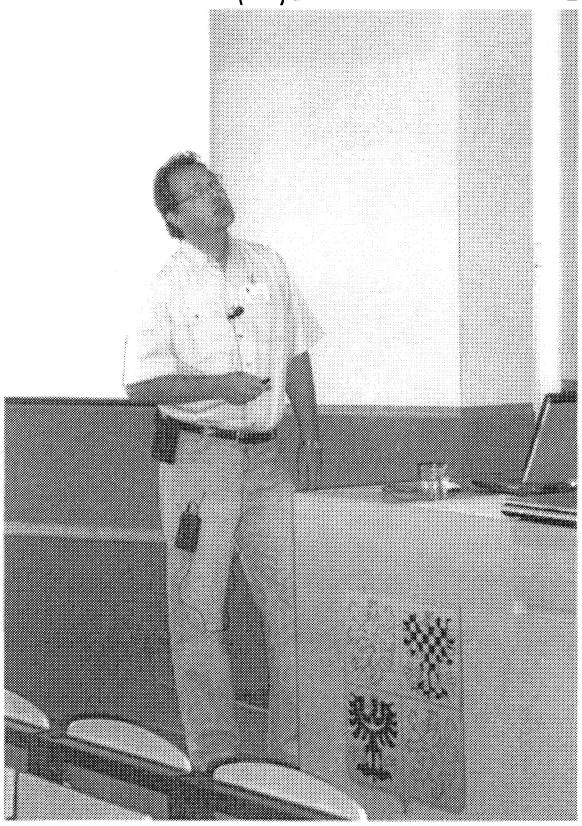
Dr. Miroslav Jedlička, President of the Czech and Slovak Society for Photonics and Chair of the Conference Organizing Committee, addresses the Conference participants on behalf the Society. On the right, ***Professor Oldřich Jirsák***, specialist in the field of nanofibers, who recently won the National Czech Head Award for Nanospider (a functional laboratory model of a nanofiber-forming machine), is paying attention to the opening address. He also welcomed the Conference participants on behalf of the Technical University of Liberec. On the left, another representative of the Technical University of Liberec, ***Prof. Miroslav Svoboda***, who was a Member of the Organizing Committee of the Conference, delegated by the Liberec University.

... four outstanding personalities of the Conference



Prof. Ivan Glesk (SK)

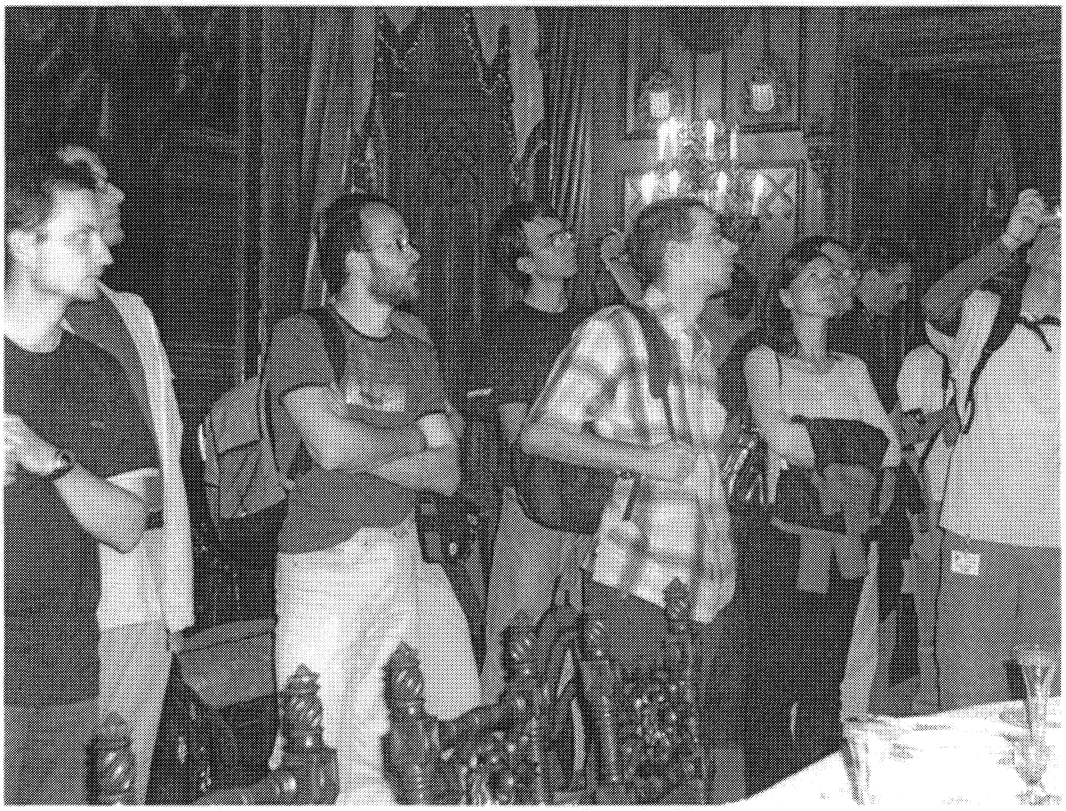
Dr. Dagmar Senderáková as a Session Chair



Prof. Pavel Zemánek (CZ)

Prof. Waclaw Urbanczyk (PL)

... young participants during excursion to Liberec town hall



About one half of them, who participated in the Conference.