Curriculum Vitae

István Bányász

Family name and first name: Bányász, István

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Place and date of birth: Pápa, Hungary, February 2, 1959

Nationality: Hungarian, citizen of the European Union

Studies pursued:

"Türr István" High School in Pápa, Hungary, Physics major, 1973-1977.

"Eötvös Loránd" University, Budapest, Hungary, Faculty of Sciences, field of study: physics, 1978-1983.

Academic qualifications

Diploma in physics, received from "Eötvös Loránd" University, with "Summa cum laude" grade. (1983)

Ph.D. in physics (in the fields of optics and electrodynamics) received from "Eötvös Loránd" University, with "Summa cum laude" grade. (1987)

"Candidate in Physics" degree received from the Hungarian Academy of Sciences (1994)

Employment history

1. Institute of Microelectronics, Central Research Institute of Physics, Budapest, Hungary. Ph.D. scholar of the Hungarian Academy of Sciences (1983-1986), Research Fellow (1986-1987).

2. Institute of Physics of the Technical University of Budapest. Research Fellow, 1987-1989.

3. Department of Nuclear Physics, Institute of Isotopes of the Hungarian Academy of Sciences, Budapest, Hungary. Research Fellow, 1989-1994. Senior Researcher, November 1994 - August 1998.

4. Laboratory of General Photochemistry, School of Chemistry, University of Haute Alsace, Mulhouse, France, Invited professor, 15 October 1994 - 16. June 1995.

5. Interuniversity Department of Optics, University of Alicante, Alicante, Spain, Invited Professor, 1 April 1997 - 1 March 1999

6. Research Institute of Solid State Physics and Optics of the Hungarian Academy of Sciences, Budapest, Hungary, Senior Researcher, 1 January 1999 – to date.

7. Equipe Optique Cohérente, IRCOM, Université de Limoges, France, Professeur Associé, 1 May – 31 June 2001

8. Groupe Optique et Matériaux, Laboratoire Aimé – Cotton, Université Paris – Sud, France, Directeur de Recherches Associé, 1 September – 30 November 2001

9. Optoelectronics Group, Department of Electronic and Computer Engineering, Ngee Ann Polytechnic, Singapore, Consultant, 12 – 28 May 2002

Detailed description of research experience:

1. Optical phase conjugation by classical holography. Its potential application in microlithography. Development of a new method (based on the general form of the Fresnel-Kirchhoff integral) for evaluation of the aberrations of the holographic image caused by the misadjustment of the hologram or that of the reconstruction beam. Precise values of alignment tolerances have been determined. (1982-1987)

2. Theory and practice of high-resolution holography. Evaluation of the images reconstructed from high numeric aperture holograms by adapting the exact form of the Fresnel-Kirchhoff integral to the problem. Evaluation of the effects of the Gaussian intensity profile of the auxiliary beams, the misadjustment of the hologram at reconstruction and the irregular thickness variations of the hologram substrate. As for the experimental results, the best resolution achieved at $\lambda = 633$ nm was better than 1 micron. (1983-1987)

3. Researches in the field of holographic interferometry. Development of the 'single reference beam' - version of difference holographic interferometry of phase objects. (1987-1989)

4. Researches in the field of holographic recording materials, especially dichromated gelatin. Development of a novel, long shelf life, instant DCG. (1988-1989)

5. Frequency stabilization of semiconductor lasers by applying an absorption cell filled with a suitable gas. (Only at the level of research plan.) (1989)

6. Evaluation of classical and computer-generated holographic elements. Motivation: Correction for the aberrations of plastic lenses of CD- pickups. (1988-89)

7. γ-spectroscopy for the demonstration of the NEET- effect (Nuclear Excitation by Electronic Transition) in ^{129}I. (1989-1990)

8. Non-destructive assay of fresh and spent nuclear fuel. (Computer codes for the evaluation of the γ-intensities produced by fuel elements.) (1990-1991)

9. Development of a new, unified model of practical holography, including the first exact method for the incorporation of the effects of the MTF of the recording material into the diffraction integrals describing the complex amplitude of the reconstructed holographic image. The other cardinal point of the model is a precise evaluation of the effect of the nonlinearities of the recording materials on the reconstructed image for the optimum design of the recording of any holographic optical element, with respect to the recording geometry, the alignment tolerances and the exposure and beam ratio. (1991-1995)

10. Design and fabrication of volume transmission diffractive optical elements in glass and silica via high-energy ion implantation. (1994 – 1997)

11. Holography and real-time holographic interferometry at λ=780 nm with a new photopolymer recording material and a laser diode. Proof of the polarization-sensitivity of that (non-photorefractive) IR photopolymer material. (In cooperation with the Laboratory of General Photochemistry, School of Chemistry, University of Mulhouse, France (1994-1995)

12. Study of the effects of processing on phase holograms recorded in silver halide emulsions. (at the Interuniversity Department of Optics, University of Alicante, Spain.) (1997 - 1999)

13. Construction of a chirped pulse amplification (CPA) high-power laser system for experimental investigation of the interaction of very high intensity laser pulses with matter (multiphoton photoeffect, generation of X-ray pulses, generation of attosecond light impulses). (1999 - 2000)

14. Spectral-temporal holography in spectral hole burning materials in the 600 – 820 nm range (2001)

15. Real-time observation of the build-up of holographic gratings in photorefractive crystals via phase contrast and interference microscopies and holographic interferometry (2002 – to date)

16. Design, fabrication and characterisation of passive and active integrated optical elements in amorphous and crystalline optical materials via ion implantation. (2003 – to date)

Project leadership

”Design and fabrication of holographic optical elements”, 1988 -1989, funded by the Hungarian National Research Fund, 500,000 HUF.

“Development of a new type of dichromated gelatine for holographic recording”, in co-operation with FORTE Photochemical Works, Vác, Hungary, 1988-1989.

”Fabrication of diffraction gratings in amorphous and crystalline solid states by ion implantation”, 1994 - 1997, funded by the Hungarian National Research Fund, 3,600,000 HUF.

“Ion-implanted integrated optical elements”, 2004 – 2007, 5 million HUF, in the framework of the Hungarian – Italian bilateral intergovernmental scientific and technical co-operation, Italian partner: IFAC, CNR, Firenze, Italy.

“Application of ion implantation to the fabrication of integrated optical devices”, 2010 – 2012, 4 million HUF, in the framework of the Hungarian – Italian bilateral academic scientific co-operation (MTA –CNR), Italian partner: IFAC, CNR, Sesto Fiorentino, Italy.

“Fabrication of integrated optical elements via ion beam implantation and irradiation for telecommunication applications“, funded by the Hungarian National Research Fund, project number K 101223, 2012 – 2014.

Participant in the following projects

“Development and characterisation of novel photopolymer recording materials for infrared holography”, funded by the French Space Agency, Director Prof. Daniel-Joseph Lougnot, 1994-1995.

“Non-linear recording in silver halide holographic materials”, funded by Spanish Ministry of Education and Science, Director: Prof. Inmaculada Pascual, 1997-1999.

“Photo- and neutron refractive materials and phenomena”, 2004 – 2007, funded by the Hungarian National Research Fund, Director: Dr. László Kovács, project number T 47265, 15,664, 000 HUF.

"Fabrication of waveguides and diffractive optical elements via ion implantation", 2007 – 2012, funded by the Hungarian National Research Fund, project number K 68668, 16,200,000. - HUF.

Teaching experiences

1. Director of physics laboratory for graduate students, Department of Physics, Technical University of Budapest (1987 - 1989)
2. Lecturer of general physics for graduate students, Department of Physics, Technical University of Budapest (1989)
3. Academic adviser of English speaking foreign students, Department of Physics, Technical University of Budapest (1987-1988).
4. Co-supervisor of a French Ph.D. student at the Université de Haute-Alsace, Mulhouse (in the academic year of 1994/95).
5. Non-official co-supervisor of Spanish M.Sc. and Ph.D. students, Departamento Interuniversitario de Óptica, Universidad de Alicante, Spain (1997-1999).
6. Co-supervisor of an Italian Ph.D. student at the Instituto di Fisica Applicata, Florence and at the Universita di Bologna (2004-2006).

Computer skills

Machines routinely used:

R40, R45, (Eastern equivalents of large IBM machines like the 360) IBM RISK series, SUN Spark Workstation, a cluster of DEC Alpha machines, HP Apollo workstation, IBM and compatible PCs, MacIntosh personal computers, including Power Macs.

Operation systems routinely used:

Several versions of IBM OS, DOS, Windows, Mac OS, UNIX, AIX and Linux.

Programming experiences:

Development and running of computer codes for numerical simulation of physical phenomena, including several versions of a code developed for the evaluation of the reconstructed holographic image, in FORTRAN. Basic experiences with Web page design.

General experience:

Thorough knowledge of a large number of commercial computer programs such as Windows, word and image processors (Word, Word Perfect, PaintShop Pro), spreadsheets (Quattro, Excel), statistical and other mathematical programs (PlotIt, Mathematica, Matlab, Origin) and network

software (including correspondence via INTERNET , design of personal home pages and use of SSH-based network software).

Professional visits abroad

1. Institute of Optical Storage and Processing of Information of the Bulgarian Academy of Sciences, Sofia, Bulgaria, 27-30 October, 1989.

2. Department of Optics and Laser Physics, Technical University of Berlin, Germany, 7-21 November 1989.

3. Department of Physics, Trinity College, Dublin, Ireland, 7-10 October 1990

4. Department of Physics, University of Loughborough, United Kingdom, 27-30 January 1992

5. Laboratory of General Photochemistry, School of Chemistry, University of Mulhouse, France, 7-15 March 1993

6. Institute "Paul Pascal", Pessac, France, 15-22 March 1993.

7. Interuniversity Department of Optics, University of Alicante, Spain, 20 September - 13 October 1993. (Joint research work in the framework of an intergovernmental cooperation)

8. Departemento de Fisica, Grupo d'Optica, Universitat Autonoma de Barcelona, Bellaterra, Spain, 13 October - 20 October 1993

9. Laboratory of General Photochemistry, School of Chemistry, University of Mulhouse, France, Invited professor, 17 October 1994 - 17 April 1995 and 18 May - 16 June 1995.

10. Interuniversity Department of Optics, University of Alicante, Spain, Invited professor, 1 April 1997 - 1 March 1999.

11. Equipe Optique Cohérente, IRCOM, Université de Limoges, France, Professeur Associé, 1 May – 31 June 2001

12. Groupe Optique et Matériaux, Laboratoire Aimé – Cotton, Université Paris – Sud, France, Directeur de Recherches Associé, 1 September – 30 November 2001

13. Optoelectronics Group, Department of Electronic and Computer Engineering, Ngee Ann Polytechnic, Singapore, Consultant, 12 – 28 May 2002

14. Department of Optoelectronics, IFAC, Florence, Italy, Guest researcher, 6 times one month between 2004 and 2010.

Language proficiency:

Hungarian: Mother tongue
English: Able to speak, read and write fluently (Certificate issued in Hungary)

Spanish:	Able to speak, read and write fluently (Certificate issued by Spanish Official School of Languages)
French:	Able to speak, read and write fluently (Diplôme Approfondi de la Langue Françoise)
Russian:	Good skills in both the spoken and written language. (Certificate issued in Hungary)

Memberships and services to professional organisations:

Hungarian Physical Society (1987-1997)
SPIE and its Holography Working Group (1991-94, 2009-2010)
Reviewer of Optical Engineering (1997 -), the OSA Journals (Applied Optics, Optics Letters, Optics Express (1999-), Optics Communications (2002-) and Optical Materials (2010 -).

Awards received:

Prize of the Hungarian Academy of Science for Young Scientists, 1993.
Publications: Separate list of publications attached.

Budapest, 26 August 2011

Dr. István Bányász