

Curriculum Vitae of Professor Franco Docchio

Bio-data and Scientific-academic career



Prof. Franco Docchio is born in Milan on February 2nd, 1952. He received a degree (Laurea) in Nuclear Engineering at the Polytechnic of Milan in 1976 *magna cum laude*. Until November 1978 he was researcher of the Electronic Division of the Research Centre CISE S.p.A. of Milan, where he carried out a project of optical systems for the detection of faults on high-voltage power lines, and of the relative control instrumentation.

From 1978 to 1987 Prof. Docchio was Researcher of the Consiglio Nazionale delle Ricerche (National Research Centre of Italy), by the Centro di Elettronica Quantistica e Strumentazione Elettronica (Director Prof. Orazio Svelto) located at the Institute of Physics

of the Polytechnic of Milan.

In 1981 he obtained a fellowship from the Special Project on Power Laser of the CNR, to carry out research in the field of high-energy, high average power flashlamp-pumped dye lasers at the Max Planck Institut für biophysikalische Chemie of Göttingen, Germany, under the direction of Prof. F.P. Schaefer. During this period Prof. Docchio carried also out another project, concerning the development of a novel wavelength meter based on a rotating interferometer. For the activities carried out in Germany he received, in 1982, a prize from the Direction of the Special Project on Power Lasers.

In 1986 Prof. Docchio was nominated Associate Professor in Electronics at the Faculty of Engineering of the University of Brescia, at the Department of Electronics for the Automation. In 1994 he became Professor of Optoelectronics, and lectured, during the years, Analogue Electronics, Digital and Microprocessor Electronics, and Optoelectronics. In the position of Associate Professor Prof. Docchio was elected member (in different time frames) in the Administration Council, in the Council for Research (coordinating the University-industry relations), and in the Academic Senate of the University of Brescia.

As a suppliant lecturer, he lectured Electronic Measurements at the University of Modena and Reggio Emilia from 1997 to 2000.

In 2000 Prof. Docchio was appointed full Professor in Electronic Measurements at the same Faculty. Since then he has lectured on Industrial Electronics,

Optoelectronics, Optical and Electrooptical Devices and Components, and Sensors to the students of the Degrees in Mechanics and Electronics.

As a Full Professor, in 2001 Prof. Docchio has been appointed Vice Dean of the Faculty of Engineering, and operated as a delegate of the Dean to improve the relations between the Faculty and its stakeholders (the secondary schools, and the industrial context around the Faculty). In 2002 he was also appointed Rector's delegate for the National Project "CampusOne", aimed at improving the quality of the University system across Italy using quality-based methods. In the meanwhile Prof. Docchio started to develop an informative system and an e-learning system for the automation of all the didactic and administrative procedures within the Faculty. This informative system has successively been adopted by the entire University, and for this reason he was called by the University Rector to cover the role of "Rector's Delegate for the Didactic informative systems and the e-learning" of the University of Brescia. Currently, he the Faculty Delegate in the University Committees for Patents and for Start-up companies at the University of Brescia, and advisor of the Faculty for all matters concerning intellectual property and creation of a start-up.

In 2005 Prof. Docchio was appointed by the Minister of Telecommunication "Ordinary Member" of the "Consiglio Superiore delle Telecomunicazioni" (Superior Council of Telecommunications), and in this position he operated until 2008.

Research activities

In his position of Researcher at the Italian CNR, Prof. Docchio has made a considerable amount of research in

- Studies of laser-tissue interaction (with particular emphasis of ocular photodisruption in ocular media by high-power nanosecond and picosecond lasers): he elaborated the still studied theory of Moving Breakdown and intra-pulse plasma shielding in liquids under picosecond and nanosecond irradiation;
- studies of primary and secondary fluorescence from biological tissues irradiated by picosecond and nanosecond lasers, and development of optoelectronic instrumentation for the measurement and analysis of fluorescence decay curves (multi-spectral gating techniques, dye lasers for excitation of the fluorescence, development of adapters to slit-lamps for ocular tissue *in vivo* excitation, and to microscopes;
- development of new laser sources (Nitrogen lasers with higher brilliance, Distributed feedback dye lasers, Nd:YAG lasers with innovative pumping chamber concepts);
- optoelectronic measurement instrumentation (waveform averaging, gated spectroscopy systems, pulsed spectrometers, wavelength meters,

- Studies of industrial applications of power lasers (cutting, drilling).

At the Department of Electronics for the Automation of the University of Brescia Prof. Docchio founded the Laboratory of Optoelectronics. The purpose of the Laboratory has been, since the beginning, basic and applied research on optical measurements with particular emphasis to biomedical and industrial applications. The Laboratory operates under national and international funding, in the fields of:

- Development of innovative electro optical instrumentation for industrial applications (phase-modulated interferometers, Double heterodyne interferometers, low-coherence interferometers, polarimeters, scanning roughness meters, profilometers for surface inspection)
- Development of three-dimensional vision systems (structured light illumination with single or multiple wavelengths and different projection strategies, laser scanning 3D profilometers)
- Development of innovative optical and electro optical systems for the early detection of pathologies using autofluorescence, light scattering and polarization and colorimetry (portable corneal fluorimeter, light-scattering systems for vitreous measurements, blood analysis by colorimetric methods, portable oxymeters);
- Application of 3D vision to industry (acquisition and reverse engineering of manufactures, coordinate-machine and 3D vision combination, RE of car parts and entire historical cars), to biomedicine (acquisition of body parts for the construction of prostheses), to cultural heritage (acquisition of statues, bass reliefs and archaeological findings, and their study and reproduction in scale), to crime scenes (3D acquisition of crime scenes, corpses and anatomic parts of cadavers as an aid to the investigator to document the crime);
- Design, development and testing of optical components (refractive and diffractive optics, non-imaging optics for LED lighting applications, filters for laser protection goggles).

The above research activity is documented by more than 220 publications on International journals and Conference Proceedings, and by 5 patents on electro optical instrumentation.

Promotion of High-tech entrepreneurship

Since 1997, part of the activity of Prof. Docchio and of his Laboratory (now directed by Prof. Sansoni) has been devoted to the dissemination of the know-how acquired by basic and applied research projects through the promotion of start-up companies. The Laboratory has been a cradle for new companies (primary start-ups), as well as an incubator for independently born companies (secondary start-ups) and a know-how dispenser for larger companies wishing to enlarge their expertise in optics and optoelectronics.

Direct start-ups are: SemTec s.r.l. (industrial production visual inspection), Opentechnologies s.r.l. (3D measurement system development and application), Q-Tech s.r.l. (optoelectronic instrumentation, lasers, optical sensors, Optical design), Nirox (biomedical optical instrumentation and low-coherence interferometry), DoCSWay (associated consultancy study).

Indirect start-ups are: Tullio Giusi S.p.A. (laser marking systems), Laserberg s.r.l. (laser marking systems), SEI S.p.A. (power lasers for industry), Luceat S.p.A. (POFs and POF-based communication equipment), CIELLE S.p.A. (engraving laser systems), Univet S.p.A. (laser protection goggles).

Associative activities

Prof. Docchio is Vice-president of COMED, a no profit organization for telemedicine and teleophthalmology. He is appointed director of the Periodical Journal Tutto Misure (5000 copies and 20.000 copies in the electronic form). He is reviewer in a number of international journals in Optics and Optoelectronics.

Prof. Docchio is a member of IEEE/LEOS, of EOS and SIOF, where he served as a member of the board for several years. In June 2008 he has organised the Joint Meeting of DGaO-SIOF, held in Brescia from June 2nd to June 5th, and in this position he has been member of the board of the DGaO society.

He is also member of Rotary Club Brescia Nord, and manager of the Rotary District 2050, head of the fellowship and Alumni committees. Equally, he is Vice-president of the Blood donor Association (AVIS) of the city of Brescia, delegate for the relation with University and Schools and for the informative system for the management of Donors.

In 2009 Prof. Docchio has been nominated member of the major cultural institution of the Town of Brescia, the Athenaeum of Sciences, Letters and Arts. He has also been elected Fellow of the European Optical Society.

Selected Publications of Prof. Docchio

F. Docchio, A. Longoni and F. Zaraga; Subnanosecond fluorescence waveform measurements with a dual time-scale microprocessor-controlled digitizer-averager; Review of Scientific Instruments; 52; 1671-1675; 1981

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- L. Rovati and F. Docchio; Low coherence interferometry using self-mixing superluminescence diode; IEEE Photonic Technology letters; 10 (1); 123-125; 1998
- L. Rovati, U. Minoni, F. Docchio; Dispersive white light interferometry with a frequency modulated continuous wave interferometer for high-resolution absolute measurements of distance; Optics Letters; 22 (12); 850-852; 1997
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