NEWSLETTER

COMMISSION INTERNATIONALE D'OPTIQUE ● INTERNATIONAL COMMISSION FOR OPTICS

Obituary: Giuliano Toraldo di Francia

The ICO mourns the passing of a pioneering ICO leader.

Giuliano Toraldo di Francia in the Dolomite mountains. (Courtesy of his family).

Below: this photograph was taken at the "Réunions d'Opticiens" in Paris, October 1946, where the creation of an international commission for optics was discussed. G Toraldo de Francia stands a little to the left of center, halfway towards the back, with glasses, a dark suit and handkerchief in his breast pocket. Identifications of the others in the photo, many quite important in the recent history of optics, are to be found at the ICO website.

Giuliano Toraldo di Francia, professor emeritus of physics at the University of Florence, and an ICO pioneer, died in Florence on 26 April 2011, aged 94. After gaining a degree in physics from Florence University in 1939, he joined the National Institute of Optics, now INO-CNR, where he started his research. In 1943 he moved to the Ducati company, where during the next seven years he designed optical systems. In 1951 he came back to INO as professor of optics, until 1958. During that period he wrote one of his most translated scientific books, *Electromagnetic Waves* (1953) and a few years later, in 1958, the book *La diffrazione della luce* was published, gaining noticeable international attention.

Toraldo di Francia also went to America, spending two years at the University of Rochester as professor of optics before returning to Europe, when in 1959 he was hired as chair of optics at the University of Florence. In 1963 he moved to the chair of higher physics, a position he held until retirement in 1991. From 1968–73 he served as president of the Italian Physics Society (SIF). From 1976–81 he directed the University Institute of Higher Physics, which he founded. After his return from the US he collaborated with the Institute of Electromagnetic Waves of the National Research Council of Italy, IROE-CNR (now IFAC-CNR). He promoted research on microwaves and optics and, very early after the demonstration of the laser, he fostered the CNR programme "Maser and Laser", which introduced laser activity to Italy. From 1970–81 he was also IROE's director.

Toraldo di Francia was the last surviving member of the ICO founders from Prague in June 1947. In preparation for the first plenary session of ICO in Amsterdam in July 1948, the Italian delegation prepared a report on diffraction theory, under the responsibility of Toraldo di Francia. He served two terms as ICO vice-president and was president from 1966–69.

Toraldo di Francia was a great scientist who made outstanding contributions to the field of electromagnetic waves and optics. One of his first results in diffraction by surfaces was in 1941 with the formulation of the "Inverse interference principle", a particular case of which (diffraction by plane surfaces) gave rise to Fourier optics. Other seminal results came from the demonstration of the existence of evanescent waves in diffraction phenomena, extensive studies of the quasi-Cherenkov effect based on evanescent waves, and deep investigation of geodesic lenses. Working on antennas, he introduced the concept of super-resolution, showing that with suitable filters in the pupil plane of an aperture (Toraldo filters) it is possible to increase the resolution in a given direction, beyond the diffraction limit. Another of his innovative contributions to optics was the introduction of the "Degrees of information of images", where he offered a new approach based on information theory and on information content of the images, to the classical concept of resolving power.

Toraldo di Francia had a great interest in philosophy and its relationship with physics. His book *The Investigation of the Physical World*, in which he presented physics methods to the scholars of philosophy, was also published in English. In 1984 he founded the Forum for the Problems of War and Peace, which is still active. His passion for music led to him to be involved in the School of Music of Fiesole, and he also wrote the "libretto" for *Talgor*, an opera by Riccardo Luciani. Toraldo di Francia was an OSA Fellow and Honorary Member of the Italian Society of Optics and Photonics, SIOF. Some of the recognitions that he received include the Young Medal of the Institute of Physics, the OSA C. E. K. Mees medal, and the Gold Medal of the Ministry of Public Instruction of Italy.

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