Laudation for Professor Ingo Müller
ISIMM Prize Awardee 2012

Ingo Müller was born in Darmstadt in December 1936. He studied physics at the Technical University of Aachen, where he got his Ph.D. Between 1966 and 1975 he made research in the United States and Mexico, in particular in Baltimore at the Johns Hopkins University with professors Ericksen and Truesdell. In 1975 he returned to Germany as a professor of Theoretical Physics first in Düsseldorf, then in Paderborn; since 1979 up to his retirement in 2003, he held the chair of Thermodynamics at the Technical University of Berlin. Since 2005 he is Professor Emeritus.

In 1989 he and Kolumban Hutter founded the Springer journal Continuum Mechanics and Thermodynamics, which they codirected until 2003, making of it one of the leading journals of its sector.

He served as president of the ISIMM in the years 2000–2004.

Professor Müller is widely recognized as one of the most authoritative researchers in continuum thermodynamics. His achievements remain as milestones in a rigorous process of revision of this discipline.

His most renowned results include a reformulation of the Second Principle of Thermodynamics. At variance with the approach of Coleman and Noll, on the basis of a kinetic argument Müller proposed a formulation in which not only the density of entropy but also its flux are not a priori prescribed. Nowadays this version of the second law is universally accepted, and is extensively used to select admissible constitutive relations in continuum mechanics.

Ingo Müller also gave a major contribution to what now is known as Extended Thermodynamics, a topic that he had already addressed in his Ph.D. thesis. The tenets of this theory were laid down by Ingo Müller and Tommaso Ruggeri in a Springer monograph, where in particular they derived the hyperbolic system for rarefied gases on the basis of three general principles: objectivity, entropy production, and the concavity of the entropy function.

Ingo Müller also gave a fundamental contribution to the modelling of hysteresis phenomena, like austenitic-martensitic phase transitions. He formulated an elegant theory of shape-memory materials, that also obtained experimental confirmations and had remarkable technical applications that

range from aeronautics to medicine. For this research in 1987 he was also awarded the prestigious Leibniz prize of the Deutsche Forschungsgemeinschaft.

Ingo Müller also contributed to several other researches, notably Sociothermodynamics, an application of thermodynamic principles to sociology.

Recently he also wrote an interesting history of thermodynamics (for Springer).

As a teacher Ingo Müller had several Ph.D. students. These include e.g. I-Shih Liu, W. Dreyer, Y. Huo, W. Müller (who also co-authored with Ingo the English version of the book for student that Ingo himself used for many years in his courses: Fundamentals of Thermodynamics and Applications, for Springer); W. Weiss (who coauthored with him the book Entropy and Energy – a Universal Competition, for Springer); P. Strehlow (who coauthored with Ingo the book Rubber and Rubber Balloons, this also for Springer), H. Struchtrup, S. Seelecke (who was one of the editors in chief of Ingo's and Hutter's journal, after 2003).

The activity of Ingo Müller was recognized by the scientific community on several occasions. Besides the above mentioned Leibniz prize, for instance he was awarded: the laurea Honoris Causa of the Darmstadt University; the honorary membership of the Serbian Society of Mechanics; the Gili-Agostinelli prize of the Accademia delle Scienze di Torino.

Endowed with a deep physical insight, Ingo Müller combines a mastery of the mathematical tools with an unusual sensibility for applications and his typical exigency for rigour.

It is well known that he tends to be uncompromising in life just as in science. This did not contribute to make his life easy – a tribute he repeatedly had to pay to his cultural integrity.

Tommaso Ruggeri and Augusto Visintin (June 2012)