

Bruno ECKHARDT
1960-2019

On August 7, 2019, Prof. Bruno Eckhardt, Philipps University Marburg (Germany), passed away unexpectedly at the age of 59 from complications after a medical surgery. With him, the international physics and fluid dynamics community loses far too early an outstanding theorist, committed teacher and a role model who never shied away from assuming responsibility in scientific self-administration in a variety of ways.

Bruno studied physics at the Technical University of Kaiserslautern and at the Georgia Institute of Technology in Atlanta. In 1986 he defended his doctorate in Bremen on chaotic and quantum chaotic systems. After a stay at Forschungszentrum Jülich, Bruno became an assistant professor in Marburg and defended his habilitation in 1992 on quantum chaos and periodic orbit quantization. His review on this topic is still widely read and quoted.

Directly after his habilitation, Bruno was appointed to the Carl von Ossietzky University in Oldenburg. In 1996 he returned to Philipps University Marburg as full professor. Here Bruno turned his interest to hydrodynamics and in particular to the transition to turbulence. In pipe flow, Couette flow and other shear flows, turbulence does not occur through linear instability and bifurcations, but suddenly, which corresponds to a chaotic saddle in the state space, as Bruno and his colleagues recognized thanks to numerical simulations and theoretical modelling. If the system is given enough time, turbulence can die out again. Bruno also discovered the so-called edge states in the pipe flow, which are a crucial element in the transition to turbulence. He also elucidated the role of coherent structures in turbulence transition in further shear flows and established the connection to chaos theory. His contributions are a lasting milestone in turbulence research.

Bruno continued to be interested in the chaotic dynamics of many other systems, especially in biological systems. He was significantly involved in the foundation of the Loewe Center for Synthetic Microbiology in Marburg and was its director since 2010. He also wrote a generally understandable book on the subject of "Chaos". A topic that also excited the general public was Bruno's model for the collective synchronization phenomenon on the Millennium Bridge in London through the steps of a large crowd of people, which was noticed immediately after its opening in 2000 and led to stability problems.

Another of Bruno's passions was scientific publishing and the self-organization of the scientific community. He was Associate Editor of Physical Review E since 2007. He was also editor of the "Physik Journal", associate editor of "Nonlinearity" and "Nonlinear Science" and editor of books. Bruno was a member of the DFG's Senate and Joint Committee for many years and played a leading international role in the governing bodies of IUTAM and EUROMECH.

Bruno has received many national and international honours and awards. In 2002 he was awarded the Leibniz Prize of the DFG and was also a Fellow of the APS, the IOP and EUROMECH.

We are losing a special student, friend, colleague, teacher and mentor who, through his selfless commitment to the interests of others, was a role model and has had a lasting positive influence on the scientific community. We will miss his sharp spirit, his constructive criticism and his tireless commitment to the welfare of the community.

Our sympathy goes especially to Bruno's wife Kirsten and the three daughters he leaves behind.

Adapted from the obituary written (in German) for the *Physik Journal* by Siegfried Grossmann (Philipps-Univ. Marburg), Detlef Lohse (Univ. Twente), Tobias Schneider (EPFL Lausanne), Jörg Schumacher (Techn. Univ. Ilmenau)