Special Issue in Honour of the Life and Work of Fritz Haake

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With this special issue we honour the life and scientific work of the late Fritz Haake, who sadly passed away on 18 November 2019.

Fritz was born 1941 in Königsberg (today Kaliningrad), and grew up in Passau, Stuttgart and Bonn. He commenced his studies of physics in Stuttgart, continued these in Berlin and Paris, and eventually returned to Stuttgart, where he graduated and obtained his Dipl. Phys. (Physics Diploma) in 1965. He then entered research as a postdoctoral student of Wolfgang Weidlich, and received his Dr. rer. nat. (PhD) in 1968 with a dissertation on the non-Markovian properties of open damped systems. As a post-doc he spent 1970 and 1971 with Roy Glauber (Nobel laureate 2005) at Harvard University, and then returned once more to Stuttgart for his Habilitation, which he completed in 1972. In 1973, Fritz was appointed to a Chair of Theoretical Physics at the freshly founded University of Essen. He grabbed this opportunity by both hands, and this not only to establish the long-standing and consistent line of research that forms his scientific legacy, further expanded upon below. It is to a large extent to Fritz's merit that many other young talented theoretical physicists were attracted to this new university, and an internationally renowned school of modern directions in statistical physics arose. His approach was consciously constructive, and soon reached further afield—his advice was highly valued by numerous scientific commissions

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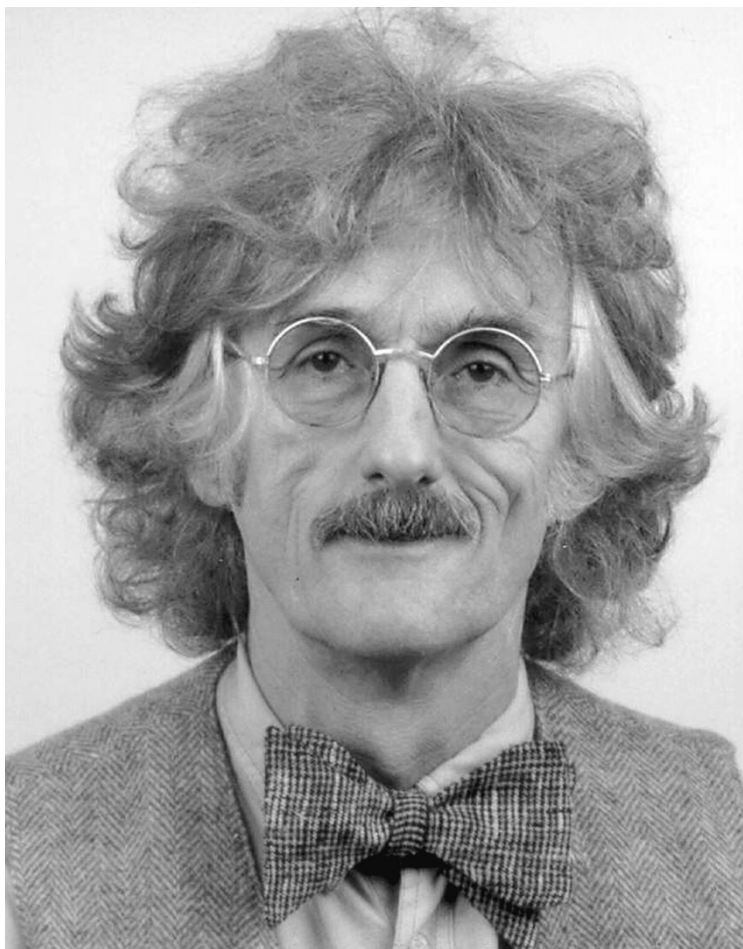
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FIG. 1. Fritz Haake (1941-2019)

and research boards at renowned institutions. Amongst these, Fritz became a member of the scientific boards at the École Normale Supérieure and the Max-Planck–Institute for the Physics of Complex Systems in Dresden. With great dedication, he skilfully lead the DFG-Sonderforschungsbereich "Unordnung und große Fluktuationen" (Special research centre of the DFG on "Disorder and Large Fluctuations") at the Universities Bochum, Düsseldorf, Wuppertal, and Essen, resulting in a stimulating interchange between physicist and mathematicians and widespread international collaboration—more on this below. He was also a member of several editorial boards, including, from 2001 to 2003, for Journal of Physics A. Widespread as these activities may have been, they are still just one facet of Fritz's legacy, as a scientist, mentor, educator, and personal friend.

Fritz's seminal scientific achievements lie in the fields of Non-equilibrium Physics as well as Quantum Chaos, the latter a field that he strongly shaped as one of its pioneers from

the mid 1980s [1]. A common theme in his research was his deep desire to improve our fundamental understanding of Quantum Theory, especially for open quantum systems [2]. With Roy Glauber, he developed an influential theory that explains the quantum-optical phenomena of superradiance and superfluorescence as a spontaneous collective decay process of an unstable atomic state [3]. Very modern topics such as dissipation and decoherence in quantum systems [4] the quantum mechanical measurement process [5] had constantly been on his agenda since the start of his career. In quantum chaos, he was fascinated by the question of universality, and was one of the main players who brought together the fields of semiclassical asymptotics and random-matrix theory. This was crowned with an extraordinary success [6] in his late years, when he and his co-workers developed a physically convincing microscopic semiclassical explanation of the Bohigas–Giannoni–Schmit conjecture, supporting that the physics of "chaotic" quantum systems (quantum systems whose classical counterpart has chaotic dynamics) is universal and described by ensembles of random matrices.

Fritz's international recognition is reflected in his many research stays at ~~the~~ leading international research institutes, including Harvard University, Cornell University, the University of Innsbruck and the École Normale Supérieure in Paris. Even more widespread was his international network of scientific collaborators. Fritz built close relationships to many of these, and many personal friendships developed around his scientific work. He kept close contact to his mentors Wolfgang Weidlich and Roy Glauber. A special friendship connected him to Robert Graham, whom he knew since in the late 1960s when they both pursued their PhD in Stuttgart, working in the field of theoretical quantum optics that grew very rapidly at the time. In the 1970s they were joint again, as full professors at the young University of Essen, where they laid the foundation for one of the leading schools in theoretical statistical physics, which lived on at the University Duisburg-Essen after the merger in 2003. His friendship with Dan Walls (1942-1999) also dates back to their early years in Stuttgart and at Harvard, and was deepened by many research stays at the University of Auckland in New Zealand. Among these many personal friends, another one that needs to be mentioned is Petr Braun, who sadly passed away a year later than Fritz, in December 2020. Petr, who was a full professor in St Petersburg, became a frequent guest of Fritz since the 1990s, and later indeed joined the University of Essen. Their joint accomplishment in explaining universality in quantum chaos is a fruit of this personal and scientific friendship.

A special cause for Fritz was the scientific collaboration with colleagues in Poland, and this again also led to a large number of personal friendships. Already in 1980s, he started to attend numerous conferences in Poland, and built close ties at a time when these were no natural matter. Fritz had a strong impact on the development of theoretical physics in Poland over the last 40 years. In 1998 he was awarded the Alexander von Humboldt Polish Honorary Research Fellowship of the Foundation for Polish Science, and in 2003 he received the Marian Smoluchowski–Emil Warburg Prize of the German and Polish Physcal Societies. Fritz also felt attracted to the people, the culture and the country of Poland. He enjoyed every stay and, whenever possible, combined science with his beloved outdoor sports activities: bicycle tours through Masuria, mountain biking near Kraków or in the Tatra Mountains near Zakopane, and of course ski touring – always accompanied by his local friends.

Fritz's immense achievements as a scientific educator are reflected in the large number of former PhD students and post-docs of his group who have carried on with scientific careers as researchers and professors at international universities and research institutes. Everyone who learned the trade from Fritz knew him as a passionate teacher who lectured in a very special and captivating style. His seminars on the quantum mechanical measurement process became legendary and were formative for a large part of the audience. He could be quite unforgiving in his endeavour to teach his students how to give a clear well organised scientific presentation, a lesson many learned to appreciate when it helped to secure them their research positions or professorships. The importance that both the written and the spoken word had for him was evident to anyone who could enjoy his lectures or presentations, and his written work will be a lasting evidence of his endeavour for clarity and against dullness. His textbook "Quantum Signatures of Chaos" [7] has been and will remain one of the main references on quantum chaos since its first publication in 1991. With each new edition Fritz always updated the textbook to include new developments. In his later years, already suffering from ill health, he worked restlessly on the fourth extended edition. He lived to see its publication in early 2019, which was celebrated with joy and pride.

Whatever Fritz did he did it jokingly and with enthusiasm and energy. As a human being he was open to everyone, cordial and sincere. His family always took priority. He connected privately to his students and coworkers – even climbing mountains such as the Aconcagua and the Kilimanjaro, the highest peaks in the Americas and in Africa. He was

not a man of naysaying and misgivings. Especially in sports and when driving he was a daredevil – including windsurfing at strong winds in the North Sea, or abseiling into the unknown of a dark cavern. No outdoor stairs in and around Essen were secure from being cycled up or down with his mountain bike – even in his final years. Everyone who knew him will remember him for his neverending humour, which could be mischievous at times, and anything dull or boring could be the target of his ridicule. His attire was colorful and eccentric, and no one will forget his characteristic bow-ties, his large hats and flamboyant pullovers.

All facets of Fritz's personality were a genuine expression of his deep nature: he was a fully upright and honest man, who loved freedom and would not stray from his chosen path.

With Fritz Haake, we have lost a great scientist and a wonderful human being.

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