Professor Theo Geisel

The 9th School/Conference Is Dedicated to the
65th Birthday of Professor Theo Geisel
of the Max-Planck-Institute for Dynamics and Self-Organization, Göttingen, and University of Göttingen, Germany

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Professor Theo Geisel is Managing Director of the Max Planck Institute for Dynamics and Self-Organization and Full Professor of Theoretical Physics at the University of Göttingen since 1996. He is also heading the Institute for Nonlinear Dynamics of the Georg August University Göttingen and was the founder and long-term chairperson of the Bernstein Center for Computational Neuroscience Göttingen. Born in 1948 he studied at the universities in Frankfurt and Regensburg and received his PhD in Theoretical Physics in 1975 from the University of Regensburg.

After his PhD studies he worked as a postdoc at the Max Planck Institute for Solid State Research in Stuttgart (1976-1977) and the Xerox Palo Alto Research Center (1978-1979). In 1980 he returned to his alma mater in Regensburg as an assistant professor, in 1983 he became a Heisenberg Fellow. The University of Würzburg recruited Theo Geisel as an associate professor in 1988 from where he left to join the Faculty of Physics at the University of Frankfurt in 1989. In 1996 the Max Planck Society hired him as a director of the Max Planck Institute for Fluid Dynamics, founded by Ludwig Prandtl in 1925, to guide it to new scientific directions. This eventually led to the scientific reorientation of the institute, now dedicated to the dynamics of complex matter, and to its renaming as Max Planck Institute for Dynamics and Self-Organization;

Professor Theo Geisel is widely recognized internationally for his cutting-edge research on nonlinear dynamics. He was the pioneer who discovered and introduced the stochastic process of Lévy Random Walks in 1985 and applied them in a variety of dynamical systems. On the one hand he has been working on problems originating in physics, like transport in nanostructures and quantum chaos, on the other hand he has applied methods from nonlinear dynamics to complex biological networks, the spreading of modern epidemics, and many problems in neuroscience that can be addressed by theoretical and computational methods.

Applying nonlinear dynamics to transport problems in semiconductor nanostructures he was able to explain numerous magnetoresistance effects, like e.g. a negative Hall effect and novel magnetoresistance peaks, by chaotic dynamics in mixed phase spaces. In the area of quantum chaos he elucidated the influence of classical chaos on fractal spectra in quasiperiodic Schrödinger systems and their localization transitions. He gave general quantum mechanical answers to the old questions, what determines the spreading of wave packets and what determines the decay of quantum mechanical correlations in such nontrivial cases with fractal or multifractal spectra.

His work, supported by the Leibniz-Prize 1994 and by the foundation of the Bernstein Center for Computational Neuroscience under his leadership, led to important and outstanding discoveries in neuroscience. He succeeded in developing the general theory for the emergence of neuronal maps in the visual cortex of mammals explaining many experimental details. These findings contributed substantially to the understanding of learning processes and the formation of neural circuits. He discovered the phenomenon of unstable attractors emerging generically in large networks of pulse-coupled oscillators. This appears to be a fundamental mechanism which allows neural systems to achieve the flexibility required to respond to ever changing inputs.

Furthermore, some 10 years ago Professor Geisel opened a new and original approach to the theoretical and empirical studies of human travel behaviour, the spreading of epidemics and related systems by analyzing the spreading of bank notes as a proxy and by introducing the notion of anomalous diffusion. His theoretical results explain the observed spreading behaviour and - very importantly - provide a basis for a largely improved precision for the prediction and forecast of epidemics.

In 1994 the German Research Foundation (Deutsche Forschungsgemeinschaft) awarded him the Gottfried Wilhelm Leibniz Prize, the most distinguished German research prize. A fellow of the American Physical Society (2008) and a member of the Göttingen Academy of Sciences and Humanities he received the Gentner-Kastler Prize in 2009, a prize which is awarded to a German physicist every second year by the French Physical Society and the German Physical Society.

Professor Theo Geisel is one of the five Honorary Directors of our Schools & Conferences, and one of the most outstanding invited lecturers since 1999. He is a pioneer of classical and quantum chaos and one of the most important founders of theoretical neurophysics, a scientific organizer and highly appreciated teacher and mentor. It is impressive to conclude that he has contributed important applications of dynamical systems to many of the scientific disciplines and research fields that are covered by the scientific programme of our School and Conference.

It is a great privilege to welcome and honour him at our 9th School and Conference in Maribor, on occasion of his 65th birthday, combining wonderful science with wonderful music. Also this cultural dimension is a part of his intellectual life, as he is an enthusiastic musician playing the saxophone and flute, e.g. in his institute's jazz band. It is on Tuesday 1 July 2014 at 19:00 that we shall celebrate his 65th birthday by a concert, laudatio, and the banquet.