JÜRGEN MOSER

Königsberg, Germany (now Kaliningrad, Russia) 1928 - Zürich, Switzerland 1999

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Brief scientific biography

Jürgen Moser was one of the most profound analysts of the last half century. His work ranged over different fields of mathematics, both pure and applied. Much of his deepest work was concerned with dynamical systems, especially small divisor problems and re-lations with celestial mechanics. He also did fundamental work in functional analysis - the Nash-Moser theory - and partial differential equations, and he made deep contribu-tions in completely integrable systems, geometry, and complex analysis. Moser was also a master of exposition. His papers and published lectures are beautifully written.
Louis Nirenberg, quoted in (MATHER, MCKEAN, NIRENBERG, RABINOWITZ 2000, p. 1398).

Jürgen Kurt Moser was born on 4 July 1928 in Königsberg, then an eastern outpost of Germany, now the Russian city of Kaliningrad. He attended the Gym-nasium in Königsberg but when he was fifteen years old he was forced into a military auxiliary force. After the end of the war he studied at the University of Göttingen.
In Göttingen Moser studied the spectral theory of differential equations with the South-Tyrolian mathema-tician Franz Rellich (1906-1955). Moreover Carl Ludwig Siegel (1896-1981), who returned to Göttingen in 1951, became a major influence on Moser, who ac-quired an interest in astronomy and number theory through him. In 1952 Moser was awarded his doctorate from Göttingen University.
Moser remained in Göttingen until 1953 when he went to the United States to spend a year at New York University on a Fulbright Scholarship. After working for a year at the Courant Institute, he returned to Germany, where he was an assistant to Carl Siegel at Göttingen University in the academic year 1954-1955. During this period he took notes of Siegel's lectures, which first be-came the basis for a book by Siegel published in 1956, then later became the basis of a joint book *Lectures on celestial mecha-nics* (1971) (O'CONNOR, ROBERTSON 2006).

Königsberg

In 1955 Moser emigrated to the United States, where he married Gertrude Courant on 10 Sep-tember 1955. They had two daughters, Nina and Lucy.

Göttingen University

Jürgen Moser was appointed to New York University as an assistant professor in 1955. Then he went to the Massachusetts Institute of Technology in 1957. He spent 1961 as a Sloan Fellow and, since 1967 to 1970, he was Director of the Courant Institute.
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Hochschule (ETH) in Zurich, where he was Director of its Research Institute for Mathematics from 1984 to 1995, when he was made Professor Emeritus.

Moser's mathematical interests included the theory of partial differential equations, spectral theory, dynamical systems, complete integrability, differential geometry, and complex analysis (LAX 2002).
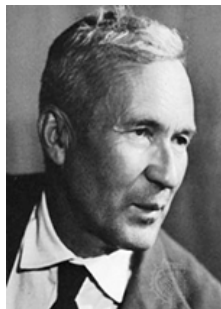
He introduced some techniques which could be applied to almost any dy-namical system of Hamil-tonian type, and the "Moser twist stability theo-rem". When combined with the work of Vladimir Igorevich Arnold (born in 1937) this led to the so-called K.A.M. Theory. Based on ideas by Andrei Nikolaevich Kolmogorov (1903-1987), this impor-tant theory provided a new approach to stability prob-lems in celestial mechan-ics (O'CONNOR, ROBERT-SON 2006).

Andrei Kolmogorov
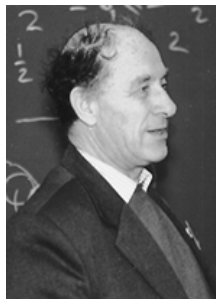
Vladimir Arnold

Moser wrote several books, including *Lectures on Hamiltonian sys-tems* (1968) which examines problems of the stability of solutions, the convergence of power series expansions, and integrals for Hamiltonian systems near a critical point, and *Stable and random motions in dynamical systems* (1973, reprinted in 2001) which describes how stable behaviour and statistical behaviour take place together in analytic conservative systems of differential equations.

Integrable Hamiltonian sys-tems and spectral theory (1983) arises from a course of lectures which Moser gave at the Scuola Normale Superiore in Pisa (1981). A course of lectures that Moser gave at ETH in the spring of 1988 became the basis for *Selected chapters in the calculus of variations* (2003). In 1979-1980 Jürgen Moser and the Swiss mathematician Eduard Zehnder (born in 1940) began to write a book on Hamiltonian dynamical systems, but never finished, only writing the first three of five planned chapters. These three chapters were published in 2005 (O'CONNOR, ROBERTSON 2006).

Moser was invited to give the Gibbs lecture of the American Mathematical Society in Dallas in 1973, the Pauli lectures at ETH in 1975, the American Mathematical Society Colloquium lectures in Toronto in 1976, the Hardy lectures in Cambridge in 1977, the Fermi lectures in Pisa in 1981, and the John von Neumann Lecture of the Society for Industrial and Applied Mathematics in Seattle in 1984. Elected to the National Academy of Sciences in 1973, he had been awarded its Craig Watson Medal in 1969 for his fundamental contributions to dynamic astronomy.

He was President of the International Mathematical Union, and member ex officio of the ICMI Executive Committee, from 1983 to 1986, and was awarded many prizes, including AMS/SIAM Birkhoff Prize in Applied Mathematics (1968), Dutch Mathematical Society Brouwer Medal (1984), DVR Cantor Medal (1992), Wolf Prize (1994/1995), London Mathematical Society Honor-ary Membership (1996). In 1998 he was invited to address the International Congress of Mathema-ticians in Berlin, the third time he had been invited to address an International Congress.

Jürgen Moser, "one of the leading mathemati-cians of the postwar era", in Konrad Osterwalder's words, a colleague at Swiss Federal Institute of Technology, died on Friday 19 December 1999 in Schwerzenbach, Zurich, Switzerland.

Paul H. Rabinowitz, one of Moser's students, wrote (in MATHER, MCKEAN, NIRENBERG, RABI-NOWITZ 2000, p. 1393):

Jürgen Moser

He was a lifelong music lover - he played the cello - and amateur astronomer. He enjoyed biking and swimming. At the age of sixty, he took up paraglid-ing. With his untimely death at seventyone, many of us in the mathematics community lost a hero, friend, and mentor.

Up

Quotations relevant to mathematics education

Peter Lax wrote:

Jürgen was very direct; he said what was on his mind, even when it was not what you had hoped to hear. But that only deepened his friendships, for his judgments were mostly right, and be-cause everything he did was done with great kindness (LAX 2002).

Paul H. Rabinowitz wrote:

To those who knew him Moser exemplified a creative scientist and, perhaps even more impor-tant, a human being. His standards were high and his taste impeccable. His papers were ele-gantly written. Not merely focused on his own research, he worked successfully for the well-being of mathematics in many ways. He stimulated

several generations of younger people by his penetrating insights into their problems, scientific and otherwise, and by his warm and wise counsel, concern, and encouragement. My experience as his student was typical: then and after-wards I was made to feel like a member of his family (in MATHER, MCKEAN, NIRENBERG, RABINOWITZ 2000, p. 1393).

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Author
Giorgio T. Bagni
Department of Mathematics and Computer Science
University of Udine - Italy
giorgio.bagni@dimi.uniud.it