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In memoriam Nico van Kampen

Nicolaas Godfried van Kampen was born on June 22, 1921 at Leyden, the Netherlands, where his father held a chair in zoology at the university. He deceased on October 6, 2013 in the Dutch town Nieuwegein. His long life was dedicated to physics. Science was his passion until the last day.

After finishing his secondary school education at the Stedelijk Gymnasium Leiden he started studying mathematics and physics at Leyden University in September 1939. After this university was closed by the Germans in November 1940 he moved to Groningen, where his uncle Frits Zernike held the chair of theoretical physics. He finished his studies there in 1947, and started working on his PhD thesis with Kramers at Leyden. Zernike and Kramers were his role models, and he always talked about them with deep appreciation. In 1948 and 1950, while working under Kramers, he wrote two articles on diffraction in optics[1],[2], based on his work with Zernike, recipient of the 1953 Nobel prize for the invention of the phase contrast microscope.

In his dissertation Van Kampen treated the quantum mechanical interaction of an electron with the electromagnetic field, elaborating Kramers' ideas on renormalization. During his PhD studies he spent a year at Niels Bohr's institute in Copenhagen, and in 1952 he graduated cum laude at the university of Leyden, only a few months before Kramers died. The title of his thesis was "Contribution to the quantum theory of light scattering"[3].

In 1952/1953 he worked as a research associate at the Institute of Advanced Study in Princeton, continuing his work on quantum mechanical scattering theory. He wrote two articles on the connections between the S-matrix and the causality condition[4],[5]. Returning to Leyden University he obtained a permanent position as a lecturer. His interests soon turned to statistical mechanics, as witnessed by two articles, entitled "Quantum statistics of irreversible processes"[6] and "On the derivation of reciprocal relations between irreversible processes"[7], the latter with S.R. de Groot. In these days he also worked on plasma physics, especially on the dispersion relation for plasma waves and the related Landau damping. In his paper "On the theory of stationary waves in plasmas"[8] he introduced the well-known Van Kampen modes.

In 1955 Van Kampen was appointed associate professor at the University of Utrecht. In 1956 he published an extensive article "Grundlagen der statistischen Mechanik der irreversiblen Prozesse"[9], in which he discussed the irreversible evolution of macroscopic systems on the basis of quantum mechanics. The article builds on the ideas developed by Paul and Tatiana Ehrenfest in their famous Encyclopedia article of 1912 on irreversibility in classical statistical mechanics. Van Kampen deliberately continued the tradition Boltzmann-Ehrenfest-Kramers in statistical mechanics. In the 1956 article he laid down his deep ideas on the chaotic time evolution of dynamical systems. His frequent reaction to later developments was "They did not read my paper" (and in fact this was not the only paper this could be heard about).

In 1958 he was appointed full professor of theoretical nuclear physics at the university of Utrecht, a discipline he has not really worked in later on. His inaugural speech of May 25, 1959, entitled "Is natuurkunde een wetenschap?" ("Is physics a science?") started off a series of philosophical essays on the nature of science, and physics in particular. The speech excels in lucid and pointed formulation, so characteristic of Van Kampen's style.

Van Kampen cared strongly about the praxis of physics in The Netherlands. This resulted in several excellent and still relevant articles in the Nederlands Tijdschrift voor Natuurkunde, the journal of the Dutch physical society. The earlier ones amongst these, appearing between 1957 and 1963, were about specific physics subjects, such as the Fokker-Planck equation[10]

or the Aharonov-Bohm effect[11], whereas most later ones, between 1984 and 1992, are about more general questions, like "Wat is wetenschap?" ("What is science?"), and "Het postmoderne obscurantisme" ("Postmodern obscurantism").

During the nineteen-sixties Van Kampen published several memorable articles. In "A power series expansion of the master equation"[10] he developed the well-known Ω-expansion, which to date goes under his name. In "A simplified cluster expansion for the classical real gas"[11] he put forward a very clever way of deriving the Mayer cluster expansion, and the article "Condensation of a classical gas with long-range attraction"[12] was one of the first papers in which a phase transition in a continuum system was derived in a strict mathematical way. It has served as a strong inspiration for further work by others, including even more rigorous derivations.

Other important work includes the book "Theoretical methods in plasma physics"[13], and the article "On the macroscopic theory of Van der Waals forces"[14]. In the well-known Festschrift article "The case against linear response"[15], written in honor of Wergeland's 60th birthday, Van Kampen explains his objections to a too mechanical acceptance of the Green-Kubo expressions for linear transport coefficients.

In many of his papers, published over an era of five decades, he treats the theory of fluctuations. His ongoing thorough study established Van Kampen as a world authority in this area. His book "Stochastic processes in physics and chemistry"[16], dedicated to the memory of F. Zernike, is an invaluable standard work. A revised and extended version appeared in 1992. The book is extremely clear and has been written with utter care for detail. It contains many highly original and useful exercises and is indispensable for anyone working in the field.

Two much-cited review articles on stochastic differential equations[17] and elimination of fast variables[18] give evidence of his mastery of mathematical methods. The articles impress by their wide scope and by the application of sophisticated methods to a variety of physical situations.

In more recent times he became interested in the foundations of quantum mechanics. An article on the collapse of the wave function[19] was followed by the construction of a model for the quantum mechanical measurement process. A concise summary of his conclusions can be found in "Ten theorems about quantum mechanical measurements"[20]. After this he submitted two letters to Physics World[21],[22], gave a summary at a Tokyo meeting[23], made an address to the Royal Dutch Academy of Sciences, and published several more articles. His last contribution was a letter to the "American Journal of Physics" entitled "The scandal of quantum mechanics"[24]. In this letter, among other issues, he debunks hidden-variable theories as well as the many-world interpretation of quantum mechanics. Its last sentence reads "Even now many physicists have not yet learned that they should adjust their ideas to the observed reality rather than the other way around".

Van Kampen's philosophical observations on science, especially statistical mechanics and quantum mechanics, and his tribute to some other physicists, Kramers in particular, have been collected in the book "Views of a physicist"[25], edited by his good friend Paul Meijer, another student of Kramers. His satirical book "Waanwetenschap" ("Fancy science")[26] gives a "demonstration of the way one should use one's mental capacities to separate the wheat from the chaff and to arrive at real knowledge". Both books bear witness to his keen skeptical mind and his acute sense of humor.

Nico van Kampen was a scholar of the classical style. He studied problems in physics with passion and a contagious enthusiasm. He was a central person in Dutch theoretical

physics, an oracle to many, and a stimulating discussion partner to all. He has at times been characterized as the conscience of Dutch physics. His verdicts were not always accepted, but they were always listened to. He was elected a member of The Royal Netherlands Academy of Arts and Sciences in 1973, and was a quite loyal attender of its meetings until recently. He received an honorary doctorate from RWTH Aachen University in 1981, and was awarded the Koninklijke/Shell Prize in 1988. To his colleagues he was a dear friend and to his students a highly esteemed teacher. His critical sense and his great knowledge and wisdom will be dearly missed.

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