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## Tchavdar Dimitrov Palev – In Memoriam

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Our colleague and friend Tchavdar Palev passed away in Sofia, Bulgaria on November 19, 2021, after a long fight with a terrible disease.

Palev was an active member of the Standing Committee of the “International Colloquium of Group Theoretical Methods in Physics” from 1988 until December 2008.

As a scientist

- Tchavdar was successful as an outstanding researcher in theoretical and mathematical physics;
- he was an excellent lecturer;
- he was a promotor of academic freedom, international collaboration and tolerance.

Tchavdar Dimitrov Palev was born in Sofia on April 15, 1936. At the age of 6 months his family moved to Paris. Soon after, his father took part in the Spanish Civil War, where he was killed in action. The mother returned with her infant son to Sofia, where she raised and educated him in a spirit imbued with the pursuit of knowledge, hard work, honesty and integrity. Tchavdar graduated from secondary school in Sofia in 1955 and dreamed of building airplanes, but as often happens at turning points in life, fate took him in another direction. He studied physics at Moscow State University “M.V. Lomonosov”, where defended his diploma thesis in

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1961. Then returning to Bulgaria, he won a competition to become a research assistant at the then existing Institute of Physics of the Bulgarian Academy of Sciences, and later went to work at one of its successors, the Institute for Nuclear Research and Nuclear Energy.

Palev was one of the first physicists to specialize at the International Center for Theoretical Physics in Trieste, Italy, which opened in 1964. Working for a year at the Center, he was one of the lucky ones who were in daily contact with its Director, Nobel Laureate Abdus Salam. In 1968, he defended his Ph.D. thesis in mathematical physics at the University of Marburg, (West) Germany on “Realization of Lie algebras as functions of Heisenberg algebra generators. General theory and applications to finite- and infinite-component field equations”. His supervisor was Prof. Dr. H. D. Doebner.

Being back in Sofia he received his Habilitation degree and was elected as a Professor at the Institute for Nuclear Research and Nuclear Energy at the Bulgarian Academy of Sciences. In recognition of his achievements in the field of mathematical and theoretical physics, Palev was successively elected as a corresponding member and academician in 2004 and 2008.

As a human, Palev was a sports personality, he jogged every day. On a cold, snowy day he was jogging along a river in Sofia when he noticed something strange in the water. Tchavdar realized it was a 7-8 year old drowning child. Without a second thought, he entered the icy water, pulled him out, gave him first aid and took him to the hospital. This is how Tchavdar saved the life of the child, who is now a young man.

Each year from 1984 to 1994 Palev was a guest professor at the Arnold Sommerfeld Institute for Mathematical Physics, TU Clausthal, Germany giving lectures on associative algebras, Lie algebras, Lie superalgebras and Hopf algebras. He was a guest professor at the Department of Physics, University of Naples, Italy in 1990 and at the Department of Mathematics, Concordia University, Montreal in 1992. In addition Tchavdar was a visiting professor at the Department of Mathematics, University of Queensland, Brisbane, Australia, at the Research Institute for Fundamental Physics, Kyoto, Japan, at the Department of Physics and Astronomy, University of Rochester, USA, at the Department of Applied Mathematics, Computer Science and Statistics, Ghent University, Belgium, at the Department of Mathematics, University of Southampton, UK and he was a honorary associate in ICTP, Trieste from 1992 to 1998.

In 1987, Tchavdar organized the XVI International Colloquium on Group Theoretical Methods in Physics, which took place in Varna, Bulgaria. The following year, 1988, he was elected as a member of the Standing Committee. Palev was an active contributor to the organization of our Colloquia until 2008 when he had to retire, along with 7 other established members.

A large part of Palev’s scientific activity is devoted to the algebraic approach he introduced for the generalization of quantum statistics, i.e. the Bose-Einstein and Fermi-Dirac statistics, as well as their generalizations, the Green’s parastatistics, which he proved to correspond to different representations of Lie algebras or superalgebras of class  $B$ . These results give a certain algebraic sense to the known statistics and become the starting point for many interesting generalizations. Palev introduced the notion of a Wigner quantum system and studied the physical properties of such systems. It turns out that the geometry of these systems is non-commutative, which is one of the important directions in particle physics today. The  $A$  statistics he introduced is known and quoted today as “Palev’s statistics”. Also, of interest are the mathematical problems solved by Tchavdar – he constructed explicit finite-dimensional representations of Lie superalgebras, defining an analogue of the Gelfand-Zetlin basis for them. He generalized these results to their infinite-dimensional analogues and to quantum deformations of these superalgebras.

At the celebration of the 75th anniversary of T. Palev, his co-authors said:

Ronald King: “My impressions of Tchavdar Palev were that he was immensely stimulating, with a great breadth of knowledge and expertise in group theoretical methods and their application to physics, characterised by great attention to detail. But perhaps above all he was great

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fun to work with, and it is both a delight and a privilege to contribute here to the celebration of his 75th birthday.”

Joris Van der Jeugt: “T.D. Palev laid the foundations of the investigation of Wigner quantum systems through representation theory of Lie superalgebras. His work has been very influential, in particular on my own research. It is quite remarkable that the study of Wigner quantum systems has had some impact on the development of Lie superalgebra representations.”

I was a Ph.D. student of Tchavdar and after defending my thesis I had the privilege of working with him for about 10 years. He was a dedicated mentor, a stimulating scientist, a splendid person and a great inspiration to me.

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