

## **Namık Kemal Pak Obituary**

Particle Physics is a field where models built by thought, intuition and fancy are tested with highly precise experiments. In this field, where theory leads the experiment, the foremost criteria are physical integrity and direct falsifiability of the models.

Professor Namık Kemal Pak was a researcher, intellectual and teacher equipped with the virtues above. I was one of his students. His knowledge of quantum mechanics and quantum field theory and his teaching ability were astonishing. I have worked with him on various topics ranging from hadron physics to gravitation mass. In the course of all things, I have frequently witnessed his knowledge, depth and concreteness. Together with Professors Metin Durgut and Takhmassib Aliev, he has had a great impact on my research and teaching skills.

Professor Pak earned his Ph. D. degree in 1972 from the UC Berkeley. He held post-doctoral positions at SLAC Stanford and UC San Diego. He worked in the Physics Department of Hacettepe University and joined the METU Physics Department in 1982. He paid research visits to ICTP and CERN.

Doctoral degree years of Prof. Pak were at a time quantum field theory started dominating over the S-matrix approach. Quantum field theory was his main research area. In 1970s and 80s his research focused on the foundations of quantum chromodynamics, including perturbative and non-perturbative aspects as well as the phenomenon of confinement. He utilized his expertise and experience in chromodynamics to pursue the phenomenology of heavy hadrons in 1990s and 2000s. Besides these he worked on path integrals and on the Aharonov-Bohm effect. He also worked on quantum computation in his last years. He published about a hundred papers. A very brief list would involve the current algebra approach to chiral solitons of 1979, the new-time formalism developed for Feynman path integral in 1984, the gauged Goldstone bosons of 1985, the Feynman path integral for spin of 1994, the decays of polarization lepton of 1995, the Aharonov-Bohm effect in Chern-Simons theory of 1996, the path-integral quantization of Chern-Simons theory of 1997, the supersymmetric Higgs-strahlung of 1998, the very first effective potential in supergravity models with extra Abelian forces of 1998, the entirely non-standard matter-antimatter asymmetry of 2002, the Dirac leptogenesis of 2004, the extra-dimensional non-integrable phases of 2004, the gravitational Higgs mechanism of 2009, and the multipartite entangled states of 2010. Professor Pak collaborated with various researchers on various topics, each giving original contributions to the scientific literature.

Professor Pak has always been an inspiring mentor and leader for students. He supervised several graduate students and worked dedicatedly to make them experts on their topics. He was my Ph. D. advisor at the METU Physics Department. While he was criticizing the first draft of my thesis, I remember him saying “we should be understandable”. Being understandable and accessible were his teaching principles. For more than a decade when he held administrative positions at TÜBİTAK, he used to come to his office every weekend to teach and to do research. He was strict about meetings with his students. Professor Pak would help all students, not only his own.

Professor Pak contributed to the nation not only by teaching and research but also by critical administrative office. He was vice president of TÜBİTAK for years before he became president from 1999 to 2003. He planned and worked for joining the nation's academics to European Union research area, diversified TÜBİTAK publications, supported experimentalists' participation in the ATLAS and CMS experiments, made efforts for formulating a national science policy. He was a member of The Science Academy, Turkey, The World Academy of Sciences and Academia Europaea. Concerning science and technology policies, he co-edited three books "East-West Technology Transfer-New Perspectives and Human Resources", (with G. Bugliarello, Z.I. Alferov, J.H. Moore), "Strategies of the International Scientific Cooperation in South-East Europe" (with K. Simeonova, E. Turkcan), and "The Integration of Science-Technology Systems of the Central Asian Republics into the Western World" (with P. Rambaut), all published in NATO Science Series. In addition, he published several articles and reports on science and technology policy in Turkey.

Professor Pak has published various popular articles, too. His writings on supersymmetry of 2008, quantum physics of 2008, relativity of 2009, cosmology of 2010, Higgs physics of 2010, antimatter of 2011, entropy of 2012, Higgs boson of 2012, and notion of time of 2015, all published in Bilim ve Ütopya, are just a few of them. Professor Pak worked hard to contribute dissemination of scientific knowledge in society. His popular articles are excellent writings with a rather wide readership.

In 2003, despite being elected TÜBİTAK president by TÜBİTAK's Scientific Board, Professor Pak was not appointed by the government. I remember that this decision distressed him but he was in no way discouraged. He organized schools and workshops, gave popular talks, published in popular journals to raise awareness on basic sciences and science policy in Turkey. I believe that these efforts were not wasted.

Professor Pak, as a scientist, lived working on "suspicious granules of approximate knowledge", in the words of Vladimir Nabokov, and raised young researchers to study those "suspicious granules".

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