Jussi Timonen

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JUSSI TIMONEN, professor of physics, died at his home in Jyväskylä on 16th May 2018 after suffering for some time from muscular coordination problems. Timonen was born in Tohmajärvi and matriculated from Joensuu Lyceum in 1968. He developed an interest in physics while still at school, partly inspired by Kalervo Laurikainen's *Modernin fysiikan alkeita* ("Essentials of Modern Physics"), which he read during his last year before leaving school. He then went on to study that subject in the Department of Theoretical Physics at the University of Helsinki, following an especially strenuous schedule that required attendance at lecture courses during the summer as well. It was evidently from this that he acquired the habit of working at a furious pace that remained characteristic of the whole of his academic career.

Timonen began his studies at a crucial moment in world history, on the eve of the Vietnam War, the invasion of Czechoslovakia and the outbreak of radical student unrest. University students were boycotting lectures and demonstrating on behalf of more democratic administration on the "one man, one vote" principle. The unrest was somewhat more restrained in the building which housed the Department of Theoretical Physics, but there were radical thinkers among the students there, as well. And Jussi Timonen was one of them, so that when Kalervo Laurikainen, who was professor of nuclear physics at the time, arranged a discussion meeting to explain the opinions of the professorial staff, Timonen was the most vociferous among the students present.

Timonen was by no means carried away by student politics, however, but rather he devoted himself diligently to the study of physics. He completed his degree dissertation in laser physics, *Yhdensuuntaispumppauksen epästabiilisuudet käsiteltyinä Greenin funktiolla* ("Instabilities of Unidirectional Pumping viewed in terms of Green's Function"), in spring 1975, and his licentiate dissertation, *Törmäysten vaikutus saturaatioabsorptio-spektroskopiassa* ("The Effects of Collisions on Saturated Absorption Spectroscopy") two years later. Both projects involved the precise measurement of atom displacements by means of laser showers without the line broadening caused by the Doppler effect. His work was directed by Associate Professor Stig Stenholm, who supervised numerous students of theoretical physics around that time.

Since the full professor of theoretical physics in the University of Helsinki at that time, Pekka Tarjanne, was more often absent than present on account of his political responsibilities, the most prominent among the teachers of that subject was Associate Professor Pertti Lipas, and when he was appointed to the chair in theoretical physics at the University of Jyväskylä in 1974, he set about attracting young, talented physicists to join him there. Jussi Timonen was one of those who rose to the bait when he was offered a three-year assistantship at the department in Jyväskylä, partly because the corresponding positions in Helsinki were occupied by more advanced researchers and only shorter temporary appointments were available for younger people, and then only spasmodically.

Soon after his move to Jyväskylä, Timonen became affiliated to Nordita, the Nordic Institute for Theoretical Physics, based in Copenhagen. Many Finnish specialists in theoretical physics found their way into the world of international research via Nordita around that time, and Timonen spent the years 1977–1979 with Nordita. It was there, in fact, that he began the work on the physics of non-linear phenomena that eventually led to his doctoral thesis. He was guided towards this topic by the American Alan Luther, who had just entered upon his long career as professor of condensed matter physics at Nordita. Also among Timonen's colleagues at Nordita was the Dane Per Bak, who gained worldwide renown later for his research into self-organizing critical phenomena. His main collaborator, however, was Robin Bullough, professor of mathematical physics at the University of Manchester, who had specialized in soliton solutions related to non-linear phenomena.

Timonen completed his doctoral thesis, *Dynamics and Statistical Mechanics of Non-linear Systems*, in 1980, but cooperation with Bullough continued for many years, extending into the new millennium, and led to his spending two years doing research at the University of Manchester in the 1980s. Before the days of email, consultations between Jyväskylä and Manchester mostly had to take place by telephone, and the university authorities had to reprimand Timonen from time to time on account of his excessive phone bills. His standard reply was that a journey to England and back would be a great deal more expensive.

When it was decided in the 1990s to extend research in the natural sciences at the University of Jyväskylä further in the applied direction, Jussi Timonen became one of the central figures in this endeavour. There had already been some cooperation with industry in the 1980s, leading to the transfer of one of Timonen's students to the research department of the Valmet paper machine works, leading to repeated consultations with Timonen over challenging physical problems arising in these industrial processes. At roughly the same time one of the authors of this obituary, Markku Kataja, obtained his doctorate with a thesis on ultra-relativistic nucleus-nucleus collisions and their relativistic hydrodynamic modelling. It was then Timonen who perceived that Kataja's calculation methods could also be applied to certain complex industrial flow processes for which no adequate numerical solutions had yet been discovered. This indeed proved to be the case, leading to a long period of fruitful collaboration be-

tween Timonen and Kataja, a gradual expansion of research in industrial physics and further cooperation between industry, university departments of technology and research institutes.

Following his appointment to the chair in physics at the University of Jyväskylä in 1997, Timonen did much to promote research in applied physics and to develop both the infrastructure required for such research and the teaching available in this field. He possessed extensive networks of contacts and had an amazing ability to attract finance for his projects. Among other things, he set up Finland's first x-ray tomography laboratory intended for the purposes of material physics that was equipped for nanotomography, which is still a rarity on a global scale even now. He also acted as coordinator for numerous extensive research projects, and at the same time for two successive EU-financed master's programmes in industrial physics, several dozen graduates from which found excellent placements in industry and research institutes, including many who went on to complete a doctorate under Timonen's supervision.

Although applied research continued to expand in several directions and came to play an increasingly important role in his overall profile as a researcher, Timonen never forsook either basic research or the basic teaching of physics. He never omitted to emphasize that applied research is often fundamentally a question of the same problems that exist in basic research and that the difference between the two is a dubious and somewhat artificial one, and perhaps even a damaging one. He preferred, in fact, to combine theoretical and experimental approaches when seeking solutions to problems, as he maintained that it can never be obvious beforehand how a particular problem can best be solved. He had an excellent capacity to analyse physical phenomena, whether this meant the structure of complex substances, the path by which fire advances through paper, the recognition of osteoporosis or the mechanisms by which cells function.

Professor Jussi Timonen was invited to membership of the Finnish Academy of Science and Letters in 2007.

Timonen was a leader who was greatly respected by his students, the members of his research teams and those who collaborated with him. He demonstrated how important it is to keep an open mind and ask questions that no one has previously thought to ask. All those who knew him will remember him as a conscientious researcher who was devoted to his work and full of new ideas, a highly cultivated person for whom physics was all-important. When one reporter asked him how he set teaching and research aside in his free time he replied quite simply, "Not at all. They are my work and my hobbies."

Obituary by Markku Kataja and Jukka Maalampi

Photo: University of Jyväskylä