Ilkka Tuominen In Memoriam

Ilkka Vilhelmi Tuominen, Professor emeritus of Astronomy of the University of Oulu, Finland, died of a sudden bout of illness on the 19th of March 2011 at his home in Helsinki. Ilkka Tuominen was born on the 4th of September 1939 in Boston, U.S.A.. His father Jaakko Tuominen was working there as a visiting scientist at the Harvard College Observatory. The young family with their first-born returned to Finland during the Winter War in February 1940. Jaakko Tuominen served in 1951-1974 as Professor of Astronomy at the University of Helsinki.

Ilkka Tuominen studied since 1959 at the University of Helsinki and graduated in 1962 with Meteorology as his main topic. He switched to Astronomy and defended in 1973 his PhD thesis "On stellar structure in non-uniform rotation". The thesis work was partially done in Moscow where he worked during 1971-73 at the Astronomical Council.

Ilkka Tuominen worked in 1962-95 at the Helsinki Observatory in different positions: as Observator, Docent and acting Professor. From 1995 on he served as professor of Astronomy at University of Oulu. After retiring from Oulu in 2004 he returned to Helsinki Observatory and continued as an active researcher and mentor of students and young researchers until his death.

Tuominen furthered in many roles the international collaboration of Astronomy, perhaps most notably in the "Sun and Cool Stars: Activity, Magnetism and Dynamos" collaboration. He organised in 1991 an IAU Colloquium on this topic in Helsinki and later served as SOC member of two further IAU Symposia on related topics. Ever since his early period in Moscow 1971-73 he had many collaborations and connections with astronomers of the Soviet Union, later especially with the Russian and Ukrainian ones. Several astronomers from these countries worked in his group in Helsinki and Oulu and took later professor's positions in the West. He also organised joint conferences between Finnish and Soviet/Russian/Ukrainian/ Georgian astronomers and he was appointed as the Coordinator for Astronomy collaboration between the Academy of Finland and the Soviet Academy of Sciences 1979-83.

Other important collaborating parties especially for Solar and stellar dynamos have been the MHD group at Potsdam-Babelsberg and Nordita in Copenhagen/Stockholm where Tuominen's former student is now leading the activities in this field. Tuominen's group was the first Finnish research group to coordinate an EC Human Capital and Mobility Network in 1994-98.

Tuominen served as Finland's representative in the A&A Board of Directors from 1998 until present, and he published the majority of his refereed papers in this journal over the 40-year period 1970-2011. Tuominen was also member of the Editorial Boards of Astronomische Nachrichten and Geophysical and Astrophysical Fluid Dynamics. Since 1973 a member of the IAU, Tuominen served since 1977 as member of the Finnish National Committee, and 1996- 2007 as its chairman. He was also Finland's representative at many of the IAU General Assemblies, the last time in Rio de Janeiro in 2009. Tuominen was member of the Finnish Academy of Science and Letters and he was one of the founders of the Astronomical Society of Finland in 1969.

Ilkka Tuominen's scientific activity covered 50 years, 1960-2011. During his scientific career he has published over 200 papers, covering three major areas of astrophysics, namely observational stellar astrophysics, instrumentation, and theoretical research on magnetic activity on astrophysical bodies.

One of the cornerstones of his research project was the collection of high-resolution spectroscopic observations of active late-type stars, including stars like the young Sun. These observations have yielded one of the most extensive datasets collected for these stars. It has been used to derive surface temperature and magnetic field maps of the sample, allowing for the investigation of the time evolution of the surface

structures (star spots). From this kind of time series it has been possible, for the first time, to detect cyclic behaviour of magnetic activity on these stars. This has been especially important to understand the early evolution of our Sun as well as the climate of the Earth which is – as Tuominen liked to emphasize -- mainly controlled by the solar irradiance.

The extensive observational programme carried out by Tuominen's group became possible with the construction and development of a dedicated instrument, namely the high-resolution spectrograph SOFIN, designed and built in collaboration with the Crimean Astrophysical Observatory. This instrument is presently located at the Nordic Optical Telescope (NOT) in La Palma, Canary Islands, Spain, and saw its first light in 1991. The instrument has been maintained and constantly upgraded by Tuominen's group, the members of which have also provided service observations and support to a wider community observing with SOFIN. In addition, Tuominen used several other international telescopes, e.g. the Kitt Peat McMath-Pierce Solar Telescope, the Crimean 2.5-m, the ESO CAT/CES, the Italian Galileo, and the Bulgarian NAO Rozhen 2-m telescopes.

Together with the observations, Prof. Tuominen's group simultaneously developed theoretical models for explaining the observational behaviour of stars. The modeling was started in the early 1980's in collaboration with the Astrophysikalisches Institut Potsdam, employing the so-called mean-field dynamo theory to analytically and numerically calculate the long-term evolution of global magnetic field patterns in the Sun and other stars. This approach was found to be very successful, and was later applied by Tuominen's group to other astrophysical bodies, such as galaxies.

Although these non-linear dynamo models have yielded significant results, it was realized by the group that more information on the small-scale motions, i.e. turbulence, was needed to develop more realistic models of the astrophysical bodies. Therefore, new three-dimensional computer models were developed by the group in tight collaboration with several international experts, some of which have been educated by the group. These numerical models have recently been adapted to take advantage of modern computer technology, such as parallel computing. These models have been applied to stellar convection zones, accretion disks, and interstellar matter, yielding unique and important results.

In Tuominen's group a large number of academic degrees have been completed, among them 11 doctoral dissertations. Some of Tuominen's students and group members have established significant international careers. Tuominen has also actively participated in teaching of astronomy and astrophysics throughout his career, both at the Helsinki Observatory and the University of Oulu, where he and his group have significantly improved the quantity and quality of teaching in the Division of Astronomy.

Ilkka Tuominen was not a scientist who would have drawn himself back into his ivory tower. Rather, he was participating in the social activities both within the university and outside. Being actively involved in the leftist student and young academics movement in the 1960s and 1970s he got many life-long friends from most different fields of the society. In 1969 he was a central person in the course of matters which lead to a student action known as the “occupation of the Helsinki Observatory”. As a result of the occupation, the Director's residence at the Observatory was transformed to institute offices and the outdated lecture curriculum of Astronomy was brought up to international standards. In the 1970s when Tuominen was acting professor and Director he introduced democratic structures to the Department's administration. The circle closed up after 40 years again when the University administration decided in 2009 to close the Astronomy Department and to remove its staff, including Tuominen, from the Observatory and to merge them with Geophysics Division in the Department of Physics. Tuominen was among those who resisted this decision sharply until the very last, obviously to the resentment of the administration. In the Physics Department no office space or working possibilities were made available for Tuominen any longer.

Tuominen's hobbies ranged from ornithology to gardening, from literature to music, from opera to jazz and choral singing. Tuominen's colleagues, former students and friends remember him as a colourful person with a sense of humour. He is also remembered of his sharp comments and questions especially when it came to defending the academic freedom. Ilkka Tuominen was married twice and he is survived by two sons and a daughter.

Kalevi Mattila