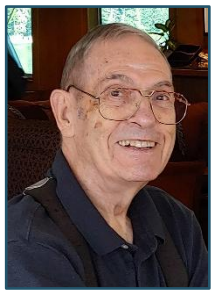
William (Bill) Ross Frisken (1933-2023)



Bill Frisken, experimental particle physicist and Professor Emeritus at York University, died August 8, 2023. Born in Hamilton, Ontario in May, 1933, the second son of Orval James Frisken, engineer, and Chalmers Melissa (Barrowman) Frisken, Bill grew up in a lakeside home near the village of Bridgenorth, and attended high school at the Peterborough Collegiate and Vocational Institute. He remembered his early years mainly for summer holidays spent fishing, swimming, and sailing, but during that part of his life he and his brother John each built their own sailing dinghy, using salvaged cedar planks for the hull and discarded flour bags for sails. He and John also spent many hours tending to the needs of a vintage Model A Ford, which their father gave them on condition they earn enough money to keep it supplied with gas, oil, and tires, and that they repair it themselves. Bill and John rebuilt every part of that machine, learning a lot of auto-mechanics in the process.

Bill took the Model A with him to Queen's University, where he enrolled in Engineering Physics in Fall 1951. It was a fateful decision, for car ownership brought an introduction to Frances Code, English major and newly-appointed editor of the *Queen's Journal*. They were married on the evening of May 19, 1956, the day that Bill graduated in Engineering Physics in the morning and Frances in English Literature in the afternoon. (They celebrated their 67th anniversary this past May.)

In Fall 1956 Bill began graduate studies at Queen's for his MSc degree, for which he built an apparatus to study the angular correlation of nuclear gamma rays using two scintillation counters. And so began what he would later describe as his "long and exciting career in experimental particle physics." In the fall of 1957, a graduate scholarship took him and Frances to the University of Birmingham, which was operating a small 1 GeV proton synchrotron. He joined a group investigating mesons created in proton-proton collisions using a bubble chamber (first reported by Don Glasser four years earlier) and a more sophisticated version of his scintillation counter apparatus. After receiving his Ph.D in the summer of 1960 he returned to Canada to join McGill University as an assistant professor. This was followed by a move to Long Island, New York, in 1964 where Bill began work as an associate scientist at Brookhaven National Laboratory where he designed detector systems for particles produced in proton-proton and meson-proton collisions, around the time when particle physicists were just beginning to realize that "elementary" particles like protons and neutrons were not elementary at all, but dynamic assemblies of smaller particles (later termed quarks and gluons). The next move was to Cleveland, Ohio, where Bill had secured an appointment as Associate Professor at Case Western Reserve University (CWRU). During his time at CWRU, he collaborated on experiments at Argonne, scattering charged pions from protons, producing neutral pions and neutrons, again challenging the elementary nature of these particles.

Bill took a break from particle physics starting in the summer of 1971 when he contracted with Resources for the Future (RFF), a U.S. think tank, to produce a report summarizing scientific research

being done on climate change. This work eventually resulted in two lengthy review articles, "Extended Industrial Revolution and Climate Change" (1971) and "The Atmospheric Environment of Cities" published by RFF in a single volume, *The Atmospheric Environment,* in 1973. It also led to his return to Canada in 1971 as a professor of environmental physics at York University. He spent several years working in environmental physics in the early days when scientists began to think seriously about climate change.

But the solar neutrino crisis of the early 1970's brought him back to particle physics and he began working on experiments at Fermilab developing tracking calorimeters for neutrino-proton scattering experiments. It was around this time that the Institute of Particle Physics (IPP) of Canada was formed to promote collaboration in particle physics research among Canadian universities. Bill soon became heavily involved in an IPP proposal to build a circular accelerator in which to collide high energy electrons and protons. While the IPP first planned to develop this collider at Fermilab in Chicago as the Canadian High Energy Electron Ring (CHEER), the proposal eventually came to fruition as the Hadron-Electron Ring Accelerator (HERA) at the Deutsches Electronen Synchrotron laboratory (DESY) in Hamburg, Germany. Bill was a key player in Canada becoming the first country to support and contribute to HERA. During this period, Bill also helped design and build a sophisticated cylindrical vertex drift chamber for the $e^+ - e^-$ collider experiment ARGUS at DESY, which opened a window into understanding bottom quark physics and made the important discovery of $B^0 - \overline{B^0}$ mixing in 1987.

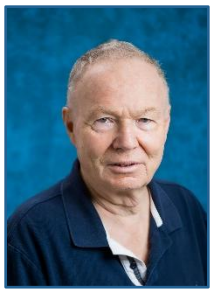
The IPP was a major collaborator in the ZEUS experiment carried out in the HERA collider, which began operation in 1991 and collected data until 2007. For ZEUS he spearheaded the development of a huge laboratory in Markham, Ontario where he and colleagues from McGill and the University of Toronto designed and built several tonnes of specialized calorimeters to measure the energies of particles scattered from HERA electron-proton collisions. ZEUS and other HERA experiments contributed enormously to the understanding of the internal quark and gluon structure of the proton.

Bill continued to pursue more physics after he retired in 1996, investigating superconducting radio frequency accelerator cavities, giving his last scientific presentation in 2005. Many undergraduates, graduate students, and post-doctoral fellows benefitted from his well-known imaginative expertise in designing and constructing unique particle detectors. All his colleagues greatly enjoyed the infectious wit with which he communicated his ideas.

Barbara Frisken, Simon Fraser University
John Martin, University of Toronto

For more about Bill Frisken's career in Physics, please check out his memoir entitled WRF – My Life in Physics*, accessible from the History section of the webpage of York U's Department of Physics and Astronomy.*

REPORT ON CANADA'S PARTICIPATION IN THE 53RD INTERNATIONAL PHYSICS OLYMPIAD IN TOKYO, JAPAN



By **ANDRZEJ KOTLICKI** (<kotlicki@phas.ubc.ca>, University of British Columbia)

The 53rd International Physics Olympiad (IPhO) took place from July 9 to July 17, 2023 in Tokyo, Japan. It was great to see the IPhO running in-person after a 3-year COVID break.

ACADEMIC PROGRAM

Japanese organizers did a fantastic job creating, analyzing and marking Olympiad problems. The Academic Committee worked perfectly with two Nobel prize winners and a large number of distinguished professors from various branches of physics who participated. The problems were very well designed not only to challenge the best high school physics students in the world but also to interest them in subjects of physics usually not taught in schools and to teach them some new skills. The International Board discussion resulted in very few significant changes to the problems.

It was amazing to realize how much support this high school competition had from leading Japanese physicists, universities and their educational authorities, as well as leading industrial companies that sponsored the event. Companies like Toshiba, Hitachi, Casio, Honda, Hamamatsu, Nikon and Toyota, just to name a few, were on the sponsor list.

The first experimental problem was loosely based on the Kibbel balance. It asked students to measure the mass of a cylindrical oscillator and the mass of additional weights by measuring the static and dynamic characteristics of the oscillating system.

The second experimental problem asked students to measure the thickness of a birefringent quartz crystal by measuring the light from the white (phosphor-based) LED propagating through the crystal at certain polarizations. The light from the LED was passed through a transmission diffraction grating, which could be rotated allowing the different wavelengths of the LED to pass through the crystal placed between 2 polarizers.

Both problems required a careful assembly of the experimental setup, making precise measurements, graphing them, calculating the results and analyzing the experimental errors. It was an excellent test of the students' experimental skills.