Richard Geller 1927–2007

Richard Geller, whose work led to the sources used worldwide in heavy-ion studies, passed away on 1 July 2007. His presence at the Laboratoire de Physique Subatomique et de Cosmologie (LPSC) in Grenoble was no longer permitted with effect from 30 June 2007, such is the way of administrative decisions. He passed away in the early hours of the following day – a sign perhaps: no physics, no Richard.

Born in Vienna, Richard was a scientist forged out of the difficulties of the Second World War, who became the spearhead for scientific reconstruction in France. He interrupted his secondary studies to join the French resistance and abandoned his studies again in 1948, leaving a prestigious French engineering school to join Frédéric Joliot-Curie as one of the pioneers of the Commissariat à l’Energie Atomique (CEA). Throughout his life he maintained his independence, instinctively keeping his distance from mainstream thinking. The result culminated in almost 60 years of technical and scientific innovation.

In 1954 Richard prepared his thesis under Yves Rocard and Francis Perrin. For this he conceived and developed the helium spectrometer which is still applied worldwide for leakage detection under vacuum. In 1956, participating in the major project of the time – the Saclay synchrotron at the Centre d’Études Nucleaires (CEN) – he became an accelerator specialist, and worked on the development of the first turbo-molecular pump to provide a good vacuum for the accelerator.

Always curious, from 1958 Richard was drawn towards plasma physics and related technologies, and in 1961 he was invited by Stanford University to study controlled fusion. It was here that he created the "bumpy torus", a collection of connected magnetic mirrors that became an important milestone in the history of magnetic fusion research. A year later he began working with the tool with which he achieved so much: the electron cyclotron resonance (ECR) heating of thermonuclear fusion plasma. As early as 1965 he realized that this technique opened a radically new approach to generating a plasma heavy-ion source for accelerators.

In 1970 Richard moved with the General Ion Service to CEN-Grenoble, leading in 1976 to the transformation of a magnetic fusion device into an ion source: SUPERMAFIOS (SUPER Machine For Ion Stripping). Only someone competent in accelerator and plasma physics could propose the principle of the electron cyclotron resonance ion source (ECRIS) or "Geller source". In doing so Richard became the founding father of a new discipline that had an impact on many areas of physics; the ECRIS conferences that began at this time continue today with enduring success.

The first fully operational source, MINIMAFIOS in 1979, was made thanks to his work with René Pauthenet, who introduced the scientists at Grenoble to permanent magnet technologies, allowing the miniaturization of the system. A MINIMAFIOS and the related ECRERIS source were both used on accelerators in 1982. The miniaturization and reliability of these sources enabled uninterrupted delivery of either continuous or pulsed ion beams, allowing the observation of rare events. The revolution that followed has lived on in all fields of physics where heavy ions are involved, whether in atomic physics, nuclear physics, high-energy or quark–gluon plasma physics. The first source dedicated to quark–gluon plasma experiments was a MINIMAFIOS installed at CERN in 1986 for oxygen beams. Future experiments on heavy ions at the LHC will also benefit from lead beams from an ECR source.

Richard officially retired in 1990 after managing several laboratories at the CNRS and CEA, but retirement from science made no sense to him. He continued his career as consultant at CEN-Grenoble from 1990 to 1992, and thereafter at LPSC until his death. He supported all the projects for secondary ions at different accelerators. In 1997 he showed the way to sources for short-lived radioactive ions, with the 1+/n+ sources that coupled two ion sources to ensure the re-acceleration of secondary ions from production targets. These prototypes have been operational at the GANIL, TRIUMF and ISOLDE since 2003, enabling the study of exotic nuclei.

Richard also took an interest in the numerous applications of his sources. Having learned of Bob Wilson's work on hadron therapy, he was the first to promote their use in the battle against cancer. In 1985 he conceived of the first source based exclusively on permanent magnets. Thanks to their ease of use and reliability they enabled all new European hadron therapy projects to be equipped with sources of this kind.

He continued to combat cancer himself for his last three years, but it finally interrupted his last paper, on philosophical arguments concerning time in physics. No one will ever know if his conclusion was similar to his conference conclusion in the early 1980s: "Next time, I will present results about our primitive soup a few microseconds before a time discontinuity called the Big Bang!"

With Richard's death, a tradition of knowledge and humanism has disappeared. Humble, avoiding attention, he received with humour a number of distinctions late in life having refused to accept them earlier. The entire community of accelerator scientists can assure his wife Annie, always present at his side, of the immense respect they had for Richard.

Pascal Sortais, LPSC.