

## Balazs L. Gyorffy 1938-2012

*Balazs Gyorffy Emeritus Professor of Physics and Senior Research Fellow died on October 25 after a short illness. Professor Robert Evans pays tribute to an outstanding scientist and a valued colleague, best described as a force of nature.*

Balazs was born in Eger, Hungary. In 1956 realising that as a 'class enemy' he would be barred from higher education, Balazs left on a train bound for Vienna. When this was stopped by Russian soldiers he and his mates jumped off, ran through marshland, bribed a guard with watches and broke through the iron curtain into Austria. Landing up in the U.S. Balazs entered Yale University where he studied Electrical Engineering and Physics, obtaining a BS in 1961. His entry into Yale was facilitated by the fact that he was a swimmer of Olympic standard. He continued in Yale completing his PhD on the theory of pressure effects on the output of gas lasers in 1966. His PhD advisor was Willis E. Lamb Jr., Nobel Laureate in Physics. Balazs came to the U.K. in the same year and held postdoctoral research appointments in UCL, Queen Mary College and Sheffield University before joining the Physics Department of the University of Bristol, as a lecturer, in August 1970. His presence was felt from day one. This tall, athletic, handsomely moustached, charming, and argumentative man brought new energy and ideas. By 1972 he was setting a new research agenda. Balazs was promoted to Reader in 1980 and to Professor in 1987. Balazs retired, rather the University ceased to pay his salary, in 2003. As Emeritus Professor his scientific productivity continued unabated. He published three papers in 2012 and was collaborating with several colleagues on new pieces of work until the final days of his illness.

Balazs Gyorffy was a theoretical physicist working across a broad area of solid state physics. Perhaps as a consequence of his training with Willis Lamb, Balazs always attempted to bring fundamental, first-principles approaches to the difficult problems he tackled. His goal, and it was an ambitious one, was to develop methodologies that would allow one to determine the electronic structure and the related physical properties of metals starting from knowledge of only the atomic numbers of the constituent atoms and the crystal lattice type. The quantum mechanics of the electrons, solved using intelligent approximations, should then yield all relevant physics. Of course this is a tall order; a typical crystal has  $10^{24}$  electrons interacting with each other and with the atomic nuclei. Balazs was probably the first to coin the term electron 'glue' to describe the role of electrons in determining the structure and properties of metallic materials. He is perhaps best recognized for his seminal contributions to the theory of metallic alloys (mixtures of two or more atomic components) where he developed a powerful and tractable approach for calculating the electronic structure that continues to be a key tool for materials scientists. In the early 1970s together with G. Gaspari, a visitor to Bristol, Balazs developed what was arguably the first successful quantitative theory for the strength of the electron-phonon coupling interaction—a quantity crucial in determining the temperature of the transition to the superconducting state in metals. His fascination in how superconductivity occurs continued throughout his career and on occasions he worked closely with experimentalists in Bristol and elsewhere to elucidate the properties of particular superconducting materials. Understanding the nature of the transition from the paramagnetic to the ferromagnetic state in metals such as iron and nickel was another research topic which intrigued Balazs. Unlike insulating magnets where the

electrons responsible for magnetism are localized on atoms, in metals these are itinerant. The challenge is to construct a theory that treats all the electronic (spin and orbital) degrees of freedom on equal footing. This was achieved by Gyorffy and co-workers in the mid 1980s in a successful approach that allowed them to calculate the ferromagnetic transition (Curie) temperatures for transition metals. These are merely a few of the topics Balazs pursued. Throughout his career he published more than 260 scientific articles.

The significance of his contributions was recognized by international awards that include: Elected External Member of the Hungarian Academy of Sciences 1995, Gordon Bell Prize of the Association of Computing Machinery (US) 1998 and Hume-Rothery Award of the Minerals, Metals and Materials Society (US) 2001. Balazs was frequently a visiting professor. His ability to enthuse young researchers, and to re-invigorate some of the more senior ones, led to many invitations for extended stays. These included the University of Würzburg, Technical University of Vienna, Brookhaven National Laboratory, Oak Ridge National Laboratory, Institut Laue-Langevin Grenoble, Max-Planck Institute for Microstructure Physics Halle and the Central Research Institute for Physics Budapest.

Balazs was a charismatic lecturer who took no prisoners. Those students who survived a Gyorffy undergraduate course often went onto great things. His talents were best reserved for final year undergraduates where his enormous enthusiasm and deep knowledge of theoretical physics were much appreciated. It was in postgraduate teaching where Balazs showed exceptional commitment. He was a fierce advocate for postgraduates continuing their formal education beyond BSc. Influenced by his experiences in the U.S. and certain European institutions, he argued passionately (and at a very early stage) that U.K. science students require courses that provide formal underpinning of their chosen discipline, more advanced than what is taught at undergraduate level. He delivered a renowned and very demanding course on 'Quantum Many-Body Theory', over a period of many years, to postgrads, postdocs and members of staff. Indeed some attended several times without mastering any of the subtleties. When Access Grid videoconferencing became available Balazs pioneered its use, broadcasting his course to several UK and European institutions.

Balazs was more than a leader in his discipline; he was an inspirational, generous and entertaining colleague. He possessed incredible energy and passion for *everything* that he engaged in -not only his research and scholarship. His interests were wide. However, politics was a particular passion. He was an active member of the Cotham and Redland Branch of the Labour Party and regularly made clear his views. Physicists will recall fondly the heated discussions in the tea-room. Balazs would urge the assembled academics, and any one else who happened to be near, to get off their backsides, be more active in getting rid of the Tories and vote for the person or party he is supporting. Those of us, from various departments across the University, who enjoyed lunch in the Hawthorns with Balazs will miss his stories, his knowledge of European history, his good humour, his hatred of pomposity, his distaste for administration as well as his forceful analysis of *any* current political situation. As an enthusiastic member of the University Arts Lectures Committee, Balazs brought a scientific perspective and with it a string of new ideas. He provided scientific advice to Michael Frayn for his famous play 'Copenhagen' that describes events in the history of quantum physics, and advice on Hungary and Hungarians to Philip Ball for

‘The Sun and Moon Corrupted’, an intriguing novel about an eastern European communist physicist. In the 1990s Balazs used his connections with Budapest to initiate a student Exchange Fellowship scheme between Bristol and Eotvos Universities. This scheme now includes an exchange programme for mathematics teachers.

Balazs was a member of Bristol Central Swimming Club and of Gloucester Masters. In 2009 he held the European Masters record for the 200 metres freestyle (age group 70-74). I recall how upset he was when ‘a young East German stole’ his record. Balazs continued swimming in competitions until well into 2012 when his illness made this impossible.

There are many anecdotes about Balazs and all are true. Several involve his forgetting to take or mislaying his (U.S.) passport but somehow managing to talk his way back into the U.K. Sometimes this entailed a telephone call from the Border authorities to the Registrar, usually in the early hours of the morning, seeking confirmation that a certain Professor Gyorffy was indeed employed by the University of Bristol. On one occasion in the 1970s Balazs was driving from Bristol to a conference in Manchester with a Hungarian colleague. Happily talking physics and singing songs from the old days they were unaware of the motorway exit to that fine city. It was only when another passenger woke up and noticed they were about to enter Scotland that they realized that had gone slightly too far.

Many of us who knew Balazs imagined that a person with such spirit and such physical presence would be immortal - as is a force of nature. Sadly we were mistaken.

R. Evans

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