Tribute to Ralph Severin (Sev) Crisp

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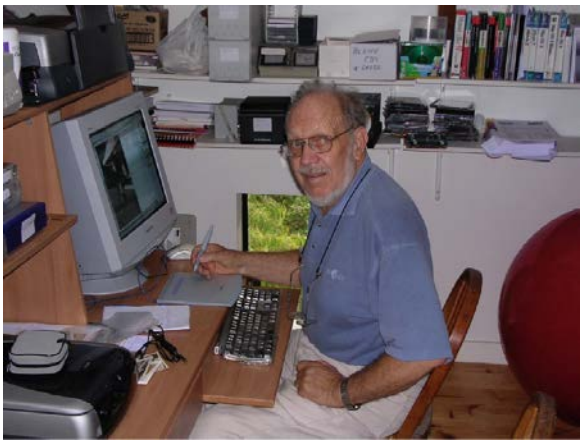

Severin Crisp at his home computer in Albany, W.A., following his retirement. (Picture courtesy Jenny Crisp.)

Severin Crisp (pictured) who had been a loyal supporter of the Wagga Conference during its early years under the title of the "Australian and New Zealand Institutes of Physics Solid State Physics Conference", passed away on 26th April, 2019. Given that Severin was an academic in the Department of Physics at the University of Western Australia (UWA), it was always quite an effort for him to support the Wagga Conferencce but I recall that he would often make the long trip from Perth to Wagga Wagga more valuable by spending a little time with one or other of his research colleagues, who at the time were at the University of Wollonging (Professor Peter Fisher), the University of New South Wales (Professor Dan Haneman) or the then National Measurement Laboratory, in the grounds of the University of Sydney.

Severin's interest in Solid State (or should I now say, Condensed Matter) Physics began during his BSc (Honours) year at UWA when, under the supervision of Syd Williams and in collaboration with a post-graduate student, Peter Fisher (also known to the Wagga Community), a grazing-incidence spectrometer for wavelengths in the 5 to 100nm range, was built and commissioned. This spectrometer then served as the basis for Sev's successful PhD at UWA, with the title *The Soft X-ray Emission Spectra of the Light Elements and Some Alloys*, and the following were the most significant peer-reviewed publications.

"The K Emission Spectrum of Metallic Lithium" R.S. Crisp and S.E. Williams, *Phil. Mag.* **5** (53), 525-527 (1960). (Times cited: 39)

"The Soft X-Ray Spectra of Lithium, Magnesium and Aluminium and Their Alloys" R.S. Crisp and S.E. Williams, *Phil. Mag.* **5** (60), 1205 (1960). (Times cited: 39)

"Soft X-Ray Emission Spectra from Potassium Metal in the 40-1000 Å Range" R.S. Crisp, *Phil. Mag.* **5** (59), 1161 (1960). (Times cited: 29)

"The Soft X-Ray Emission Spectra of Sodium, Beryllium, Boron-Silicon and Lithium" R.S. Crisp and S.E. Williams, *Phil. Mag.* **6** (63), 365 (1961). (Times cited: 56)

Following his PhD, he accepted a Post-Doctoral Fellowship in the Division of Applied Chemistry at the National Research Council of Canada in Ottawa and later was appointed as a Research Scientist in that same Division. His research at that time focussed on measuring the temperature dependence of electrical resistivity and thermopower from 300K down to ~5K. Typical of this period of his research career are publications such as:

"Thermopowers and Resistivities of Primary Solid Solutions of Zinc, Gallium, Germanium and Arsenic in Copper" R.S. Crisp, P.A. Schroeder and W.G. Henry, *Phil. Mag.* **10** (106), 553 (1964). (Times cited: 57)

"Design of a Low Temperature Thermocouple Material" R.S. Crisp and W.G. Henry, *Cryogenics* **4** (6), 364 (1964). (Times cited: 4)

"Temperature Dependence of Characteristic Thermopower of Zinc, Gallium, Germanium and Arsenic in Copper and Silver" R.S. Crisp and W.G. Henry, *Phil. Mag.* **11** (112), 841 (1965). (Times cited: 15)

It is reported that Severin was ″head hunted" by Professor Alan Boyle, who had become Head of Physics at UWA and he joined the Department in 1964 as a Lecturer. He quickly built up a research group in Solid State Physics, developing experimental capability in thermal and electrical conductivities and thermopower in the 200mK to 300K temperature range. In addition he returned to research begun during his PhD involving soft-x-ray spectrometry. Indeed, it was in this area in particular, that we benefited from his inputs to a number of Wagga Conferences, which I have summarised as follows:

1982 *Soft X-ray Emission and Self-Absorption Studies of Metals and Alloys* R.S. Crisp
Thermopower in Alloys of Sg with Zn, Ga, Ge and As – Separation of the Impurity Fe Contribution R.S. Crisp and S.J. Song

1983 *Soft X-ray Absorption Spectra via Self-Absorption* R.S. Crisp
The Effect of Alloying on the Li-K and Mg-L_{23} Soft X-ray Edges R.S. Crisp

1985 *K-β Emission from Mg in hcp Alloys of Li in Mg* R.S. Crisp and R.J. Liefield

1986 *Soft X-Ray L_{23} Emission Spectra from Crystalline and Amorphous Silicon* R.S. Crisp
A Sorption Pumped He^3 Cryostat and the Thermopowers of α-Phase Ag-Ge, Ag-As Alloys from 300 mK to 30 K Peter J. Turner and R.S. Crisp

1988 *A Line Satellite of the Li_η Doublets of 17Cl thru 22Ti* R.S. Crisp
Soft X-Ray Observation of "Gap States" in c-Si and a-Si:H R.S. Crisp
Soft X-Ray Emission from a $YBa_2Cu_3O_{7-\delta}$ Superconductor R.S. Crisp

1989 *Electronic Band Structure of an Amorphous $Fe_{78}B_{13}Si_9$ Alloy by Soft X-Ray Emission* R.S. Crisp
Valence Band Structures in Hydrogenated Amorphous Silicon, with Various Dopings, Studied by Soft X-Ray Emission R.S. Crisp

1991 *Band Structures, Gap States and Doping Effects in Amorphous Hydrogenated Silicon Studied by Soft X-Ray Emission Spectroscopy* R.S. Crisp and D. Haneman
The Low Temperature Martensitic Transformation in Li and Li-Mg Alloys Observed Via Soft X-Ray Emission Spectroscopy R.S. Crisp
Valence Band Structure of $CuInSe_2$ Studied by Soft X-Ray Emission Spectroscopy R.S. Crisp, D. Haneman and J.W. Chu

1992 *The Electronic Structure of $CuInSe_2$ Studied by Soft X-Ray Emission Spectroscopy* R.S. Crisp, D. Haneman and J.W. Chu
A Systematic Study of the Soft X-Ray M_ζ Lines in the Series $_{37}Rb$ thru $_{52}Te$ R.S. Crisp

1994 *Porous Silicon Studied by Soft X-Ray Emission Spectroscopy* R.S. Crisp, D. Haneman and R. Sabet-Dariani

Throughout his career at UWA he was a strong supporter of the Australian Institute of Physcs, an interest which had begun in his days as a student. On his retirement in 1994, he had risen to the level of Associate Professor. In addition, he had been elected

Fellow of both the Australian Insititute of Physics and the Institute of Physics (London). As an academc, he always maintained a keen interest in the teaching of Physics and had given excellent service to various university committees concerned with educational matters.

Following his retirement, Severin and his wife, Jenny, moved to Albany where he engrossed himself in the local community, particularly Albany's lively Annual Summer School, serving as the secretary between 2004 and 2016.

It was in Albany in 2008 that I was very pleased to renew my acquaintance with Severin while my wife and I were on a holiday in Western Australia, following my own retirement from Monash University. Indeed, he was the pleasant and hard-working person I had come to know through my almost annual interactions with him at a series of Wagga Conferences.

I should like to acknowledge Cyril Edwards and his article ″Sev Crisp – Some passing thoughts“ published in the July-August, 2019 Issue of *Australian Physics*, for some of the comments on Severin's life and work which I have presented. Also, I acknowledge Severin's wife, Jenny, for the image of him at his computer.