



## Aloysio Janner (1928–2016)

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Aloysio Janner passed away on 27 January 2016. He was born in 1928 in Muralto, Ticino, the Italian-speaking part of Switzerland. He was awarded his master's degree with a thesis under Pauli at the ETH Zurich, but during his PhD work Pauli died, so Aloysio finished his PhD with Thellung, at the University of Zurich. Then he went to the Batelle Research Institute in Geneva, where he worked with Edgar Ascher. One of their achievements was an analysis of the structure of space groups in terms of extensions in the mathematical sense. In 1963 he came to Nijmegen as head of the theoretical solid-state physics group. There his interest in the relation between structure and properties led him to study the symmetry of electromagnetic fields in terms of four-dimensional space–time groups. I was his first PhD student and we derived the first list of these groups.



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In 1972 Aloysio met Pim de Wolff, who had found that the  $\gamma$ -phase of anhydrous sodium carbonate has a structure that does not have lattice periodicity but still has sharp diffraction peaks, which, however, require four indices in order to be indexed. He proposed a four-dimensional space for the description of its structure. The symmetry groups he needed were exactly the four-dimensional groups in our work, now called superspace groups. Aloysio continued this research with Pim and me by generalizing this approach, called the superspace approach, to include other aperiodic structures, such as density-modulated and composite compounds, and quasicrystals. He was very happy that the result of this research led to international recognition. He received the Aminoff Prize of the Swedish Academy of Science (with Pim and me) and the Ewald Prize of the International Union of Crystallography (with me). Furthermore, he was awarded honorary degrees from the Universities of Rennes, Geneva and Lausanne. After his official retirement he chose a different direction, though related to his earlier work. He studied the symmetry of snow crystals, and later of polytopes, biomolecules and viruses.

These structures show scale symmetries similar to those of quasiperiodic tilings, like the Penrose tiling. He published several papers in this area, three of which are included in this issue of *Acta Crystallographica* Section A.

Aloysio was a very enthusiastic and warm person. In the last ten years he did not travel much, but at every conference I attended in that period there were always people asking about him. He was always happy to discuss the problems he was working on, and his advice was very stimulating for his PhD students. Some of them were experimentalists because he thought that, just as experimental groups sometimes include theoreticians, a group of theoreticians could have experimentalists as members; they could carry out the research suggested by the calculations of the theoreticians. An example of the benefit of this approach was the solution of a very old

riddle: the morphology of calaverite. This compound shows facets that cannot be indexed in the usual way with three indices. Aloysio and his collaborators showed that it is possible to index them with four indices. The reason behind this is that the structure is aperiodic, and the diffraction pattern also needs four indices to index it.

Besides his research, he was active in other fields. He was the Dean of the faculty for several years, twice he (co-)organized the Conference on Group-Theoretical Methods in Physics, he was a member of an EPS Committee on Physics and Education, and Chair of the Committee on University, Industry and Public Authorities of the University in Nijmegen. These tasks he also performed with much energy.

We have lost a great colleague.