

# Honouring Ted Janssen's contributions to crystallography and the IUCr

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Ted's contribution to aperiodic crystallography is one of the most fundamental of the field. Shortly after the publications of P.M. de Wolff on the incommensurately modulated structure of  $\gamma\text{-Na}_2\text{CO}_3$  (1972-1974) and its description in four-dimensional space, Aloysio Janner and Ted Janssen, both theoreticians from the Institute of Physics at the University of Nijmegen, were ready to enter the new field owing to their deep knowledge of the symmetry properties of solids in dimensions higher than 3. Obviously, the close Dutch proximity created a very favourable environment for a successful collaboration between the three pioneers.

The first papers published in the IUCr journals by A. Janner and T. Janssen appeared in 1980 and introduced the way to apply the superspace formalism to describe commensurately and incommensurately modulated structures [1]. A year later, both authors together with P.M. de Wolff already presented the complete list of superspace groups in (3+1) dimensions, *i.e.* all those superspace groups compatible with one-dimensional modulations [2]. In order to facilitate the determination of the superspace group, the extinction rules resulting from diffraction were also included.

Following the discovery of quasi-crystals in 1984, Ted published in 1986 an article showing that the symmetry of quasicrystals is a special case of the symmetry of incommensurate phases and thus can also be described in dimensions larger than 3. His work was later completed in 1991 [3] with the symmetry of quasi periodic systems detailing the equivalence classes applied to modulated phases, composites and quasicrystals.

An important contribution to the field of incommensurate structure determination was published by Ted and coworkers in the 1999 edition of the International Tables (IT) Vol C [4]. In 48 pages, the authors presented a full list of possible superspace groups in (2+2) and (3+1) dimensions with a complete theoretical development of the symmetry properties. This chapter is still one of the most elegant description of superspace symmetry and its applications which can be found in the literature.

Ted's collaboration with the IT included also important contributions to the volume dedicated to physical and tensorial properties of crystals. He is the author of two important chapters, one dedicated to the representation theory of crystallographic groups and the other to tensors in quasiperiodic structures [5, 6].

On the community level, the IUCr Commission on Journals greatly benefitted from Ted's membership (1993-2002). He was also the leader of two Subcommittee Reports on the Nomenclature of n-Dimensional Crystallography [7, 8].

Ted's contribution to the field of solid state is distributed in approximately 250 publications covering a large spectrum of specialties. The last important contribution of Ted is the new edition of the IUCr book series of Aperiodic Crystals co-authored by Marc de Boissieu and the author of the present abstract. Both of us were deeply saddened knowing that Ted would not be able to see the new edition of the book into which he put so much work and efforts. The book is expected to appear shortly before the Aperiodic 2018 meeting [9].

The international scientific community is very well aware of Ted's important contributions to the physics of solids. In 1998, he received the Aminoff Prize from the Swedish Academy of Science along with P.M. de Wolff and A. Janner. In 2014, he shared with A. Janner the Ewald Prize attributed by the IUCr.

Ted will be dearly missed by the Aperiodic community who always appreciated not only his visionary approach to theoretical crystallography, his clear and elegant presentations as well as his ability to give pertinent advices.

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