

Walter Kohn (1923-2016)

Walter Kohn, one of the great masters of contemporary theoretical condensed matter physics, just passed away. Everything about him is a paradigm: his life story, his scientific style and approach, his strongest contributions, his rigorous and yet compassionate outlook.

Escaped, a Jewish boy, the horrors of Nazi Austria through Britain to Canada and the US, absorbing en route a taste for physics and mathematics, he made it to a Harvard PhD, a career in research, a grand role in world science including a Nobel Prize, and a recognized moral leadership in favor of peace and of environmentally friendly technologies. From near annihilation to greatness.

In theoretical physics, most contributions by Kohn are tied to some variational principle, a principle to which he always openly declared his love. Securely tied to a no-nonsense, compassionate but safe course in his life, he was similarly tied to the no-nonsense safety of the variational principle as the compass of his research. The variational principle as a sort of Archimede's lever.

His most famous contribution — centered of course on a variational principle — is the density functional theory (DFT) of the electronic structure of condensed matter systems. Not immediately appreciated when first formulated in the form of a somewhat arcane theorem in the 1960s, DFT gradually made it feasible to calculate and predict all properties of most solids, liquids, surfaces, nanosystems, etc., with an amount of computational effort which the growing power of number-crunchers became providentially able to provide from the 1970s onwards. The initially raised eyebrows of part of the chemical community were so effectively canceled by the DFT successes to justify in the 1990s, the Chemistry Nobel Prize. From an obscure theorem to everybody's practical abacus.

Estranged by force from his family and country, orphaned, bounced across a world in war, he could have become the bitterest of men, or at least a creature wary of mankind and its destiny. His good nature and moral strength taught him on the contrary, that good fellow humans and worthy ideals existed and could be met and picked up everywhere along his path. That redeemed his vision of the world, turning him into an active pacifist and a lover of mankind, one devoid of wishful thinking and full of practical action. From a crumbling world to rolled-up sleeves building a better one.

In Trieste, Walter Kohn was no stranger, in fact a personal and dear friend to many of us. His DFT methods form the backbone of a large portion of the theoretical condensed matter output of SISSA, ICTP, and University of Trieste. He came here often, however, not just out of friendship, or just to foster the application of DFT. He came in response to the call of his fellow scientists, especially the young ones, especially those from disadvantaged backgrounds and from countries in disarray when not in war. He came to provide not just science, but also good human support and worthy ideals, thus returning in part what he had received as an expatriate orphan. Being Walter Kohn, he did all this in simplicity, working, no pomp or pretense — no-nonsense.