

## Isaac Goldhirsch: a pioneer of granular matter theory

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About 20 years ago, Isaac Goldhirsch was one of the first to recognize that granular matter, behaving neither as a normal fluid nor as a normal solid, was not only an exotic *terra incognita* for basic science, but is paradigmatic for a whole class of complex systems with irreversible interactions. This field became his passion at a time when he was already a very successful, internationally renowned theoretical physicist. Certainly this helped to establish granular matter theory as a lively new branch of science. The very existence of a prominent new scientific journal “Granular Matter”, entirely devoted to this field speaks for itself.

The present special issue of “Granular Matter” is dedicated to the memory of Isaac Goldhirsch (1949–2010). It is a tribute of colleagues who do research in this field, in return for the profound inspiration and deep insight they have received from Isaac. It also demonstrates Isaac’s lasting impact.

Isaac Goldhirsch contributed immensely to the transformation of the field of granular matter from a largely phenomenology driven description to a mathematically well founded theory. Cornerstones that will remain connected to his name are the investigation of the clustering instability in granular gases, the elaboration of kinetic theory, and the development of the foundations of granular elasticity, just to name the most prominent ones.

Isaac Goldhirsch had the rare capability of integrating seemingly disparate scientific approaches: The point of view of an engineer was as familiar to him as that of a mathematician. Isaac combined atoms, grains, complex mesoscopic



Isaac in his office at the University of Tel Aviv

statistical behavior and macroscopic hydrodynamic continua to a truly multiscale picture.

In one way or the other, all contributors to this issue benefited from Isaac Goldhirsch’s readiness to share his insights. He enjoyed scientific discussions and liked to challenge others intellectually. This was never a one way street: because of Isaac’s passion to learn, he also liked to listen to the ideas of others and often challenged and improved the foundations of their reasoning.

His friends also had the pleasure of discussing matters outside science with Isaac Goldhirsch. He was a universal mind and a great and entertaining story teller.

We lost a great scientist and friend, but will always keep our fond memories and the feelings of gratitude, respect and love.

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