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Alberto Robledo: The scientist and the man

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Alberto Robledo was born the youngest of seven brothers and sisters of whom, including his parents, he was the only one to go to university. In many aspects of his life, and in particular his intellectual life, Alberto Robledo is a rare breed. He is a self-made man, and a self-made researcher in relation to the subject and specific topics he has worked on.

The story begins early. He learned to write his first articles in English by surrounding himself with articles on a similar theme and blending them together like a jigsaw puzzle. That he was both brilliant and individualistic is clear from his undergraduate days. He pursued three undergraduate degrees at the same time and completed the course work for all three before opting for a doctorate in physics. Through his supervisor, as a doctoral student, Alberto acquired a Scottish rigour in his work. On becoming a graduate student he built upon his already individualistic formation and simply jumped in at the deep end and learned how to do science. His personal experience of moving, in a certain sense of the word, from one very different academic world to another, has had profound implications on his career, and capacities, and achievements.

Firstly, Alberto understands every single detail of every calculation he has ever done. He developed early the habit, and capacity, to do everything by himself, in part because he had to. Later on this has been reflected in his style of research.

Above all, his research has always been independent both in conception, and execution. He rarely followed trends, and has ploughed a highly original path through the field of statistical mechanics. One of his outstanding qualities has been his capacity to discover, and then make explicit, analogies between apparently disconnected problems. Some examples come to mind.

When working for his Ph.D., he was involved with equilibrium properties of lattice gases and the use of closure relations for the Ornstein-Zernike (OZ) equation. A popular topic in those days. At the beginning he had no interesting results. However, at the same time he was reading the work of Elliot Montroll on random walks for enjoyment. From these two disconnected events his thesis and his first few papers were built upon an analogy between the OZ equation and the random walk generating function equation. This connection allowed the use of established random walk properties to determine equilibrium pair correlations. A few years later, having raised Montroll's curiosity in the topic during a chance personal meeting, he had the pleasure of showing him this analogy on his blackboard. An interesting dialogue ensued.

Later, during a short sabbatical stay at Oxford, he became aware of the (then) most prominent methods to deal with equilibrium inhomogeneous fluids, including density functional theory and Widom's particle insertion method. He made explicit the connection between the two methods and this led to a new way of constructing free energy density functionals, order parameter profiles, leading to one of his more cited papers.

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Very recently, he has become interested in the connection between the transition to chaos in maps and the slow dynamics in molecular glass formers close to vitrification. I had the personal pleasure (for it was during his stay in Dublin as part of a sabbatical) in seeing this connection being made in his mind. The outcome is a robust analogy between the two problems that (possibly) highlights the role of the loss of ergodicity and of phase space mixing in understanding the anomalous glassy dynamics.

Another outstanding quality of Albertos' is his drive and capacity to understand issues from the deepest and most fundamental principles.

Twenty-five years ago, in an attempt to 'derive' from first principles the liquid-solid transition in hard-core fluids he looked at the simplest possible model, a lattice gas with nearest-neighbour exclusion, with a method (that he invented) that was exact for a Bethe lattice. The next stage was to solve the problem for an extended hard-core up to an unspecified number of nth-order neighbours. The third stage was to obtain the continuum space limit by allowing n go to infinity while the lattice spacing went to zero. The result is a family of models that exhibit 'liquid–solid' transitions and that are solved exactly. This work was much appreciated by the community, and Alberto was asked by Jerome Percus (at the Courant Institute) to repeat the basic derivation on the blackboard for his visitors.

His interests and achievements in the arena of microemulsion were outstanding, and in fact that is how I first came across him, as I was working then as a post-doctoral with Ben Widom. Alberto was (at least this is how I remember it!) one of the contenders in seeking to develop a lattice model to describe this interesting phase, and the transitions it undergoes. After an initially cautious approach (very much his style), in which I felt rather as if I was being closely inspected, we became, and have remained close friends. Alberto, true to his form, went further in this field than many. Showing his flexibility he went smoothly from lattice models, and studied the properties of curved interfaces, of particular importance because of the vanishing surface tension, such as microemulsion. Alberto derived 'microscopic' expressions for the bending terms that are 'mesoscopic' quantities, going one step beyond the usual surface tension description. Indeed, by considering cylindrical, spherical, and then general surface shape fluctuations it was possible to derive rigorous expressions for the bending constants in terms of pair correlations, similar to the expression of Triezenberg and Zwanzig for the surface tension obtained many years before. Amongst other results he, and collaborators, were able to generalize the capillary-wave model of an interface and explain its properties.

In the last few years he became aware of (and interested in) controversy surrounding Tsallis proposals and conjectures, on the applicability of his entropy expression to the transition to chaos in well-known maps, such as the Feigenbaum attractor. He decided to clarify the issue once and for all and decided to concentrate on this problem. As usual, he went back to basics, studying specific portions of trajectories at the onset of chaos, then families of them, and finally the entire picture for the dynamics on the attractor. The results are exact and obey basic scaling properties. Previously dynamics at this level of detail was not known. As it turns out, reality is more complex and beautiful than we initially suspect, and a new connection has appeared between earlier work of Mori (and colleagues) and Tsallis (and colleagues).

In writing this, I have tried to summarize some of his achievements. However, to know Alberto Robledo as a man, is first of all to know a man of science from the depths of his soul. The second aspect, easily missed in the generality of International Science, is that he is a Latin America man of Science. His achievements were framed in Latin America, and lend glory not just to him, but to intellectual vigour and creativity of that region. He is driven by the desire to understand, and not by transient pressures, nor trends, nor even personal ambition. Those that do not know him well (I have always considered him essentially a shy person), could miss some of the most interesting, and pleasing aspects of his character. He is, in the best sense, a deeply moral person, with a highly developed sense of justice. Slow to make superficial friendships, those honoured by his friendship feel his warmth, loyalty and constancy for all the years.

We, and all that have appreciated his contributions, hope that the coming decades bring as much to him (and us) as those fruitful and inspiring years that have passed.