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PHYSICS AND COMPLEXITY

ABSTRACT

This talk will be concerned with the origin, understanding and some consequences of complexity in the collective behaviour of "many-body" systems, arising through conflicts involving competitive interactions and/or constraints together with microscopic quenched disorder, even with relatively simple individual units and relatively simple few-body interactions. The perspective will be that of Physics as a mind-set.

However, I shall discuss not only topics traditionally recognised as Physics but also others more traditionally considered to be within the domains of Biology, Economics, Information theory, Computer Science and Social Science. The common links come through conceptualization, minimal modelling and mathematical formulation, rather than apparent physical similarity.

More particularly, I shall concentrate on concepts and methodologies which have their origin in attempts to understand some (fairly obscure) complex solids, but try to show their much wider and richer applicability and potential, some of the successes in application, some of the similarities and differences between systems, and some of the challenges that remain in the symbiosis of subjects.