Complexity ideas from condensed matter and statistical physics

Tecnology

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Posted on : 2009/1/21 11:50:00

This field of physics was originally identified as Solid State Physics. Later P.W. Anderson coined the term Condensed Matter Physics and more recently it has merged with Statistical Physics to lead to the Physics of Complex Systems.

This area of physics is in a way complementary to that of elementary particles which is based on a reductionistic approach. The traditional approach of physics in fact, is to consider the simplest systems and study them in great detail. This approach focuses on
the elementary “bricks” which are the building blocks of matter. This reductionistic vision can be applied to a great deal of situations
and it implies necessarily the existence of characteristic scales: the size of an atom, of a molecule or of some macroscopic object.
On the other hand, there are many situations in which the knowledge of the individual elements is not sufficient to characterize
the properties of the whole system. In fact when many elements interact in a nonlinear way, they can lead to complex structures
which cannot be directly related to the individual elements. In these cases we can think at a sort of “Architecture” of nature, which
depends in some way on the individual elements but, in addition, it manifests properties and fundamental laws which cannot be
deduced from the individual elements. This point of view was first exposed in a famous article of P.W. Anderson (PWA) which had a deep impact in the development of complexity ideas.

http://www.scienzaonline.com/index.php?option=com_content&view=article&id=190:complexity-ideas-from-condensed-matter-and-statistical-physics&catid=65:rassegna-stampa&Itemid=60