



Wherever it gets multiscale, complexity come out from behind: a couple of "non standard" study cases

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In the late seventies fractals were not that widely known and many phenomena were described and interpreted in terms of analytical equations. In meteorology as well as in statistical mechanics. In meteorology the best simulations used Tchebychev polynomials; in statistical mechanics the approach started from trying to describe the movement of every single particulate of the complex system.

Around the early eighties, however, the notion of the “fractal nature of geometry” became more and more popular so that the way of looking at several problems changed substantially.

The fact that the deposit on ground of debris after the explosion of a chemical reactor; of the radioactivity fallout after a nuclear explosion are so similar to the rainfall that it is natural to try and use the same methodological approach in simulating the phenomenon or in studying their features is almost trivial.

However the fact that the production of many elementary particles in a high energy nuclear interaction is essentially a multiplicative cascade process, since according to theory “multiparticle production” is merely the result of a process called “parton shower”, opens up a door to look at the phenomenon with “fractal eyes” and verify whether or not fractal properties can be seen in the experimental data. In such a way, the reductionism typical of quantum physics pays a tribute to the softer view of the fractal gang.

In this talk I'll tackle some study case:

- will show the usefulness of the fractal description of the pollution spread in the air by

a chemical accident at an herbicide industry (ICMESA) located in the city of Seveso near Milan, in 1976;

- will show how the radioactivity detected from near Chernobyl as well as some 3000 kilometers away from it; will display fractal parameters very similar to cloud formation;

- will show the fractal properties of multi-particle production in high energy collisions, in spite of the unavoidable intrinsic mathematical limitations.