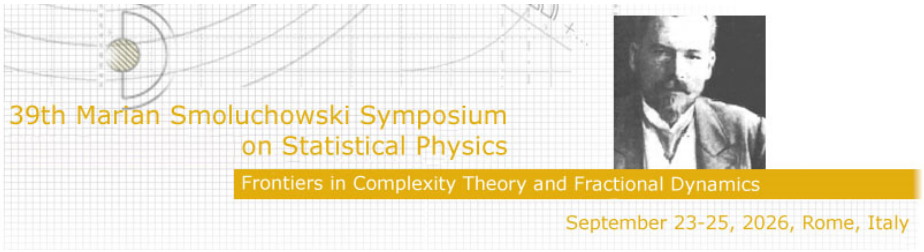

Contribution ID: **9** Type: **Invited talk**

The real butterfly effect: from the pop culture to mathematics and physics

Thursday, 24 September 2026 09:00 (30 minutes)

The butterfly effect, introduced about half century ago by E. Lorenz, is now part of the
folklore of chaos and of the pop culture.
We show how for the understanding of a realistic scenario in fully developed turbulence,
one must to go beyond the pure mathematical study of infinitesimal perturbations of the Lyapunov exponent.
In particular it is necessary to take into account:
a) the pre-asymptotic behavior of an infinitesimal perturbation;
b) the growth of finite perturbations via the Finite Size Lyapunov Exponents;
c) the role of noise at small scale.
Once one accepts that the evolution equation of the atmosphere
can be approximate with a set of (many) ordinary differential
equations the metaphor of the butterfly is just a poetic version of the sensitive dependence on the initial conditions.
Of course the butterfly, typically, after two weeks will not provoke a tornado,
but just for sure will be able to change (usually in a non dramatic way) the state of the atmosphere.

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