p-values: meaning, misconseptions and dangers, but also their practical utility if used *cum grano salis*

Giulio D'Agostini

Starting remembering few items of the quite long list of false discoveries announced by physicists in the past decades, I will focus on what **they meant** to report (`the probability of a genuine discovery') by the accompanying "number of sigmas" and why this cannot be achieved by the statistical tool ('p-values') they applied to analyze the data.

Fortunately, there is presently an increasing level of awareness of what p-values are and what they aren't, but there is still a strong resistance by practitioners accustomed to their statistical tool box.

It is then important to understand when p-values can be used as alarm bells for further investigations and when, instead, a more careful probabilistic comparison of the possibly concurring models is required.