The Stochastic Geometry of non-Gaussian Fields

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STELLINGEN

Behorend bij het proefschrift

"The Stochastic Geometry of non-Gaussian Fields"

I. When a Gaussian field undergoes a local perturbation, the relative difference between maxima and minima can be exactly related to the perturbation and the spectrum of the field.
Chapter 2 of this thesis

II. Umbilical points can prove to be a sensitive tool for uncovering the non-Gaussian statistics of a given signal.
Chapter 3 of this thesis

III. The statistics of extrema of a near-Gaussian field can be tracked even when it dynamically undergoes a nonlocal perturbation.
Chapter 4 of this thesis

IV. Coarse-graining, although often the result of imprecise measurements or a model thereof, can actually help to amplify a non-Gaussian signal.
Chapter 5 of this thesis

V. Extending the study of the stochastic properties of Gaussian fields, as pioneered by Longuet-Higgins and others, into the domain of non-Gaussian fields may provide new fascinating and useful insights.
M.S. Longuet-Higgins. Statistical Properties of an Isotropic Random Surface. Phil. Trans. R. Soc. Lond. A ***250*** *157 (1957)*

VI. Vitelli et al. noted that the shear field due to weak gravitational lensing contains topological defects that can be related to the projected gravitational potential, but did not note or realize that classifying them can shed light on the (non-)Gaussianity of said potential.
V. Vitelli, B. Jain, and R.D. Kamien. Topological Defects in Gravitational Lensing Shear Fields. JCAP ***09*** *034 (2009)*

VII. Experimental verification of theoretical results on the statistics of points of circular polarization in optical speckle fields, as done by Flossmann et al., can now be extended to fields that are not perfectly Gaussian.
F. Flossmann, K. O'Holleran, M.R. Dennis, and M.J. Padgett. Polarization Singularities in 2D and 3D Speckle Fields. Phys. Rev. Lett. ***100*** *203902 (2008)*

VIII. The stark difference in structure of $+1/2$ defects, as noted by Hudson and Thomas in the context of nematics, is precisely the difference between stars and monstars in the language of umbilical points.
S.D. Hudson and E.L. Thomas. Frank elastic-constant anisotropy measured from transmission-electron-microscope images of disclinations. Phys. Rev. Lett. ***62*** *1993 (1989)*

IX. It is important—in science, but also in life in general—not to confuse what you want to be true with what is actually true.

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