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The Stochastic Geometry of non-Gaussian Fields THOMAS BEUMAN, Institute Lorentz, Leiden University, ARI TURNER, University of Amsterdam, VINCENZO VITELLI, Institute Lorentz, Leiden University — Gaussian random fields pervade various areas of physics and have distinctive and well understood stochastic properties. Here we study the stochastic geometry of a random surface, whose height is given by a nonlinear function of a Gaussian field. We find that, as a result of the non-Gaussianity, the density of maxima and minima no longer match and calculate the relative imbalance between the two. We perform similar calculations for the density of umbilical points, which are topological defects of the lines of curvature. Our results apply to the analysis of speckle patterns generated by nonlinear random waves and more generally to detect and quantify non-Gaussianities present in any scalar field that can be represented as a smooth two-dimensional surface.

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