Universal fluctuations of global measurements in planar clusters

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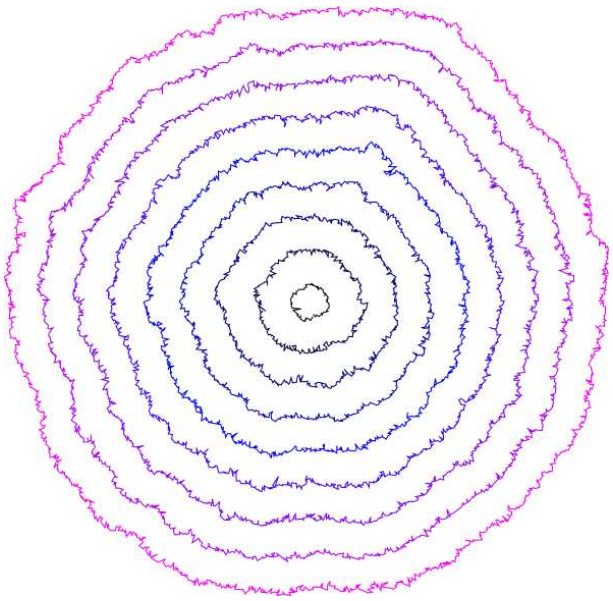

Fig. 1. Example of balls of increasing radii of a random metric.

The growth of interfaces in a noisy environment is, under broad conditions, described by the renowned Kardar-Parisi-Zhang (KPZ) universality class. Recently, a deep relation between the KPZ class and random geometry was shown in the study of balls on random two-dimensional riemannian manifolds whose metric field is, in average, flat and presents only short-range correlations [1]. Moreover, it was shown that the choice of background manifold was crucial for the nature of the fluctuations: when the manifold is a cylinder, the radial fluctuations follow the TW-GOE distribution, while the distribution becomes TW-GUE when the manifold is a cone of any opening angle, or a plane [2].

Our aim in this work is to describe the statistical characterization of key geometric observables within the random metrics paradigm of the KPZ class, such as the area, length or position of the center of mass of the balls as those shown in the figure 1. These are all *global* observables of a given ball, as opposed to local ones, such as the radial fluctuations. As we will show, the fluctuations in all these global observables presenta a scaling behavior, with exponents associated to those of the KPZ class.

[1] S.N. Santalla, J. Rodríguez-Laguna, T. LaGatta and R. Cuerno, *Random geometry and the KardarParisiZhang universality class*, New J. Phys. **17** 033018 (2015).

[2] S.N. Santalla, J. Rodríguez-Laguna, A. Celi and R. Cuerno, *Topology and the KardarParisiZhang universality class*, J. Stat. Mech. 023201 (2017).