

CLT for level functionals and applications.

José R. León R.

INRIA de Grenoble. UCV de Venezuela.

In this talk we will establish a general method for obtaining a CLT for level functionals of stationary Gaussian process or fields. The procedure can be sketched in the following form.

- The use of the Rice's formula both for the expectation and the second factorial moment (or second moment) of the functional allows getting conditions under which such functionals are in $\mathbb{L}^2(\Omega)$.
- The approximation of the functional by means of a well defined occupation functional, permits to get an Itô-Wiener's expansion with precise coefficients.
- Under some $\mathbb{L}^1(dx) \cap \mathbb{L}^2(dx)$ hypothesis for the covariance functions of the process and a careful use of the inequality of Miguel Arcones we get that the asymptotic variance of the normalized functional is bounded.
- This last result is used afterwards to show that for obtaining the CLT it is enough to work with a finite dimensional expansion into the chaos. Then an application of the Breuer-Major's Theorem in the modern version of Nourdin-Peccati-Podolskij gives the asymptotic normality.
- We end the talk with two applications: firstly to the number of crossings of a process and secondly to the Euler's characteristic of an excursion set.