SEMINAR

on

COMPLEX AND HYPERCOMPLEX ANALYSIS

Anf. 11.1.3, Departamento de Matemática

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Superoscillations, the Talbot carpet, and Gauss sums

Daniele Struppa
Chapman University, U.S.A.

In this talk I will discuss three apparently unrelated topics. Superoscillations, functions that oscillate faster than their largest Fourier frequency; the Talbot carpet, an intriguing diffraction image discovered in 1836; and Gauss sums, an idea introduced by Gauss in Disquisitiones Arithmeticae in 1801, in connection with the quadratic reciprocity law. I will show how the Talbot carpet can be considered a way to calculate, in an optical way, the value of Gauss sums, and I will then use some recent results in the theory of superoscillations longevity to show how we can asymptotically recover the Gauss sums from discrete values of an arbitrary compactly supported function. I will avoid unnecessary technicalities and the talk can be seen as a geometrical introduction to the theory of superoscillations. The work discussed is joint with F.Colombo, I.Sabadini, and A.Yger.

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