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**Seminar of the Department of Mathematics and Statistics, University of Cyprus**

Room: 037, ΣΘΕΕ01. Date: 01/11/2017 Time: 11:00

**Speaker :** Eric Loubeau (University of Brest)

**Title :** Harmonicity of of -structures

**Abstract:**

In this talk I will present an approach of -structures on seven-dimensional

Riemannian manifolds, based on the theory of harmonic maps.

Harmonic maps are defined as critical points of the energy functional

 and characterized by the vanishing of the associated Euler-Lagrange operator, the

 tension field, which is a system of semi-linear partial differential equations of second

 order.

I will review some of the essential results on harmonic maps and then turn to

the specific case of vector fields, viewed as maps from M to TM (equipped with

the Sasaki metric) which must satisfy

when harmonic.

This will unfortunately lead to a blind alley but it will serve as toy-model for

the more interesting but more challenging case of sections of homogeneous bundles

with a particular geometrical meaning.

After a quick overlook of the unified set-up of geometrical structures, I will

illustrate this with the historical example of almost complex structures and then

the lesser-known case of almost contact structures.

Recently, in dimension seven, efforts have been made to apply these ideas to G2-

structures, as preparatory conditions to obtaining -manifolds. These have led to

a harmonic condition for -structures, through their characteristic three-forms,

which paves the way for the formulation of a heat flow type of problem.