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SEMINAR ZAVODA ZA TEORIJSKU FIZIKU

Noncommutative digital geometry: introduction and applications

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Datum: srijeda, 4. srpnja 2018.
Vrijeme : **14 sati c.t.**
Mjesto: IRB, predavaona I krila

Abstract:

Noncommutative geometry, as the generalised notion of geometry, allows us to model the quantum gravity effects in an effective description without full knowledge of quantum gravity itself. On a curved space one must use the methods of Riemannian geometry but in their quantum version, including quantum differentials, quantum metrics and quantum connections constituting quantum geometry. The mathematical framework behind it is the noncommutative differential graded algebra. After presenting the motivation and the general framework, I will discuss some recent results on the classiffication of noncommutative differential geometries, over the finite field F_2 (instead that of C), in $n = 2, 3$ and 4 dimensions.

Already in 3-dimensional cases some of the possible geometries have non zero quantum curvature, which we regard as a purely quantum phenomenon. The choice of the finite field leads to a new kind of 'discretisation scheme', which we called the 'digital geometry'.

The talk will be based on "Classification of digital affine noncommutative geometries" J. Math. Phys. 59, 033505 (2018) [arXiv:1701.06919] by S. Majid, A. Pachol.

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