Institut Ruđer Bošković
ZAVOD ZA TEORIJSKU FIZIKU
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SEMINAR ZAVODA ZA TEORIJSKU FIZIKU

(Zajednički seminari Zavoda za teorijsku fiziku,
Zavoda za eksperimentalnu fiziku i Zavoda za teorijsku fiziku PMF-a)

Non-commutative quantum field theories, renormalization and emergent gravity

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Abstract:

In order to explore the foundations of physics at very short distances, a mathematical framework describing a quantized version of space-time geometry and quantum fields thereon is desired. One possible road to take are the so-called non-commutative quantum field theories. However, it is well known that these theories are plagued by a new phenomenon referred to as UV/IR mixing. So far, these problems could be overcome only for some special scalar models. In particular, UV/IR mixing in NC gauge field theories remains an open problem. On the other hand, formulated in terms of matrix models, one can show that (quantum) gravity "emerges" naturally. In fact, in the semi-classical limit classical General Relativity terms (such as Einstein-Hilbert) are recovered. In this talk, I plan to give a brief overview over these topics. I will introduce a potential candidate for a renormalizable non-commutative gauge theory, and discuss some recent result of emergent gravity from matrix models.

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