Seminar Odjela za fiziku

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From higher spin symmetries to Moyal-product based gauge theories

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Abstract

Fundamental interactions that are very well known, such as electromagnetism or gravity, are very well described in terms of fields of spin 1 and 2. Curiosity naturally leads physicists to ponder what the deal is with fields of higher spin? After all, there remain unanswered questions with the quantum description of gravity or high energy behavior of quantum field theories, and hints or answers might be found in unexpected places.

While free fields of higher spin can be described in simple terms and in much detail, a lot is still unknown about interacting theories, with traditional ways of looking for them still having to produce a satisfying answer.

In this seminar, after introducing and reviewing the context, I will describe a novel approach, based on utilizing symmetries of fields of matter in an unconventional way. This approach relies on a few crucial ingredients discovered fairly recently. The obtained construction is a Yang-Mills like theory defined over a symplectic manifold, with a non-commutative structure encoded with the Moyal product. It is perturbatively stable and possesses a number of interesting properties.