

# Gravitational Geometry and Dynamics Group Seminar

Wed., June 3, 2026, at 11h00.

Room: Sala Sousa Pinto and Teams ID: 339 078 083 741 180

(Password: contact [jnicoules@ua.pt](mailto:jnicoules@ua.pt))

## Yasha Shnir

Dubna

More about *Gr@v*  
at: [gravitation.web.ua.pt](https://gravitation.web.ua.pt)



### O(3) boson stars and hairy black holes

We present and study new nontopological soliton solutions in the U(1) gauged nonlinear O(3) sigma-model with a symmetry breaking potential in 3+1 dimensional space-time. The configurations are endowed with an electric and magnetic field and also carry a nonvanishing angular momentum density. Coupling of these solitons to Einstein gravity gives rise to a rich set of boson stars of two different types. The type I solutions represent the usual boson stars, which emerge from the vacuum as the boson frequency is decreased below the boson mass, whereas type II boson stars emerge from a set of static soliton solutions. Depending on the strength of the gravitational coupling constant, both types, or only one type, are present. At a critical set of coupling constants, both types undergo a bifurcation. Subject to the usual synchronization condition, the model admits spinning hairy black hole solutions with different types of scalar hair. We explore the domain of existence of the solutions and address some of their physical properties.