

”The Trans-Carpathian Seminar on Geometry & Physics”

(See also the [Geometry & Physics @ DFT](#) seminar homepage)

Date: Wednesday, March 27, 2024, 15:15 Bucharest time

Location: online via Zoom

Speaker: **Prof. Katarzyna Grabowska** (KMMF)

Title: **Algebroids – a playground for geometric mechanics**

Abstract: Hamiltonian formulation of classical mechanics is based on a symplectic or Poisson structure of the phase space of a mechanical system. When the phase space is a cotangent bundle with the canonical symplectic form, the corresponding Lagrangian description ”lives on” the tangent bundle. The geometric structure that allows for the infinitesimal Lagrangian formulation of mechanics is that of an algebroid - in the case of the tangent bundle, it is its canonical Lie algebroid structure. We shall introduce the concept of a Lie algebroid and present an appropriate version of the Tulczyjew triple, based on a linear Poisson structure on the Hamiltonian side and a Lie algebroid structure on the Lagrangian side. Finally, we shall pass to an even more general framework appropriate for systems with nonholonomic constraints, where double vector bundle morphisms of the Tulczyjew triple are replaced by certain linear relations known in the literature under the name of Dirac algebroid. The theory will be illustrated by examples, including systems with dynamics generated by families of functions, invariant systems on Lie groups, and systems with nonholonomic constraints.

The talk will last 2x45 min with a break in the middle.