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A Talk at the 2nd ISNMP Conference

Bad Ems, 28 June to 4 July 2026

Regular Session:

Speaker: Mats Vermeeren (Loughborough University, UK)

Collaborator: Pierandrea Vergallo

Title: *Symplectic operators and Lagrangian multiforms for bi-Hamiltonian systems*

Abstract: This talk presents some recent insights into the Lagrangian structure of bi-Hamiltonian systems. It is well-known that for many integrable Hamiltonian PDEs (e.g. KdV equation) passing to a potential variable allows one to formulate a variational principle. We show that such a potential variable is fundamentally connected to the Hamiltonian operator. The transformation to potential variables turns a compatible pair of Hamiltonian operators into a compatible pair of symplectic operators. Each of these symplectic operators can be used to construct a Lagrangian multiform - a structure that describes an integrable hierarchy in a single variational principle.

Reference

Pierandrea Vergallo, Mats Vermeeren. Duality of Hamiltonian and Lagrangian formulations for integrable systems. arXiv:2604.19655