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## A Talk at the 2nd ISNMP Conference

Bad Ems, 28 June to 4 July 2026

### Open Problems Session:

**Speaker:** S. Anco (Brock University, Canada)

**Title:** *Symmetries and Conservation Laws of PDEs*

#### **Abstract:**

- Every PDE system admits infinitely many symmetries in the sense of continuous transformations that map solution space into itself (Bluman).

How to find nonlocal symmetries systematically?

- Every dynamical PDE system admits infinitely many conservation laws in the sense of quantities that are unchanged under time evolution (Anco & Bluman).

How to find spatially nonlocal conserved quantities systematically?

A general approach for nonlocal symmetries and nonlocal conservation laws is through covering systems. How to find useful covering systems which have no gauge freedom?

- In analysis of dynamical PDEs, quantities that can be controlled in terms of norms such as energy or  $L^2$  are very useful. These quantities are not conserved but their time-derivative is proportional to energy or  $L^2$ .

How to find these quantities systematically?