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Symmetries and Reduction of Multisymplectic Manifolds

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Multisymplectic manifolds provide a natural generalization of symplectic manifolds by considering closed, non-degenerate k-forms in place of 2-forms. A central theme in the study of (multi)symplectic structures is the investigation of the relationship between symmetries, encoded by group actions that preserve the differential form, and reduction procedures. These reduction schemes yield a lower-dimensional space that retains the essential geometric structure of the original manifold.
In the symplectic case, the Marsden–Weinstein–Meyer theorem demonstrates that the geometric structure of a symplectic manifold can be analyzed via the orbits in a regular level set of a momentum map. Sniatycki and Weinstein have extended this result to encompass singular momentum maps, enabling a broader framework for reduction in the symplectic category.
The scope of this talk is to review some relevant algebraic structures related to multisymplectic manifolds, namely the higher version of the observables algebra and moment maps, and to discuss how the regular and singular reduction schemes extend to the multisymplectic framework.

This talk is based on joint work with Casey Blacker and Leonid Ryvkin.

Orateur: MITI, Antonio Michele (University of Rome 1)