SEMINARIO DI GEOMETRIA

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Politecnico di Torino,
Dipartimento di Scienze Matematiche,
AULA SEMINARI

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Invariant hypersurfaces in Lagrangian Grassmannians and nonlinear PDEs

In this talk I will outline the main result of the recent preprint arXiv:1606.02633, written in cooperation with D. Alekseevsky, J. Gutt and G. Manno. In an earlier preprint, D. The has proved that basically all complex simple Lie algebras can be realized as the algebras of symmetries of a certain second-order (nonlinear) PDE (see arXiv:1603.08251), which he called 'exceptionally simple'. I will explain the framework in which these PDEs are obtained, stressing the purely projective-geometric character of the construction. It may be though of as a natural 'nonlinear generalization' of the theory of exterior differential systems. In particular, a second-order PDE on the adjoint contact manifold to a Lie group, possesses an (algebraic) degree - not to be confused with the order of the PDE, which is always 2. For instance, a Monge-Ampere equation on a contact manifold has degree one, and indeed it is a genuine exterior differential system. The exceptionally simple PDEs display, in general, a very high degree. The main result is that there are other PDEs, with the same group of symmetries as the exceptionally simple ones, whose degree is much lower and, indeed, the lowest possible; in most of the cases, this lowest-degree PDEs is unique.