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Announcement

Seminar on Deformation Quantization and Geometry

03.07.2026 at 14:00 s.t.

Seminarroom SE 31

Hartwig Winterroth (Università degli studi di Torino)

Extending Yang-Mills theories through generalized principal connections

Aiming at the development of generalized gauge theories within the fiber bundle approach to covariant Lagrangian field theories, we investigate the notions of generalized principal bundle and generalized principal connection (Castrillón López and Rodríguez Abella, 2023). We provide a characterization of Lie group fiber bundle connections and generalized principal connections in order to obtain their local coordinate representations. Studying the curvature of generalized principal connections, we specialize the Bianchi identities obtaining a generalized version of the classical homogeneous field equations. As an application, we show also that vector bundles are an example of generalized principal bundles, where generalized principal connections reduce to affine connections. In this case, the generalized homogeneous field equations can be rephrased in terms of basic soldering forms and torsion tensors. Finally, resorting to variational calculus on fiber bundles, we propose a first approach to (an instance of) generalized Yang-Mills theories, showing that the corresponding variational field equations generalize the classical Yang-Mills equations. While generalized Yang-Mills theories require more developments to give a full answer, we expect that the Einstein equations can be formulated ultimately as an example of generalized Yang-Mills equations. This is a joint work with Lorenzo Fatibene.

Invited by Madeleine Jotz