Seminar: "Geometry&Physics@DFT" (IFIN-HH)
(Geometry&Physics Homepage) (DFT Seminars webpage)

Date: June 26, 2024, 15:00 EET

Location: DFT seminar room & Zoom

Speaker: **Prof. Rafal Suszek** ((University of Warsaw, UW-KMMF))

Title: **Novel Oïdeas about the Old Good Gauging**

Abstract: The standard gauge-symmetry principle bases on a choice of a principal (gauge) bundle with connection, providing us with the fundamental notions of gauge transformation and gauge field, and that of the space F of internal degrees of freedom, endowed with an action of its structure group G and giving rise to the field bundle of the gauge field theory through the so-called association procedure. The former part of the structure is largely independent of the latter one, and as such - encapsulated neatly in a number of short exact sequences of (gauge) Lie groupoids and algebroids - the Atiyah sequences.

In my talk, I shall recombine the data of a gauge field theory into a Moerdijk-Mrčun principal bundle with a structure Lie groupoid (to wit, the action Lie groupoid G —X F) and reinterpret the standard constructions from the point of view of the geometry of that Lie groupoid and its tangent Lie algebroid. This shall serve us as a springboard for a far-reaching generalisation in which the full Lie-Fréchet group of bisections of an arbitrary (regular) Lie groupoid shall be gauged and the corresponding gauge field shall be constructed, with the booby traps of differential geometry in infinite dimensions judiciously circumnavigated. The ensuing augmented Atiyah sequence shall be seen to incorporate entangled radiation and matter degrees of freedom of the groupoidal gauge field theory. Along the way, a specific field-theoretic context shall be indicated in which these ideas are anticipated to find a direct application. (This is a report from a joint work in progress with Thomas Strobl of Institut Camille Jordan à Lyon.)