"The Trans-Carpathian Seminar on Geometry & Physics"

(See also the Geometry & Physics @ DFT seminar homepage)

Date: Wednesday, Dec 17, 2025, 15:15 EET (Bucharest time)

Location: online via Zoom

Speaker: **Rafal Suszek** (KMMF, University of Warsaw)

Title: **Stacky Dynamics in the Shadows of Principaloid Bundles**

Abstract: A novel definition shall be presented of a gauge(d) field theory with the configuration bundle given by the Godement quotient F (aka the shadow) of a principaloid bundle with connection (P, Θ), introduced by Strobl and the speaker earlier this year, with respect to the defining action of its structure Lie groupoid $G \Longrightarrow M$. The field theory shall be descended from a two-dimensional Polyakov-Alvarez-Gawedzki σ-model with target M, the latter being endowed with a metric g_M and a bundle gerbe $\mathcal{G}$ with connective structure of curvature $H \in Z^3(M)$, which codetermines the σ-model through the corresponding degree-3 Cheeger-Simons differential character (aka the surface holonomy). It is to be viewed as an effective formulation of charged-loop dynamics on the characteristic foliation $M \,//\, G$, consistent with the principle of homogeneity of internal structures (configurational degrees of freedom, gauges etc.) over the spacetime of the field theory.

The crucial role of a prequantisable multiplicative Bott-Shulman-Stasheff extension (H, ρ) of the gerbe's curvature H (turning $G \Longrightarrow M$ into a Laurent-Gengoux-Xu prequantisable pre-quasi-symplectic groupoid), and that of a combined g_M-isometric and ρ-holonomic reduction of the structure group $Bisec(G \Longrightarrow M)$ of P shall be emphasised in a coherent descent of the σ-model to F from its local trivialisation. The latter employs the structure of a smooth 2-stack on bundle gerbes with connective structure (which shall be explained), alongside an augmentation of $\mathcal{G}$ that hinges on a canonical coupling between the comomentum component of the Spencer operator of ρ, as defined by Crainic et al., and the connection Θ. Time permitting, the abstract mechanism shall be illustrated with the example of the physically and mathematically important and much-studied Alekseev-Malkin-Meinrenken quasi-symplectic groupoid.

The talk is planned for 2x45 min.