OPERADIC STRUCTURES IN MODULI OF HIGGS BUNDLES

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Abstract. Moduli spaces of Higgs bundles admit both algebro-geometric and gauge-theoretic descriptions, leading naturally to coarse moduli spaces on the one hand and stack-like, homotopy-theoretic moduli on the other. In this talk, focusing on rank 2, degree 1 Higgs bundles over a compact Riemann surface, we compare the homotopy-theoretic moduli with the smooth coarse moduli space of semistable Higgs bundles and highlight the residual stackiness that persists even in this coprime case. We then place this example in the broader context of modular operads arising from gluing surfaces, clarifying why homotopy quotients are essential for defining operadic structures on moduli spaces of geometric objects.

Keywords: Homotopy, Moduli Spaces, Operads, Higgs Bundles.

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