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Local Systems and Higgs Bundles in p-adic Geometry

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The classical Corlette–Simpson (CS) correspondence relates local systems on complex varieties to Higgs bundles; it is highly transcendental in nature. Its characteristic p counterpart surprisingly turns out to be purely algebraic: Bezrukavnikov identified de Rham local systems on a smooth variety X over $\mathbb{F}_p$ with Higgs bundles twisted by a natural $\mathbb{G}_m$-gerbe on the cotangent bundle T^*X. By trivializing the gerbe over suitable loci in T^*X using additional choices, Ogus–Vologodsky then recovered an honest CS correspondence (i.e., with untwisted Higgs bundles). In this talk, I'll explain that this story has an exact analog for a smooth rigid space X over a perfectoid p-adic field: (generalized) local systems identify with Higgs bundles twisted by a natural $\mathbb{G}_m$-gerbe on T^*X, and honest CS correspondes (as studied by many authors in the last 2 decades) can be recovered by trivializing the gerbe over suitable loci in T^*X.

This is joint work in progress with Mingjia Zhang, and is inspired by recent work of Heuer.

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