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Cluster pictures for Hitchin fibers of rank two Higgs bundles

Let $\varphi\colon X \to Y$ be a degree two Galois cover of smooth curves over a local field F of odd characteristic. Assuming that Y has good reduction, we describe a semi-stability criterion for the curve X, using the data of the branch locus of the covering φ. In the case that X has semi-stable reduction, we describe the dual graph of the minimal regular model of X over F. We do this by adopting the notion of cluster picture defined for hyperelliptic curves for the case where Y is not necessarily a rational curve. Using these results, we describe the variation of the p-adic volume of Hitchin fibers over the semi-stable locus of the moduli space of rank 2 twisted Higgs bundles.