Partitions and moduli of twisted Higgs bundles

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Topological invariants of the Hitchin fibration have been the subject of intense investigation over a period of thirty years. The Hitchin fibration can be constructed on the projective line if one takes liberties with the notion of Higgs bundle. This largely removes one of the complications of the problem of calculating Betti numbers, namely the topological contributions from the moduli of the bundles. The remaining problem is highly combinatorial. We will discuss partition-type problems / conjectures that arise in trying to calculate Betti numbers using a circle action in the $\mathbb{P}^1$ setting.