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Title: Moduli spaces of sheaves and the boson-fermion correspondence

Abstract: The boson-fermion correspondence is a fundamental result in mathematical physics that relates the state spaces of fermions (particles with half-integer spin) and bosons (particles with integer spin). It is also one of the basic examples of the use of vertex operators in representation theory. We will descibe how one can give a geometric realization of the (r-coloured) boson-fermion correspondence using the equivariant cohomology of the moduli space of framed torsion-free sheaves on the projective plane. In this framework, the vertex operators are realized as Chern classes of vector bundles. We expect this work to allow one to develop geometric realizations of other representation theoretic constructions such as the homogeneous and principle realizations of the basic representations of affine Lie algebras, thus yielding new insight into these theories. This is joint work with Anthony Licata.