Hilbert Schemes of the points in the plane and quasi-lisse vertex superalgebras

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1. Abstract

For each complex reflection group Γ one can attach a canonical symplectic singularity \Mathcal{M}_{Γ} . Motivated by the 4D/2D duality discovered by Beem et at., Bonetti, Menegheli and Rastelli conjectured the existence of a supersymmetric vertex operator algebra \Mathbf{W}_{Γ} whose associated variety is isomorphic to \Mathcal{M}_{Γ} . We prove this conjecture when the complex reflection group Γ is the symmetric group S_N , by constructing a sheaf of \Mathcal{W}_{Γ} and the vertex algebras on the Hilbert schemes of N-points in the plane. In physical terms, the vertex operator algebra \Mathbf{W}_{\S_N} corresponds, by the 4D/2D duality, to the 4-dimensional $\Mathcal;$ super Yang-Mills theory with gauge group SL_N . This is a joint work with Toshiro Kuwabara and Sven Moller.