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Non-invertible Symmetries and a Categorified Bagger–Witten Line Bundle in Exceptional Holonomy

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In Calabi–Yau compactifications, the Bagger–Witten line bundle captures how the $U(1)_R$ symmetry varies over SCFT moduli space. For compactifications on $\mathrm{Spin}(7)$ and G_2 manifolds, the worldsheet theories include Ising and tricritical Ising sectors, whose non-invertible fusion categorical symmetries generalize the role of $U(1)_R$. In this talk, I propose a categorified version of the Bagger–Witten line bundle: a stack of module categories over moduli space, encoding the variation of these categorical symmetries. This framework offers new insight into moduli space geometry and the global structure of exceptional holonomy SCFTs.

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