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Cohomological Hall modules and Donaldson-Thomas theory with classical structure groups

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Given a complex reductive group G , there is expected to be a generalization of Donaldson-Thomas theory whose goal is to count, in an appropriate sense, stable principal G -bundles over a Calabi-Yau threefold. The standard Donaldson-Thomas theory arises when G is a general linear group. I will present some recent results on such a generalization when G is a classical group using the framework of quiver representations. The key new tool is a representation of Kontsevich and Soibelman's cohomological Hall algebra which is constructed from the cohomology of moduli stacks of quiver theoretic analogues of G -bundles. Conjecturally, the desired G -Donaldson-Thomas invariants are encoded in degrees of the generators of this representation. I will describe a number of situations where this conjecture has been confirmed.

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