Abstract

To a 3-dimensional Calabi-Yau category with stability condition one can, using the theory developed by Joyce-Song and Kontsevich-Soibelman, assign generalized Donaldson-Thomas invariants which, roughly speaking, count semistable objects. These are believed to correspond to counts of BPS states in N=2 theories considered in mathematical physics. As an interesting special case, we consider a new construction of 3CY categories from marked surfaces which are not of quiver type. The stability conditions on these categories correspond to flat surfaces, more precisely Riemann surfaces with holomorphic or meromorphic quadratic differentials with simple zeros and poles. These are of much studied in ergodic theory. The DT invariants one extracts count finite-length geodesics on these flat surfaces, i.e. closed loops and saddle connections. One application of the general theory is then that these invariants satisfy wall-crossing formulas as one moves in the moduli space.