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Functional integrals and pairing classes in the moduli space of Riemann surfaces.

Using an algebraic model for the homology of compactified moduli spaces of Riemann surfaces that originated in Kontsevich's papers on formal noncommutative symplectic geometry, we will describe two constructions producing homology and cohomology classes in these moduli spaces. These constructions were originally considered by Kontsevich for the open moduli space, and we will describe versions of them here for the compactified spaces by making use of the so-called "Batalin-Vilkovisky formalism", which has its origins in the quantization of gauge systems. The pairing of these two constructions may be computed by a certain (well-defined) functional integral, and we will present the first examples of such computations since the idea was first proposed by Kontsevich.