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Open-closed string topology

The area of string topology began with a construction by Chas and Sullivan of previously undiscovered algebraic structure on the homology $H_*(LM)$ of the free loop space of an oriented manifold M . Among other results, Chas and Sullivan showed that $H_*(LM)$, suitably regraded, carries the structure of a graded-commutative algebra. The product pairing was subsequently extended by Cohen and Godin into a form of topological quantum field theory (TQFT). Open-closed string topology, first sketched by Sullivan, arises when considering spaces of paths in M with endpoints constrained to lie on given submanifolds (the so-called D -branes). In this talk, I describe a way to extend the TQFT structure of string topology into an analogue of TQFT which incorporates open strings. The method of construction is homotopy theoretic, and it makes use of constrained mapping spaces from fat B -graphs (which I define) into the ground manifold M .