

The tautological ring of the moduli space of curves

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The moduli space M_g of smooth algebraic curves carries tautological classes in its cohomology ring (obtained from the Chern classes of tautological bundles). Madsen and Weiss have proven Mumford's conjecture: these tautological classes generate the stable cohomology (as $g \rightarrow \infty$) of the moduli of curves. A parallel question which also goes back to Mumford is: what are the relations among the tautological classes for each M_g ? I will discuss a new approach (with A. Pixton) for studying the relations. The main result is a proof of a conjecture of Faber and Zagier of an elegant set of relations. Whether these are all relations is an interesting open problem. I will discuss the data on both sides.