MSRI–Evans Talk

Apr. 13   **Ravi Vakil**, Stanford University
The topology (and Chow ring) of the moduli space of curves, and Penev's thesis

Genus g Riemann surfaces (or algebraic curves) form a moduli space, generalizing the notion of the j-invariant of elliptic curves. The topology and geometry of the moduli space imply important facts about the curves themselves. For example, a celebrated result of Eisenbud, Harris, and Mumford implies that in some sense we can never write equations for a general curve of genus g at least 23 analogous to the genus 1 equation $y^2 = x^3 + ax + b$. On the other hand, classical constructions can be used to describe the moduli space in very low genus, and many mysteries remain between these two extremes. I'll describe the algebraic version of cohomology (the *Chow ring*) of the moduli space, and the geometrically meaningful tautological subring, the subject of Faber's beautiful conjectures. Even now, it is possible to say important new things about these fundamental spaces. As evidence, I will describe the recent Ph.D. thesis of Nikola Penev on the Chow ring of genus 6 curves, where complete intersection techniques that work in genus up to 5 no longer apply. This talk is intended for a broad audience, and I will deliberately bore experts.