COVERS OF THE SPHERE AND THE MODULI SPACE OF CURVES

Abstract:
Hurwitz numbers count branched covers of the Riemann sphere, with specified branching over one point, and simple branching over other fixed points. These numbers arise in many fields (combinatorics, representation theory, physics, etc.). In Gromov-Witten theory, Hurwitz recursions are often consequences of the geometry (known and conjectural) of moduli spaces of curves and maps.
A remarkable formula of Ekedahl-Lando-Shapiro-Vainshtein links Hurwitz numbers to Hodge integrals (intersections on $\overline{M}_{g,n}$). We will sketch a motivation and proof of this formula using Graber-Pandharipande’s virtual localization formula, and give applications including:
(1) The combinatorial conjectures on factorizations of permutations are true.
(2) There is a simple method for proving all Hurwitz recursions in any genus.
(3) The generating function for Hurwitz numbers (the Hurwitz potential) is (an extension of) the Gromov-Witten potential of a point (a generating function for Hodge integrals).
(4) The part of $A_0(\overline{M}_{g,n})$ coming from the tautological ring is $\mathbb{Q}$, i.e. all top intersections in the tautological ring are rationally equivalent (up to multiple).
Much of this is joint work with T. Graber. Combinatorial applications are joint with I.P. Goulden and D.M. Jackson.

Tuesday, May 2, 3:00 p.m.
Harvard Room 507

The seminar webpage is http://www-math.mit.edu/~vakil/seminar.html.