

MATHEMATICS DEPARTMENT
North Carolina State University

ALGEBRA SEMINAR

Friday, January 11, 2008

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Picard–Lefschetz periods and integrable
hierarchies

ABSTRACT: If X is a projective manifold with sufficiently many rational curves then there is an algebraic formalism that allows us to reconstruct the higher genus Gromov–Witten (shortly GW) invariants of X in terms of the genus-0 ones and the higher genus GW invariants of a point. It is still an open problem to determine whether the Gromov–Witten invariants of such manifolds X are governed by integrable hierarchies. So far it is known that the GW theory of a point is governed by the KdV hierarchy and the GW theory of the projective line by a certain extension of the 1-Toda lattice hierarchy.

On the other hand the algebraic formalism in GW theory makes sense in singularity theory, i.e., the study of isolated critical points of holomorphic functions. So we may define the analogue of GW invariants and ask the same question, is it true that they are governed by integrable hierarchies. In a joint work with A. Givental we showed that the answer is positive in the case of singularities of type A , D , or E . In this talk I would like to give an introduction to this subject and to advertise an approach to integrable systems based on vertex operators, Hirota quadratic (also known as bi-linear) equations, and Picard–Lefschetz periods. No previous knowledge of Gromov–Witten or singularity theories will be assumed.

4:00 - 4:50 pm HA 335

Faculty and Students are invited to attend.