

TITLE: Double ramification cycles and integrable hierarchies (A. Buryak, P. Rossi)

ABSTRACT: The double ramification cycles are suitable compactifications of the cycles, inside the moduli spaces of stable curves, representing loci of marked Riemann surfaces whose marked points support a principal divisor. Their study is a natural problem in geometry of universal Jacobians, but they have attracted even more attention starting from Eliashberg's problem on how to express them in terms of known geometric cohomology classes. Pandharipande, Pixton, Zvonkine have recently proved a formula answering Eliashberg's question explicitly and, since then, the number of open problems and applications has only grown. DR cycles are related with Gromov-Witten theory and can be generalized in various directions (for instance the construction can be twisted to become a theory of loci of meromorphic k -differentials, instead of functions). One interesting application that has been the center of a series of papers by ourselves and several collaborators, is a construction associating a quantum integrable hierarchy to each cohomological field theory through intersection theory of the DR cycles. The DR hierarchies are deeply connected with other well known constructions by several results and conjectures we have been exploring for some years now. This course will give an overview of the general state and various aspects of this program.