

**Meeting:** 1007, Santa Barbara, California, SS 8A, Special Session on Geometry and Physics

1007-51-45            **Tamas Hausel\*** (hausel@math.utexas.edu), Department of Mathematics, University of Texas at Austin, Austin, TX 78712. *Mirror symmetry and Langlands duality in the mixed Hodge structure of character varieties of Riemann surfaces.*

Arithmetical methods are used to calculate the  $E$ -polynomial of the hyperkähler  $SL(n, \mathbb{C})$  and  $PGL(n, \mathbb{C})$  character varieties of a Riemann surface (joint work with Fernando Rodriguez-Villegas). The calculation is facilitated with heavy use of known information of the character tables of the finite groups of Lie-type:  $SL(n, \mathbb{F}_q)$  and  $PGL(n, \mathbb{F}_q)$ . The results are related to topological mirror symmetry and the geometrical picture of the Strominger-Yau-Zaslow mirror symmetry proposal, via Hitchin's integrable system (based on joint work with Michael Thaddeus). Additionally, harmonic analysis on the corresponding finite Lie algebras is conjectured to connect the full mixed Hodge structure of the character variety and Nakajima's hyperkähler star-shaped quiver varieties. Finally, the problem of the compactifications of these character varieties are addressed and their links to their  $L^2$  cohomology (based on joint work with Eugenie Hunsicker and Rafe Mazzeo), the Betti-version of the Geometric Langlands Program and  $SL(n, \mathbb{C})$ -Casson knot-invariants are discussed. (Received January 05, 2005)