Seminar/Talk

E-polynomials of character varieties for real curves

Tom Baird
Memorial University of Newfoundland

Host: Tamas Hausel

Given a Riemann surface Σ denote by $$M_n(\mathbb{F}) := Hom_{\xi}(\pi_1(\Sigma), GL_n(\mathbb{F}))/GL_n(\mathbb{F})$$ the ξ-twisted character variety for $\xi \in \mathbb{F}$ a n-th root of unity. An anti-holomorphic involution τ on Σ induces an involution on $M_n(\mathbb{F})$ such that the fixed point variety $M_n^{\tau}(\mathbb{F})$ can be identified with the character variety of real representations" for the orbifold fundamental group $\pi_1(\Sigma, \tau)$. When $\mathbb{F} = \mathbb{C}$, $M_n(\mathbb{C})$ is a complex symplectic manifold and $M_n^{\tau}(\mathbb{C})$ embeds as a complex Lagrangian submanifold (or ABA-brane). By counting points of $M_n(\mathbb{F}_q)$ for finite fields $\mathbb{F}_q$, Hausel and Rodriguez-Villegas determined the E-polynomial of $M_n(\mathbb{C})$ (a specialization of the mixed Hodge polynomial). I will show how similar methods can be used to calculate the E-polynomial of $M_n^\tau(\mathbb{F}_q)$ using the representation theory of $GL_n(\mathbb{F}_q)$. We express our formula as a generating function identity involving the plethystic logarithm of a product of sums over Young diagrams. The Pieri's formula for multiplying Schur polynomials arises in an interesting way. This is joint work with Michael Lennox Wong.

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