



Department of Mathematical Sciences welcomes

**Leonid Chekhov**  
**Steklov Mathematical Institute, Moscow**  
**Michigan State University**

**$SL_k$  character varieties and quantum cluster algebras**

**ABSTRACT:**

This talk spans 20 years of development of combinatorial approach to the description and quantization of Teichmüller spaces of Riemann surfaces  $\Sigma_{g,s}$  of genus  $g$  with  $s$  holes and algebras of geodesic functions on these surfaces. It all had started with ideal triangulations of Riemann surfaces with punctures and the corresponding W.Thurston shear coordinates and it then progressed into a complete description of sets of geodesic functions in these coordinates. These sets turned out to be related to traces of monodromies of  $SL_2$  connection on  $\Sigma_{g,s}$ , and Darboux-type Poisson and quantum relations on shear coordinates were proven to generate Goldman brackets on geodesic functions. I will describe these structures and their recent generalizations to  $SL_2$  and  $SL_n$  (decorated) character varieties on Riemann surfaces  $\Sigma_{g,s,n}$  with holes and  $n$  marked points on hole boundaries and how it is interlaced with cluster algebras, reflection equations, and groupoids of upper triangular matrices.

[Based on works in collaboration with M. Mazzocco, V. Roubtsov, and M. Shapiro.]

**ABOUT THE SPEAKER:**

Leonid Chekhov works in application of algebraic and combinatorial methods for studying geometry of Teichmüller space and moduli spaces, and in random matrix theory. Together with V.V. Fock, he coined in 1997 a term of quantum Teichmüller space. His work in this direction is focused on Poisson and quantum algebras of geodesic functions. In the theory of random matrix methods, he, in collaboration with B. Eynard and N. Orantin, developed a method of topological recursion for calculating higher-order corrections in 't Hooft  $1/N$  expansion. Leonid Chekhov is a leading research fellow at Steklov Mathematical Institute, Moscow, Russia, where he received his PhD in 1987. He is now a fixed-term professor at Michigan State University. Throughout his career he has been a long-term visiting professor at several places, in particular, Aarhus University, Denmark, and Loughborough University, UK, in the last decade.

February 8, 2019

Hosted by:  
Prof. Vitaly Tarasov

Tea begins at 3:00  
in LD 259

Research Topic  
begins at 3:30  
in LD 229

