

# SEMPARIS – Séminaires en région parisienne

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**TBA**

**Vendredi 12 Juillet 2019, 14 :30**

IHES, Amphithéâtre Léon Motchane( Cours de l'IHES )

Domaines : math

Titre : *Quantum Geometry of Moduli Spaces of Local Systems and Representation Theory (4/4)*

Orateur : **Alexander Goncharov ( Yale University & IHES )**

Résumé : *Lectures 1-3 are mostly based on our recent work with Linhui Shen.*

*Given a surface  $S$  with punctures and special points on the boundary considered modulo isotopy, and a split semi-simple adjoint group  $G$ , we define and quantize moduli spaces  $Loc(G,S)$   $G$ -local systems on  $S$ , generalising character varieties.*

*To achieve this, we introduce a new moduli space  $P(G, S)$  closely related to  $Loc(G,S)$ . We prove that it has a cluster Poisson variety structure, equivariant under the action of a discrete group, containing the mapping class group of  $S$ . This generalises results of V. Fock and the author, and I. Le.*

*For any cluster Poisson variety  $X$ , we consider the quantum Langlands modular double of the algebra of regular functions on  $X$ . If the Planck constant  $\hbar$  is either real or unitary, we equip it with a structure of a  $*$ -algebra, and construct its principal series of representations.*

*Combining this, we get principal series representations of the quantum Langlands modular double of the algebras of regular functions on moduli spaces  $P(G, S)$  and  $Loc(G,S)$ .*

*We discuss applications to representations theory, geometry, and mathematical physics.*

*In particular, when  $S$  has no boundary, we get a local system of infinite dimensional vector spaces over the punctured determinant line bundle on the moduli space  $M(g,n)$ . Assigning to a complex structure on  $S$  the coinvariants of oscillatory representations of  $W$ -algebras sitting at the punctures of  $S$ , we get another local system on the same space. We conjecture there exists a natural non-degenerate pairing between these local systems, providing conformal blocks for Liouville / Toda theories.*

*In Lecture 4 we discuss spectral description of non-commutative local systems on  $S$ , providing a non-commutative cluster structure of the latter. It is based on our joint work with Maxim Kontsevich.*

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