



The Hebrew University of Jerusalem

Syllabus

Advanced seminar on Langlands Program - 80979

Last update 30-01-2022

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: Mathematics

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Yakov Varshavsky

Coordinator Email: yakov.varshavsky@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Prof Yakov Varshavsky

Course/Module description:

"Geometric Langlands correspondence in the ℓ -adic setting"

Abstract: The goal of the seminar is to explain parts of the joint work

<https://arxiv.org/abs/2010.01906>.

In his remarkable work Vincent Lafforgue constructed a decomposition of the space of (cuspidal) automorphic forms

parameterized by semi-simple Langlands parameters for the Langlands dual group.

The goal of the seminar will be to explain a ``categorification" of Lafforgue's result, from which the (unramified case of) of Lafforgue's result follows.

Namely, our first goal will be introduce a new algebro-geometric object - the (derived) stack LocSys of local systems and to describe its properties. Our second goal will be to construct an action of ``the symmetric monoidal category of quasi-coherent sheaves on  $\mathrm{LocSys}$  for the Langlands dual group" on ``the category of sheaves on the moduli space of

G -bundles with nilpotent singular support", also called the spectral action. Our third goal will be to explain how to deduce the unramified case of the original Lafforgue's result by the so-called ``trace of Frobenius" construction.

Prerequisites: The seminar will be about algebraic geometry and category theory rather than representation theory. In particular, while no particular background in Langlands program or representation theory is needed, a familiarity with (stable) infinity categories, derived categories, t-structures, symmetric monoidal categories and algebraic stacks will be helpful.

Course/Module aims:

NA

Learning outcomes - On successful completion of this module, students should be able to:

NA

Attendance requirements(%):

0

Teaching arrangement and method of instruction: Lecture

Course/Module Content:

NA

Required Reading:

No

Additional Reading Material:

No

Grading Scheme:

Additional information:

No