TITLE: Lie Theory and Representation Theory (Algebre di Hecke)

(Advanced topics in Algebra and Geometry)

SPEAKERS:
Martina Lanini
Guido Pezzini

Period: 06/03/2024 - 10/05/2024

Schedule: 30 hours

mer 06/03, h.10-12, Sapienza	AULA B
gio 07/03, h.16-18, Sapienza	AULA B
lun 11/03, h.15-17, Sapienza	AULA B
mer 13/03, h.10-12, Sapienza	AULA B
mer 20/03, h.10-12 Sapienza	AULA B
gio 21/03, h.16-18, Sapienza	AULA B
lun 25/03, h.15-17, Sapienza	AULA B
mer 27/03, h.10-12, Sapienza	AULA B
mer 03/04, h.10-12, Sapienza	AULA B
gio 04/04, h.16-18, Sapienza	AULA B
ven 05/04, h. 11-13, Tor Vergata	Room 1201 "R. Dal Passo"
ven 12/04, h.11-13, Tor Vergata	Room 1201 "R. Dal Passo"
mar 16/04, h. 11-13, Tor Vergata	Room 1201 "R. Dal Passo"
mer 17/04, h.10-12, Sapienza	AULA B
ven 19/04, h.11-13, Tor Vergata	Room 1201 "R. Dal Passo"
mar 30/04, h.11-13, Tor Vergata	Room 1201 "R. Dal Passo"
ven 3/05, h.11-13, Tor Vergata	Room 1201 "R. Dal Passo"
mar 7/05, h.11-13, Tor Vergata	Room 1201 "R. Dal Passo"
mer 8/05, h.10-12, Sapienza	AULA B
ven 10/05, h.11-13, Tor Vergata	Room 1201 "R. Dal Passo"

PROGRAMMA

Hecke algebras are all over the place: they appear, for example, in algebraic combinatorics, representation theory, knot theory, harmonic analysis, equivariant Ktheory, integrable models in statistical physics.
In this lecture series, articulated into twoparts, each of them lasting about 20 hours (10 lectures), we will mainly focus on the algebraic (and, possibly, geometric) side. In the first part, we will discuss classical theory of Coxeter groups and define Hecke algebras via generators and relations, as well and their celebrated Kazhdan-Lusztig basis. In the second half of the course we will focus on a categorical approach to the study of Hecke algebras and deal with Soergel bimodules. Introduced by Soergel a couple of decades ago, these bimodules havebeen a central object of interest in geometric representation theory, but also investigated by a purely combinatorial viewpoint. Depending on the audience interests and background, we might discuss how Hecke algebras relate to representation theory (of Coxeter groups, of complex Lie/Kac-Moody algebras, of algebraic groups in positive characteristic, of quantum groups) and geometry (e.g. via intersection cohomology complexes on the flag varieties, or via homology of the Steinberg variety).