Oscar: some more details...

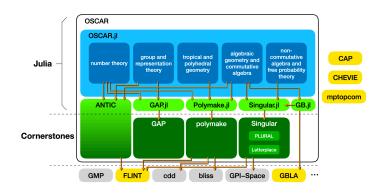
August 21, 2025





You have seen

http://oscar-system.org/



Or even

http://oscar-system.org/

GAP: computational discrete algebra, group and representation theory, general purpose high level interpreted programming language.

julia

Singular: polynomial computations, with emphasis on algebraic geometry, commutative algebra, and singularity theory.

Examples:

- Multigraded equivariant Cox ring of a toric variety over a number field
- julia
- Graphs of groups in division algebras
- Matrix groups over polynomial rings over number field



Oscar

polymake: convex polytopes, polyhedral and stacky fans, simplicial complexes and related objects from combina-

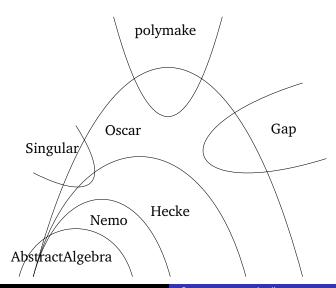
inlia

ANTIC: number theoretic software featuring computations in and with number fields and generic finitely pre-

Oscar: some more details...

More real...

http://oscar-system.org/



Some stats:

	LoC	#Func
Oscar	320	13
Hecke	250	10
Nemo	125	6.5
AA	95	3.8

LoC: kilo lines of code, roughly #Func: kilo functions, roughly

Why is this important?

- ▶ in total: Oscar is huge
- there are way more functions than documented
- only part of Gap, ... is nicely accessible
- depending on your topic, you do not need Oscar
- sometimes it pays to search elsewhere
- many people are involved, thus many people to ask!

AbstractAlgebra

- ► basics for all rings/ fields
- polynomials, matrices
- quotient rings/ fraction fields
- power series
- modules

Nemo

- ▶ interface to the flint library
- ► fast methods for special rings
- finite fields, integers, rationals
- power series, polynomials, matrices over special rings
- **.**..

Hecke

Number Theory

- ► Ring of integers, class group, unit group
- matrix algebras
- ▶ (global) function fields
- lattices
- **.**..

Oscar

All!

- algebraic geometry, schemes
- group and representation theory
- toric and tropical geometry
- ► Galois theory, Galois cohomology
- discrete geometry
- much, much more, check out the experimental stuff!