

# Geometric Invariant Theory

2h lecture, TU Berlin, SS 2020, Prof. P. Bürgisser

## Chap. 1. Introduction

- 1.1 Overview (slides)
- 1.2 Strong versus Zariski topology

## Chap. 2. Matrix Lie groups

- 2.1 Matrix exponential
- 2.2 Matrix Lie groups and their Lie algebras
- 2.3 Exponential map
- 2.4 Lie subgroups and Lie subalgebras
- 2.5 Representations
- 2.6 Compact Lie groups
- 2.7 Semisimple Lie algebras
- 2.8 Symmetric algebraic groups
- 2.9 Symmetric matrix Lie groups
- 2.10 Compact algebraic tori
- 2.11 Cartan subalgebras
- 2.12 Kempf-Ness I
- 2.13 Maximal compact subgroups

## Chap. 3. Some results from GIT

- 3.1 Hilbert-Mumford criterion for null cones
- 3.2 Hilbert-Mumford criterion and Kempf-Ness II

## Main references

- *Geometric Invariant Theory: over the Real and Complex Numbers.*  
Nolan R. Wallach, Springer Universitext 2017.
- *Lie groups, Lie Algebras, and Representations.*  
Brian C. Hall, Springer 2003.