

Student projects

Borel-Weil theorem

Project supervisor: Johan Martens

Project type

double

Suitable degrees

Comp Sci and Maths

Project description

It is one of the triumphs of representation theory in the middle of the 20th century to give a complete classification of all finite-dimensional representations of compact Lie groups (or complex reductive groups). The <u>Borel-Weil theorem</u> in particular covers the existence part of this classification, by giving an explicit geometric construction of irreducible finite dimensional representations, in terms of sections of a line bundle over an associated flag variety. In this project the theorem and all its prerequisites will be developed. Depending on the preferences of the student this project could be either focussed on algebraic geometry, of on differential/symplectic geometry aspects of the theorem (in terms of geometric quantisation).

Prerequisites

Algebraic Geometry and/or Differentiable Manifolds, as well as Group Theory.

Recommended reading

Representation Theory of Semisimple Groups: An Overview Based on Examples by Knapp.

Lie Groups, by Duistermaat and Kolk.