Georg-August-Universität Göttingen
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GEORG-AUGUST-UNIVERSITÄT
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Seminar on
Representation Theory of Compact Lie Groups

A group G having the structure of an analytic manifold such that the mapping $(x, y) \mapsto xy^{-1}$ is analytic is called a Lie group. A compact Lie group is a finite dimensional real Lie group. Important examples are $SO(n)$, $SU(n)$, and $Sp(n)$. Not only are they important in their own right with many applications in physics and related fields but their study is also a stepping stone to the theory of general Lie groups.
In practice, groups do not just arise as abstract algebraic object but usually through their action on other objects as, for instance, solutions to polynomial or differential equations or manifolds. Often there is, in some natural way, a vector space attached to such data which gives rise to a linear action of the group on it. Representation theory is then the study of this action as a way to understand the group better.

In this seminar, we want to study the representation theory of compact Lie groups following mainly the text [1]. Other appropriate resources include [2, 6].

Depending on the number of participants and their interests, we may continue the seminar with the appropriate chapters in [3] (respectively some original articles as [4, 5]), where pseudo-differential calculi on compact Lie groups are discussed.

The first meeting will be on Tuesday, the 31st of March at 2pm in HS5 in the Mathematisches Institut. If you would like to participate in the seminar but can not make the meeting, please send me an email at christian.jaeh@uni-goettingen.de so that we can discuss the particulars.

References

[1] Th. Bröcker and T. tom Dieck. *Representations of compact Lie groups*. Springer-Verlag, New York, Graduate Texts in Mathematics 98, 1985. 0-387-13678-9.

[2] J. Duistermaat and J. Kolk. *Lie Groups*. Springer-Verlag, New York, Graduate Texts in Mathematics

[3] V. Fischer and M. Ruzhansky. *Quantization on Nilpotent Lie Groups*. Birkhäuser, Cham, Progress in Mathematics 314. 978-3-319-29558-9.

[4] M. Ruzhansky and V. Turunen. *Global quantization of pseudodifferential operators on compact Lie groups, SU(2), 3-sphere, and homogeneous spaces* . Int. Math. Res. Not. IMRN, (11):24392496, 2013.

[5] M. Ruzhansky, V. Turunen, and J. Wirth. *Hörmander class of pseudo-differential operators on compact Lie groups and global hypoellipticity*. J. Fourier Anal. Appl., 20(3):476499, 2014.

[6] M. Sepanski *Compact Lie Groups*. Springer, New York, Graduate Texts in Mathematics 235, 2007. 978-0-387-30263-8