

# SUDA Lie Groups Lectures I

Speaker: David A Vogan Jr (MIT)

Title: Lie groups and representations

Time: 2020-10-20 8pm-9pm (Beijing Time)

Zoom ID: 517 680 7232 Passcode: 453060

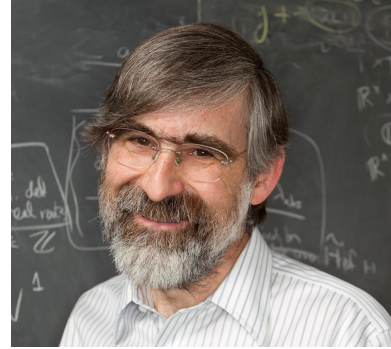


Photo by Bryce Vickmark

## Abstract:

Groups are a way to describe symmetry in almost anything: a deck of cards (which is still the same deck no matter which of 52 factorial arrangements it is given); the space around an atomic nucleus (which looks exactly the same in every direction away from that nucleus); or the collection of length functions on a vector space (which is the same collection no matter which basis of the vector space you use to describe the lengths). Lie groups are designed to describe continuous families of symmetry.

Symmetry appears everywhere in mathematics and in science, so groups are a powerful tool. But this tool can be difficult to use. It is easy to see that a hydrogen atom has rotational symmetry around the nucleus, but not so easy to see what that can tell you about electrons. Representation theory allows us to use familiar ideas from linear algebra to approach such difficult questions.

I will talk about several examples of groups and representations, beginning with some familiar and elementary ones (like even and odd functions), and moving to some more sophisticated things (like spherical harmonics, which help to answer the question about electrons). I hope to finish by saying a little about how these ideas are related to number theory; this is close to the current research of Professor Bai, Professor Dong, and Professor Wong.

**About the speaker:** David Vogan received the B.A. and S.M. degrees from the University of Chicago in 1974, and the Ph.D. from MIT in 1976 under the direction of Bertram Kostant. He was a plenary speaker of ICM 1986. He served as President of the American Mathematical Society (2013-2015). He is a fellow of the American Academy of Arts & Sciences (1996) and member of the National Academy of Sciences (2013).

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