October 20, 2022

AIM lectures by Bent Ørsted, Nov. - Dec. 2022
Elements of the history of representation theory 1950 - 1980.

Content

The representation theory of locally compact groups and in particular reductive Lie groups developed in great ways in this period. We shall present one view (very personal - this period no doubt invites many such), where some ideas of a lasting value will be presented - not always in chronological order - also with connections to interpretations in mathematical physics. One omission will be the oeuvre of Harish-Chandra, maybe for experts to present later. Same remark for the work of David Vogan, the theory of lowest K - types and cohomological induction. Among the topics will be works by

George Mackey and Irving Segal

Induced representations and the imprimitivity theorem by Mackey with applications to the (earlier by Eugene Wigner) classification of relativistic particles, wave equations, and to scattering theory. The abstract Plancherel theorem by Segal, based on von Neumann algebras. The metaplectic (harmonic, oscillator, Segal-Shale-Weil) representation arising in quantum field theory.

Anthony W. Knapp and Elias M. Stein

Principal series representations and intertwining operators. Consequences by Langlands for the classification of representations. Complementary series and some applications to models of the Kepler problem.

Bertram Kostant

The universal enveloping algebra of a Lie algebra and its representations. Geometric quantization and models of representations, minimal representations. The idea of branching laws, in physics symmetry breaking and multiplets of particles.

Edward Nelson and Leonard Gross

Two students (like Kostant) of Segal proving some contraction inequalities with relations to entropy and quantum field theory, and connections to recent inequalities in quantum computing (and new results/conjectures for matrix coefficients of representations of reductive groups).