BRANCHING LAWS, QUANTUM ERGODICITY, WAVE FRONT SETS & RESONANCES.

REIMS, OCTOBER 23-24, 2015.

Friday

9.00-9.50 Toshiyuki KOBAYASHI (Tokyo)

Analysis on Non-Riemannian Locally Symmetric Spaces --An Application of Branching Laws I.

By using branching laws and some algebraic results for multiplicity-free actions, we construct joint eigenfunctions on non-Riemannian locally symmetric spaces modeled on real forms of spherical varieties with overgroups. This is an ongoing joint work with F. Kassel.

10.00-10.50 Valdemar TSANOV (Göttingen)

Momentum, invariants, and secant varieties

There is a well know relation between momentum maps and invariant theory. We consider a classical setting of an irreducible unitary representation of a compact group K. One question relevant in various contexts, including GIT and saturation coefficients for branching laws, is: what is the minimal positive degree of an invariant polynomial? A lower bound can be derived from the geometry of K-orbits in the projective space of the representation. The relevant geometric objects are the secant varieties to the unique complex K-orbit - the orbit of the highest weight space. The geometry of secants naturally relates to the convexity properties of the momentum map, which is also closely related to invariant theory. It becomes necessary to understand the momentum images of irreducible representation spaces. Despite the extensive theory, these images escape a complete comprehensive description in terms of the highest weights. I shall present some recent results on momentum images, and a class of representations for which the lower bound on degrees of invariants is exact.

10.50-11.30 Coffee break (Reims)

11.30-12.20 Aprameyan PARTHASARATHY (Paderborn) & Gang LIU (Metz).

Restriction of unitary representations to parabolic subgroups.

The restriction problem for non-holomorphic discrete series of a real reductive group G to a (minimal) parabolic subgroup P is largely unknown, despite some effort in the previous decades. Even in the simplest example of the Hermitian group SU(2,1) an explicit decomposition was obtained only recently. In the simplest example of a non-Hermitian group, Spin(4,1), the results are known due to Fabec, although his method seems not to generalize. As a test case for our general strategy, we study this example following some calculations of Torasso. We expect our strategy to apply for a general pair (G, P), even

though it is very likely that serious technical difficulties will arise. Our work is related to a certain conjecture of Duflo about the geometric nature of branching problems.

12.30-14.00 LUNCH

14.00-14.50 Joachim HILGERT (Paderborn)
Resonances for Riemannian symmetric spaces I

Resonances of Riemannian manifolds can be defined as poles of the meromorphically continued resolvent operator for the Laplacian. Given a manifold one has to take three steps. First one constructs an analytic continuation of the resolvent kernel with possible singularities. Then one has to show that the singularities are at most poles and, finally one wants to calculate the residues. For rank one spaces it is well known how to do this. In higher rank there are only partial results.

In these lectures I will explain the status of the problem and how it is related to a hypothetical scattering theory of (locally) symmetric spaces as designed by M.A. Semenov-Tian-Shanskii.

15.00-15.50 Tobias WEICH (Paderborn)
Wave front sets of induced representations.

Given a reductive Lie Group G and a unitary representation π we will discuss the definition of a wave front set of π and its use in determining the asymptotic support of the Plnacherel measure. Furthermore new upper bounds on the wave front set of induced representations are presented. This is joint work with Benjamin Harris.

15.50-16.30 Coffee break

16.30-17.20 Benjamin KÜSTER (Marburg)
Quantum ergodicity and symmetry reduction

We study the ergodic properties of eigenfunctions of Schrödinger operators on a closed connected Riemannian manifold M in case that the underlying Hamiltonian system possesses certain symmetries. More precisely, let M carry an isometric effective action of a compact connected Lie group G. We prove an equivariant quantum ergodicity theorem assuming that the symmetry-reduced Hamiltonian flow on the principal stratum of the singular symplectic reduction of M is ergodic. We deduce the theorem by proving an equivariant version of the semiclassical Weyl law, relying on recent results on singular equivariant asymptotics. It implies an equivariant version of the Shnirelman-Zelditch-Colin-de-Verdière theorem, as well as a representation theoretic equidistribution theorem.

19.30→ ∞ DINER (Reims)

Saturday

9.00-9.50 Frédéric NAUD (Avignon)
Sharp Resonances on hyperbolic manifolds.

Sharp resonances are resonances close to the real axis: they play a leading role in wave asymptotics and in various counting asymptotics. We will state some conjectures and

partial results on the location and density of sharp resonances, putting it into perspective with the physical intuition of quantum chaotic scattering.

10.00-10.50 Toshiyuki KOBAYASHI (Tokyo)

Analysis on Non-Riemannian Locally Symmetric Spaces --An Application of Branching Laws II.

10.50-11.30 Coffee Break

11.30-12.20 Joachim HILGERT (Paderborn)
Resonances for Riemannian symmetric spaces II