

**S. Ruijsenaars, Univ. of Leeds**

**Title:** Joint eigenfunctions for the relativistic hyperbolic Calogero-Moser Hamiltonians. I. Introduction and  $N=2$  case.

**Abstract:** This is the first of two connected talks on joint work with M. Halln<sup>as</sup>. We prepare the ground for a recursion scheme that is concerned with the explicit diagonalisation and Hilbert space transform theory for the relativistic generalisation of the hyperbolic  $N$ -particle Calogero-Moser system. The latter system is defined by  $N$  commuting differential operators with coefficients that are hyperbolic functions, whereas its relativistic version involves  $2N$  commuting analytic difference operators. Thus far, only for the 2-particle case the eigenfunctions and corresponding Hilbert space transform are well understood. Indeed, they can be obtained by one-coupling specialisations of a 'relativistic' generalisation of the hypergeometric function. Recently, we obtained alternative integral representations for these one-coupling functions, which amount to Fourier transforms of products of hyperbolic gamma functions. In this talk we explain how the latter representations can be viewed as the result of the step from  $N=1$  to  $N=2$  in a recursive construction of the joint eigenfunctions of the  $2N$  difference operators. The crux is that the plane wave in the integrand can be viewed as the  $N=1$  eigenfunction, whereas the product of hyperbolic gamma functions serves as a kernel function, connecting the free  $N=1$  case to the interacting  $N=2$  case.

**M. Halln<sup>as</sup>, Loughborough Univ.**

**Title:** Joint eigenfunctions for the relativistic hyperbolic Calogero-Moser Hamiltonians. II. Formal aspects and 'free' cases for arbitrary  $N$ .

**Abstract:** This second talk will continue from where the first one left off, addressing various aspects of the recursion scheme for an arbitrary number of particles. In particular, we present kernel functions that connect the  $(N-1)$ - and  $N$ -particle case, and discuss the recursive construction of joint eigenfunctions for the relativistic hyperbolic Calogero-Moser system in a formal fashion. We also demonstrate the arbitrary- $N$  viability of the recursion scheme for the 'free' cases, and indicate some of the analytic details involved in making the scheme rigorous.