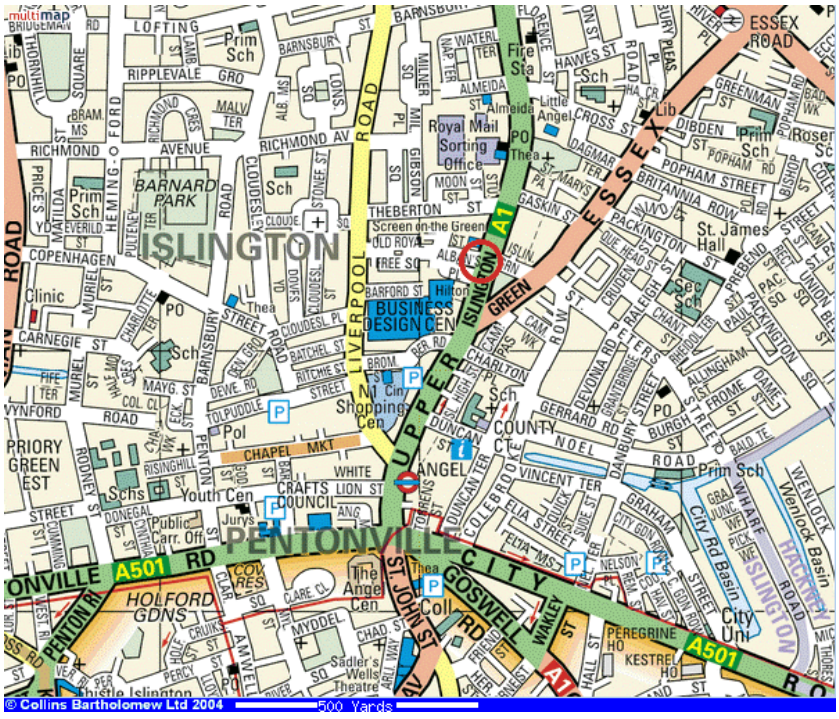
9-th UK Meeting on Integrable Models,

Conformal Field Theory and Related Topics

PROGRAMME:

FRIDAY	
3.00-4.00	**Arrival & Registration**
4.00-4.45	**G. von Gehlen**: *A large class of 3D integrable lattice spin models*
4.45-5.15	**A. Doikou**: *On integrable quantum spin chains with open boundaries*
5.15-5.45	**Coffee**
5.45-6.30	**N. Manojlovic**: *Twisted Gaudin models*
6.30- 7.00	**M. Feigin**: *Generalized Calogero-Moser-Sutherland models*
7.00-7.30	**T. Quella**: *Permutation branes in WZW models*
9.00	**Dinner at Rodizio Rico (see map)**

SATURDAY	
9.30-10.15	**F. Smirnov**: *Correlation functions in lattice integrable models*
10.15-10.45	**B. Doyon**: *A new view point on form factors*
10.45-11.15	**Coffee**
11.15-11.45	**P. Calabrese**: *Entanglement Entropy and QFT*
11.45-12.15	**J. Nagi**: *Logarithmic superconformal field theory*
12.15-12.45	**C.Young**: *Non-local charges, graded Lie algebras & coset space actions*



ABSTRACTS

Pasquale Calabrese: Entanglement Entropy and Quantum Field Theory

A systematic study of entanglement entropy in relativistic quantum field theory is discussed. For the case of a 1+1-dimensional critical system, whose continuum limit is a conformal field theory with central charge c, the result S_A\sim(c/3) log(l) is re-derived, and it is extended to many other cases: finite systems, finite temperatures, and when A consists of an arbitrary number of disjoint intervals. For such a system away from its critical point, when the correlation length \xi is large but finite, the result S_A\sim N(c/6)\log\xi is shown, where N is the number of boundary points of A. I will finally discuss the unitary relaxation from a non-equilibrium initial state, showing that both CFT and the exact solution of an integrable model lead, contrarily to the ground state case to an extensive entanglement entropy. Interesting light-cone effects will be discussed.

Anastasia Doikou: On integrable quantum spin chains with open boundaries

We review how c-number solutions of the reflection equation arise by implementing appropriate representations of the affine Hecke algebra. Having specified such solutions we construct the corresponding open spin chain, and we also study its exact symmetry. In particular, we derive boundary non-local charges, which turn out to be conserved quantities, that is they commute with the transfer matrix of the open spin chain.

Benjamin Doyon: A new viewpoint on form factors and correlation functions in the Ising field theory at finite temperature

I will identify a concept of "finite-temperature form factor" that appears naturally when considering correlation functions in the (massive) Ising field theory at finite temperature. This concept is slightly different from that involved in previous studies of finite-temperature correlation functions. I will explain how such "form factors" provide large-distance expansions of finite-temperature correlation functions, how to evaluate some of them from their analytical properties, and how they can be used to calculate form factors on the cylinder.

Misha Feigin: Generalized Calogero-Moser-Sutherland systems

We consider generalized quantum Calogero-Moser-Sutherland operator with trigonometric potential when the singularity hyperplanes form not necessarily fully symmetric configuration. The operators under consideration have full set of quantum integrals. At integer coupling parameters the Baker-Akhiezer function (joint singular eigenfunction) has closed expression. It satisfies a family of difference equations in the spectral parameters of Ruijsenaars-Macdonald rational type, difference operators also commute. The results were obtained in the works of Chalykh, Veselov, and the author.

Günter von Gehlen: A large class of chiral 3D integrable lattice spin models

We consider integrable models defined on a 3-dimensional oriented cubic lattice. The dynamical variables are taken to be elements of an ultra-local Weyl algebra at root of unity attached to the links of the lattice. The basic object is the Sergeev invertible canonical operator R which maps the Weyl variables on the three ingoing links of a lattice vertex to the three Weyl variables on the outgoing links. Sergeev has postulated a linear problem involving the Weyl variables which, together with a Baxter Z-invariance, determines R uniquely. A simple argument shows that this R satisfies the tetrahedron equation. A tedious verification of the tetrahedron equation is avoided.
Working at N-th root of unity, a N x N-matrix representation for the Weyl elements is taken and R decomposes into a functional mapping of the Weyl centers and a matrix conjugation. The matrix conjugation operator satisfies a modified tetrahedron equation with "rapidities" determined by the functional transformation. The latter is a discrete classical integrable system of trilinear Hirota form which can be solved by standard methods of algebraic geometry. The Zamolodchikov-Bazhanov-Baxter model arises when chosing the trivial solution to the classical system. Due to the flexibility of the 3D parametrization, interesting results for the 2D Bazhanov-Stroganov model have been obtained (joint work with S.Pakuliak and S.Sergeev).

Nenad Manojlovic: Twisted Gaudin Models

The Gaudin models are reviewed by analyzing model related to the twisted rational sl(2) classical r-matrix. The eigenvectors of the corresponding Gaudin Hamiltonians are found using explicitly constructed annihilation operators. The commutation relations between the annihilation creation operators the generators of the relevant loop algebra are calculated. The coordinate representation of the Bethe states is presented, as well as the relation between the Bethe vectors and solutions to the Knizhnik-Zamolodchikov equation.

Jasbir Nagi: Logarithmic Superconformal Field Theory

The construction of Logarithmic Primary Fields is a subject well understood, now, for sometime. In this talk, I review constructions, and extend them to the N=1,2 supersymmetric case.

Thomas Quella: Permutation branes in WZW models GxG with k1≠k2

We employ the Dirac-Born-Infeld and the Lagrangian description to motivate the existence of new branes which are generalizations of the usual permutation branes on GxG which solely exist for equal levels. The geometries and cohomological properties of these branes give a natural explanation for the K-theoretic charges in product groups (and in particular for SU(2)xSU(2)) of different size for which no carriers could be identified before. From an abstract point of view these branes should give rise to new defect lines between conformal field theories with different central charge.

Fedor Smirnov: **Correlation functions in lattice integrable models**

I shall describe the recent progress in calculation of correlation functions of Heisenberg anti-ferromagnet achieved in our recent works with H. Boos, M. Jimbo, Y. Takeyama and T. Miwa. These new results provide significant simplification of previously known formulae. We consider the system in infinite volume and its finite subsystem. The latter allows description in terms of a density matrix for which we obtain surprisingly simple expression.

Charles Young: **Non-local charges, graded Lie algebras and coset space actions**

I will review the construction of non-local conserved quantities for type IIB superstrings in AdS_5 x S5, and then go on to describe some recent work in which this construction is shown to generalize naturally to a wide class of sigma models on coset spaces.