

Friday, October 10th (at 4.00pm, UK time)

Marco Bertola (Concordia University)

Title: The r-matrix structure in higher genus.

ABSTRACT

On the space of matrices with rational (trigonometric/elliptic) entries there is a well-known Lie-Poisson structure, the "r-matrix structure". It is an essential structure underlying the Hamiltonian dynamics of the vast majority of integrable systems, isospectral and isomonodromic evolution equations. The known r-matrices depend on parameter in rational way (trig/elliptic, respectively) and hence we think of them on the Riemann sphere (cylinder/torus).

In a relatively abstract Hamiltonian framework, the isospectral evolution equations are generalized to higher genus Riemann surfaces as the "Hitchin systems", an evolutionary integrable system on the moduli space of vector bundles. On the isomonodromic side main progress is attributable to Krichever who used a quite explicit coordinatization of vector bundles on Riemann surfaces that we can call "Tyurin parametrization".

In this talk I report on the fully explicit generalization of the r-matrix structure to an arbitrary genus Riemann surface merging the Tyurin-Krichever approach with the general framework of Hitchin's. The key tool is a (fully explicit) matrix-valued kernel that plays crucial role also in setting up integral equations in related area of the "non-abelian steepest descent" method.
