Scientific report of Piergiulio Tempesta

Exchange grant n. 2174

Title of the research project: Integrability of systems of Toda type

The purpose of my visit to the International School for Advanced Studies (SISSA), Trieste, Italy, was to collaborate with prof. B. Dubrovin on the study of certain integrable hierarchies of differential-difference evolution equations of Toda type. Our aim is to connect these hierarchies, first studied by E. Frenkel, with the theory of Frobenius manifolds. The main result we obtained is indeed the construction of a quasi Frobenius structure, which encodes all the relevant algebraic and geometric information regarding the dispersionless limit of the Frenkel hierarchies. In turn, this quasi Frobenius structure is intimately connected with the extended affine Weyl groups of A_n type.

The collaboration established will be further carried out in the future months. We plan to compute the so called central invariants of the hierarchies under investigation. Also, it appear interesting to study the problem of the Virasoro constraints and symmetries for these and other related hierarchies of Toda type, in order to clarify the role of the quasi Frobenius structure in the dispersive case.

Consequently, I plan to visit prof. Dubrovin during the year 2008, for periods to be established.

A scientific paper containing the results of our research is currently in preparation.

Madrid, 16/12/07

Dr. Piergiulio Tempesta