Editors' preface for the topical issue on "The interface between integrability and quantization"

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Editorial

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Integrability and Quantization are central themes in modern mathematical physics, and both include geometry as a fundamental ingredient. The idea of Quantization, which originally goes back to the foundations of Quantum Mechanics, has blossomed into a full-fledged part of pure mathematics, and has given birth to such wonderful constructions as the Orbit Method and Quantum Groups. It is also one of the basic ideas standing behind Noncommutative Geometry. On the other hand, the interaction between integrable systems and quantum theory is extremely rich. It should be enough to recall that the quantum inverse scattering method triggered the development of Quantum Groups.

Most papers in this topical issue were presented during the Workshop having the same name that took place at the Lorentz Center in Leiden in April 2010. The issue includes some papers of the participants who did not give a talk during the Workshop, and some invited papers whose authors did not attend the Workshop.

The paper by Joseph Krasil'shchik and Alex Verbovetsky gives an overview of some recent results on the geometry of partial differential equations and its application to integrable systems. They discuss the Lagrangian and Hamiltonian formalism both in the free case (on the space of infinite jets) and in the constrained case.

Frédéric Paugam proposes some algebraic geometry methods for a correct description of (non-)local observables in quantum field theory. It is a good attempt to establish a connection among some already existing, but so far quite unrelated, constructions like the Beilinson–Drinfeld chiral algebra approach and Vinogradov's secondary calculus.

Conformal sigma models with a supersymmetric target space are the main interest of Thomas Quella. They provide interesting examples of nonunitary 2-dimensional conformal field theories.

Vyjayanthi Chari and Jacob Greenstein deal with representations of quantum affine algebras for special values of the deformation parameter. They prove their projectivity in some subcategory of a category of graded modules over the truncated current algebra.

The paper of Anton Zabrodin is an excellent exemplification of the title of this issue. He studies the intertwining operators which serve as building blocks for the elliptic R-matrix, which exchanges tensor products of two Lax operators taken in infinite-dimensional representations of the Sklyanin algebra with arbitrary spin.

One of the most famous integrable models – the Toda system in its generalized multi-component incarnation – is the object of Loek and Gerard Helminck's paper. They describe and study various equivalent forms of the multi-component Toda hierarchies.

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