Module: Elective Advanced Lectures: Theoretical Physics

Module No.: physics70c

Course: Introduction to Integrability (T)

Course No.: physics7511

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	2+1	5	WT

Requirements for Participation:

Preparation:
Quantum Mechanics
(Quantum Field Theory/Statistical Physics useful but not necessary)

Form of Testing and Examination:
Requirements for the examination (written or oral): successful work with the exercises

Length of Course:
1 semester

Aims of the Course:
Integrability is a property of special models or setups, which connects different physical and mathematical fields. The range of applications extends from classical mechanics to quantum field theory. The goal of this course is to gain an overview over the different facets and applications of integrability and to get to know interesting physical problems.

Contents of the Course:
Integrability and hidden symmetries of physical models, exactly solvable systems, classical and quantum integrability

Concepts & Methods:
Lax pairs, inverse scattering method, R-matrix, Yang-Baxter equation, factorized scattering, Bethe ansatz, nonlocal symmetries, quantum groups, Yangian symmetry

Models:
Elementary mechanical models, spin chains, field theories, AdS/CFT duality

Recommended Literature:
B. Sutherland. Beautiful Models: 70 Years of Exactly Solved Quantum Many-Body Problems
O. Babelon, D. Bernard, M. Talon. Introduction to Classical Integrable Systems.
P. Dorey. Exact S-matrices. http://arxiv.org/abs/hep-th/9810026
L. Faddeev. How algebraic Bethe ansatz works for integrable Model. http://arxiv.org/abs/hep-th/9605187.