

PREREQUISITS:

Understanding of the Weyl character formula, universal enveloping algebra and Verma modules.
Knowledge of some elements of Lie superalgebra theory.
Knowledge of some elements of Jacobi theta functions and modular forms.

PROGRAMM:

1. Lie superalgebras
2. Affine Lie (super)algebras: loop and KM constructions
3. Character formula for integrable and admissible representations in the Lie algebra case and Jacobi theta functions
4. Character formula for tame integrable and admissible modules in the Lie superalgebra case and mock theta functions
5. Modular invariance of normalized characters for integrable representations of affine Lie algebras
6. Modular invariance of modified normalized characters of tame integrable modules over affine Lie superalgebras
7. Branching functions are modular functions for affine Lie algebras
8. Branching functions are "half" modular functions for affine Lie superalgebras
9. Quantum Hamiltonian reduction for affine Lie (super)algebras and modular invariance of modified characters for (super)conformal algebras
(7-9 time permitting)

LITERATURE.

V.G.Kac, Lie superalgebras, Adv. Math. 26(1977),8-96. V.G.Kac, Infinite-dimensional Lie algebras, third ed, Cambridge University Press, 1990.
V.G.Kac, D.H.Peterson, Affine Lie algebras and Hecke indefinite modular forms, Bull.Amer.Math.Soc. 3(1980),1057-1061.
V.G.Kac, D.H.Peterson, Infinite-dimensional Lie algebras, theta functions and modular forms, Adv. Math. 53(1984),125-264.
V.G.Kac, M.Wakimoto, Modular invariant representations of infinite-dimensional Lie algebras and superalgebras, Proc. Nat.Acad.Sci.USA 85(1988),4956-4960.
V.G.Kac, M.Wakimoto, Integrable highest weight representations over affine superalgebras and Appell's function, Comm.Math.Phys. 215(2001),631-682.
V.G.Kac, M.Wakimoto, Representations of affine superalgebras and mock theta functions, Transf. Groups 19(2014),383-455.