

MATEMATISKA INSTITUTIONEN  
STOCKHOLMS UNIVERSITET  
Avd. Matematik

## SJÄLVSTÄNDIGT ARBETE I MATEMATIK

Onsdagen den 15 september kl. 10.00–11.00 presenterar Linda Winqvist sitt arbete “Hopf algebras in Lie theory and renormalization” (30 högskolepoäng, grundnivå).

Handledare: Sergei Merkulov

Plats: Sal 21, hus 5, Kräftriket

Abstract: In this project we study bialgebras and Hopf algebras, bialgebras equipped with an antipode, in the context of the theory of Lie algebras and the theory of renormalisation of quantum field theories (QFT). We study the classic Poncaré-Birkhoff-Witt theorem which states an isomorphism  $s : S(L) \rightarrow U(L)$  between the symmetric algebra and the universal enveloping algebra for any Lie algebra  $L$ . We prove a slightly strengthened version of PBW theorem for vector spaces equipped with an arbitrary skew-symmetric binary operation not necessarily satisfying the Jacobi identity.

We also study a Hopf algebra structure defined on vector spaces of graphs (following the ideas of Connes-Kreimer). Some specialised (tree) version of our Hopf algebra are proven by Connes-Kreimer to play an important role in the theory of renormalisation of QFT.

Alla intresserade är välkomna!