Prof. Dr. Dirk Kreimer, IHES, Bures-sur-Yvette

Talk 2 on November 3, 2010 (Wednesday), 17:15-18:45
HU, RUD 25, 3.001 (ground floor)

Title: Angels and angles in the quantum world
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abstract: This talk summarizes where research into periods in quantum field theory stands.

First, we consider periods which are renormalization scheme independent contributions to beta functions in quantum field theory.

They are the most pure objects mathematically, defined without any physics input. We still can not give them names, with the exception of very few low-dimensional examples. We review past and present work of Broadhurst, Brown, Kreimer, Schnetz and Yeats dedicated to the computation of these periods.

In particular, we summarize the known conditions under which these periods turn out to be multi-zeta values (MZVs), and emphasize an important result by Brown and Schnetz: the existence of finite graphs which will not evaluate to MZVs.

We then switch to scheme dependent contributions, which are necessarily depending on scattering angles, and summarize what is known in this context.

Literature:
'Association of multiple zeta values with positive knots via Feynman diagrams up to 9 loops',
David J. Broadhurst, D. Kreimer, Published in
Phys.Lett.B393:403-412,1997. e-Print: hep-th/9609128

'A K3 in $\phi4$',
Francis Brown, Oliver Schnetz, Jun 2010, e-Print: arXiv:1006.4064 [math.AG]

"On the periods of some Feynman integrals",
Francis Brown, Oct 2009. 69pp.
e-Print: arXiv:0910.0114 [math.AG]