REGULARIZATIONS AND RENORMALIZATION SCHEMES
MARCH 24-25 2011
Laboratoire J.A. Dieudonné
CNRS et Université de Nice Sophia Antipolis
Program.

SCHEDULE

- **Thursday March 24.**
  - 10: Coffee (at the lab’s coffee room, first floor)
  - 10.15-11.15: **Ivan Todorov** (CERN, Genève and INRNE, Sofia): Understanding configuration space renormalization.
  - 11.30-12.30: **Sylvie Paycha** (Université de Clermont-Ferrand): Counting integral points in a cone.
  - 12.30: Lunch at the administrative restaurant (hôtel des impôts).
  - 15.45-16.45: **Stefan Weinzierl**: (Universität Mainz): Properties of Feynman Graph Polynomials
  - 17-18: **Bernard Candelpergher** (Université de Nice): On the renormalizing series of some integral equations
  - Workshop dinner (tba)
• Friday March 25.
  – 9-10: **Kurusch Ebrahimi-Fard** (Universidad Zaragoza): Renormalization and reparametrization.
  – 10.15-11.15: **Dorothea Bahns** (Georg-August-Universität Göttingen): 'Local' renormalization in a nonlocal theory
  – 11.30-12.30: **Thierry Grandou** (INLN, CNRS et Université de Nice): Effective Locality: A new property of QCD?
  – 12.45: Lunch at the administrative restaurant (hôtel des impôts).

**ASTRACTS**

• **Dorothea Bahns** (Courant Research Centre Mathematics, Georg-August-Universität Göttingen): ‘Local’ renormalization in a nonlocal theory
  
  I will briefly recall the essential ideas of local renormalization in position space (Epstein Glaser framework). I will then explain attempts to generalize these ideas to quantum field theoretic models on the non-commutative Moyal space, i.e. to theories which are in a certain sense nonlocal. Particular emphasis is put on explaining within this framework the so-called ultraviolet-infrared mixing problem which occurs in such theories.

• **Bernard Candelpergher** (Université de Nice): On the renormalizing series of some integral equations

  Integral equations are considered for which a perturbative resolution gives a power series in a parameter $h$ whose coefficients are divergent integrals. The latter are subtracted out by introducing a $Z(t, h)$ - renormalizing series in the minimal subtraction scheme (MS). The convergence of the $Zs$ formal series is addressed, in relation to the kernels of the integral equations. A relation of the renormalizing series to the Lagrange inversion series is put forth.

• **Kurusch Ebrahimi-Fard** (Universidad Zaragoza): Renormalization and reparametrization.
The notion of universal charge plays an important role in multiplicative renormalizable pQFT. It allows for a simplified description of the combinatorics of the renormalization process in terms of the Fa di Bruno Hopf algebra. We present a concise Hopf algebraic approach in terms of reparametrization, underlining the natural grading of Feynman graphs in terms of loops. (This is joint work with F. Patras and J.M. Gracia-Bondía.)

- **Thierry Grandou** (INLN, CNRS et Université de Nice): Effective Locality: A new property of QCD?
  
  Summary: Sometimes, it happens that an apparently complicated structure exhibits unexpected simplifications. As compared to the abelian QED, such is the case of the non-abelian QCD with the known Asymptotic Freedom property. Here, on the basis of formal functional arguments, it will be argued that, for a whole family of QCD scattering amplitudes, the infinite series of three- and quadri-linear vectorial (gluonic) interactions boils down to some effective local interaction, of the contact-type, mediated by a rank two tensor field, antisymmetric both in Lorentz and color indices. Possible applications will also be discussed.

- **Sylvie Paycha** (Université de Clermont-Ferrand): Counting integral points in a cone.
  
  We shall review various ways of counting integral points in a cone, all of which involve a renormalization procedure. More generally, one might want to sum a polynomial expression over integral points of a cone, leading to generalizations of multiple zeta values at negative integers. The pole structure of divergent sums over cones is similar to that of multiple integrals attached to Feynman diagrams and renormalization techniques borrowed from physics such as Birkhoff-Hopf renormalization can be implemented. This is based on joint work with Li Guo and Bin Zhang.

- **Ivan Todorov** (CERN, Genève and INRNE, Sofia): Understanding configuration space renormalization.
  
  Configuration space renormalization of euclidean Green functions in a massless quantum field theory is reduced to the study of local extensions of associate homogeneous distributions. Primitively divergent
graphs are renormalized, in particular, by subtracting the residue of an analytically regularized expression. The talk previews ongoing work with Nikolay Nikolov and Raymond Stora.

- **Stefan Weinzierl**: (Universität Mainz): Properties of Feynman Graph Polynomials

Any Feynman integral can be characterised by two polynomials. These two polynomials can be deduced from the topology of the underlying Feynman graph. In this talk I will discuss the properties of these polynomials.