Journées de Physique Mathématique
L Y O N
du 3 au 5 Septembre 2008

Ces journées ont le soutien

de l'ENS Lyon (Physique) et de l'Institut Camille Jordan

Lieu: l'Université de Lyon 1, Bâtiment Braconnier, Campus de la Doua,

salle Fokko du Cloux (1er étage)

Conférenciers des mini-cours

Martin BORDEMANN (Mulhouse), *sur la Quantification par Déformation*
Harald GROSSE (Wien), *sur la Théorie non commutative des champs*
Vincent RIVASSEAU (Orsay), *sur la Renormalisation perturbative et constructive*

PROGRAMME

Mercredi 3 Septembre		**Jeudi 4 Septembre**		**Vendredi 5 Septembre**	
9h30 – 10h30	M. Bordemann	9h30 – 10h30	H. Grosse	9h30 – 10h30	V. Rivasseau
11h00 – 12h00	M. Bordemann	11h00 – 12h00	H. Grosse	11h00 – 12h00	V. Rivasseau
14h00 – 15h00	J. Kellendonk	14h00 – 15h00	D. Calaque	14h00 – 15h00	A. Tanasa
15h30 – 16h30	H. Grosse	15h30 – 16h30	V. Rivasseau	15h30 – 16h30	M. Bordemann
17h00 – 18h00	V. Rivasseau	17h00 – 18h00	M. Bordemann	17h00 – 18h00	H. Grosse

Nous aurons la possibilité de soutenir financièrement quelques thésards et jeunes chercheurs extérieurs. Si vous souhaitez un hébergement, prière de contacter le secrétariat ou les organisateurs ci-dessous :

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RESUMES

M. BORDEMANN : *Quantification par déformation*

Après avoir donné une motivation par le calcul symbolique (quantification) en mécanique quantique, je vais parler des déformation associatives des algèbres associatives. J'explique le crochet de Gerstenhaber, la (co)homologie de Hochschild, et la définition des structures L-infini et leurs quasi-isomorphismes (quis).

Ensuite la solution du problème de déformation par Kontsevich qui utilise un quis pour donner une formule de la multiplication déformée en termes d'une structure de Poisson. J'aborderai également le problème de la déformation des modules et le lien avec les sous-variétés co-isotropes, et quelques résultats symplectiques.

H. GROSSE : *Noncommutative quantum field theory*

In order to improve quantum field theories and to include certain gravity effects, one was led to study models defined over noncommutative spaces.

We start with an introduction and motivation and describe first deformed spaces and especially differential calculi on them. This leads to matrix geometries like the Fuzzy sphere which give interesting regularizations of field theory models. We remark the connection to the Connes-Lott formulation of the Standard model.

The next question concerns renormalization properties of Euclidean models. We mention the IR/UV mixing problem and discuss the solution obtained in common work with Raimar Wulkenhaar. The evaluation of the beta function indicates a new renormalization group fixpoint, which may allow to construct the model nonperturbatively (see talks by Vincent Rivasseau). The status of gauge models and fermions is mentioned. Finally we formulate models over deformed Minkowski space-time. We observe that smeared fields do not become completely delocalized, but fulfill a wedge locality.

V. RIVASSEAU : *Renormalisation perturbative et constructive*

On introduira les principes de base de la renormalisation en théorie des champs perturbative et les formules clés de la théorie constructive des champs puis, en coordination avec le cours de Harald Grosse, on discutera leur application au cas de la théorie non commutative des champs.

D. CALAQUE : *Generalized Duflo isomorphisms and deformation quantization*

We explain a proof of the Duflo isomorphism inspired by Kontsevich's approach to deformation quantization. We also give some generalization of this picture and explain its relation to a conjecture of Caldararu in algebraic geometry.

J. KELLENDONK : *Waveoperators and non-commutative topology in scattering theory*

We look at the scattering theory of perturbation Hamiltonians H=H_0+V from a topological point of view. The so-called wave (or Moeller) operators are isometries yielding unitary equivalences between the unbound (absolute continuous) part of the systems described by the free Hamiltonian H_0, on the one side, and by H, on the other. Our observation is that topologically they provide the key ingredient to a map (the index map in K-theory) between the topological invariants of the unbound system and those of the bound system of H. An example of this kind is the well known theorem of Levinson which yields a relation between the number of bound states, 0-energy resonances and the integrated time delay.

A. TANASA : *Translation-invariant noncommutative models ; Connes-Kreimer Hopf algebra for noncommutative field theory*

In the first part of this talk we briefly present the Grosse-Wulkenhaar scalar model on the noncommutative Moyal space. We then show a recently introduced translation-invariant model, which was also proved perturbatively renormalizable. Despite the manifest nonlocal nature of these models, we construct in the second part of the talk the Connes-Kreimer Hopf algebra structure adapted for the process of renormalization of these noncommutative field theories.