95TH ENCOUNTER BETWEN MATHEMATICIANS AND THEORETICAL PHYSICISTS
GEOMETRY, ARITHMETIC AND PHYSICS: AROUND MOTIVES
28-30 MAY 2015

ORGANIZATION
FLORENCE LECOMTE AND ATHANASE PAPADOPOULOS (STRASBOURG)

PROGRAM
28 May 2015

09h00
Pierre Cartier - IHES
Title: *Cosmic Galois group*
Abstract.- Il y a vingt ans , j'ai constaté de forts liens entre la théorie des multi-zetas , et les calculs par Connes et Kreimer sur la théorie de la renormalisation . J'ai introduit -- provisoirement - l'idée d'un groupe de symétrie d'un genre nouveau en Physique des Particules Elémentaires , commutant aux groupes de symétries connus (géométrique et de jauge) . Ma conjecture , basée sur les informations numériques disponibles vers 2000 , était trop optimiste . Après une première tentative de Connes et Marcolli , Francis Brown , déjà bien connu pour ses travaux sur les multizetas , au vu de nouveaux résultats "expérimentaux" , vient de proposer une version révisée de mon rêve . C'est ce que je me propose d'expliquer dans mon exposé

10h00 **Coffee break**

10h30
Lizhen Ji - University of Michigan, Ann Arbor
Title: *Toric varieties vs. Finsler metric*.
Abstract.- We will explain a bijective correspondence between projective topic varieties and a certain Finsler metrics on vector spaces, and relations between the moment map and the nonnegative part of toric varieties and horofunction compactifications of vector spaces, which were partly motivated by noncommutative geometry.

11h30
Walter Van Suijlekon - Nijmegen
Title:
Abstract. - Starting with a *-algebra, we define a semigroup which extends the group of unitary elements in that algebra. As we will explain, this semigroup describes inner perturbations of noncommutative manifolds, and has applications to gauge theories in physics. We will present some elementary examples of the semigroup associated to matrix algebras, and to (smooth) functions on a manifold. Joint work with Ali Chamseddine and Alain Connes.

28 May 2015

14h00
Joseph Ayoub - Zürich
Title: The foliated topology and the conservativity of the classical realisations
Abstract.- I'll describe parts of an approach to the conservativity of the de Rham realisation of Voevodsky motives based on a new Grothendieck topology called the foliated topology.

15h00 **Coffee Break**

15h30
Annette Huber - Freiburg
Title: Periods and Nori motives
Abstract.- Periods are number obtained by integrating rational differential. They define a countable subalgebra of the complex numbers containg many interesting elements like log(2), \pi, \zeta(n), but also Feynman integrals.
We explain an insight of Kontsevich how the formal properties of the period algebra can be explained by the theory of motives.

16h30
Christophe Soulé - IHES
Title: Weight complexes
Abstract.- Joint work with Henri Gillet.
To every variety over a field of characteristic zero we associated a bounded complex of Chow motives, called a weight complex. We extend the result to the case of varieties over an excellent Dedekind ring. We also mention a result of Bondarko, who defined a functor from Voevodsky's derived category of mixed motives to the category of complexes of Chow motives.

19h30 **Conference Dinner** *Restaurant "Au Petit Bois vert", quartier Petite France. Everybody is invited. We shall leave IRMA at 19:00*

29 May 2015

09h00
Dirk Kreimer - Humboldt Universität, Berlin
Title: Variations of Feynman Integrals
Abstract.- We discuss Feynman graphs and their associated integrals.
In their simplest incarnation, the are a source of periods. In general, as functions of the momenta and masses of particles whose scattering they describe, they have monodromy under variation of such parameters. We discuss how to understand this monodromy.

10h00 **Coffee Break**

10h30
Hélène Esnault - Freie Universität Berlin
Title: Simply connected varieties in algebraic geometry
Abstract.- We pose the problem of the relation between the étale fundamental group and various categories of crystals and discuss some known cases.

11h30
Jörg Wildeshaus - LAGA, Villetaneuse
Title: Relative motives of Abelian type and conservativity of realizations
Abstract.- The first part of the talk will introduce the category of relative motives (or motivic sheaves) of Abelian type over a base. In the second part, a recent result on conservativity of realizations, when restricted to motives of Abelian type, will be explained. Depending on how much time is left, a considerably stronger version of this result will be mentioned: the realization of a motive of Abelian type not only respects, but detects the weights present (or absent) in the motive.

14h00
Bruno Kahn - Institut Mathématique de Jussieu, Paris
Title: Towards motives with modulus
Abstract.- I will explain work in progress with S. Saito and T. Yamazaki in which we try to emulate Voevodsky's construction of triangulated categories of motives, replacing smooth varieties over a field by « modulus pairs ». The relationship between these new categories and Voevodsky's categories connects with the notion of reciprocity sheaf that we introduced one year ago.

15h00 **Coffee Break**

29 May 2015

15h30
Hiroaki Nakamura - Osaka
Title: Topology and arithmetic on the profinite Eisenstein quotient
Abstract.- In this talk, we discuss some aspect of monodromy action on the profinite fundamental group of once-punctured torus, calling new attentions in number theory, arithmetic geometry and topology. We focus on Eisenstein periods encoded in the meta-abelian monodromy with an exhibition of elementary arithmetic of various Dedekind sums trading levels for weights.

16h30
Arnfinn Laudal - Oslo
Title: Noncommutative phase spaces, deformations and algebraic geometry
Abstract. In this talk I shall show that the non-commutative phase space functor P h() defined for associative algebras, introduced in (WS): Geometry of Time Spaces, World Scientific, (2011), gives rise to a co-simplicial resolution P h (A) of the algebra A, and induces a de Rham complex that fits with the standard one in the commutative case.
Let U be the 4-dimensional real affine algebra of a point with a 3-dimensional tangent space, in A^3. The versal family of deformation of U , as associative R-algebras, contains, in a natural way, the 6-dimensional moduli space, 2 (R3), which is my Toy Model for a Big Bang-scenario in cosmology, H := Hilb introduced in (WS).
The study of the corresponding family of derivations of the 4-dimensional algebras, leads to a natural way of introducing an action of the gauge Lie algebras of the Standard Model, in H. Introducing the notion of quotient spaces in non-commutative algebraic geometry, we obtain a geometry that seems to fit well with the set-up of the Standard Model. These subjects are all treated within the set-up of (WS).

18h00 **Reception** - Mairie (City Hall, Place Broglie). Everybody is invited. We shall leave IRMA at 17:30

30 May 2015

09h00
Pierre Vanhove - IHES
Title: A Feynman integral via higher normal functions

10h00 **Coffee Break**

10h30
Norbert A'campo - Basel
Title: Early examples of motifs and motifs in knot theory.

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LIST OF PARTICIPANTS

Norbert A'Campo (Basel, Switzeland)
Vincent Alberge (Strasbourg)
Joseph Ayoub (Zürich, Switzeland)
Michael Barbos (Rochester, USA)
Vincent Blanlœil (Strasbourg)
Johann Bouali (Dijon)
Abdelkader Boudali (Saida, Algeria)
Pierre Cartier (IHES, Bures-sur-Yvette)
François Chargois (Nancy)
Cyrus Cohier-Chevaux (IMJ, Paris)
Olena Domanska (Lviv, Ukrain)
Mariya Dubova (Kiev, Ukrain)
Hélène Esnault (Freie Universität, Berlin, Germany)
Elena Frenkel (Strasbourg)
Martin Gallauer (Zürich, Switzeland)
Claire Glanois (IMJ, Paris)
Daniel Harrer (Freiburg, Germany)
Annette Huber (Freiburg, Germany)
Christine Huyghe (Strasbourg)
Fangzhou Jin (ENS Lyon)
Bruno Kahn (IMJ, Paris)
Christian Kassel (Strasbourg)
Nariya Kawazumi (Tokyo, Japan)
Dirk Kreimer (Humbold Universität, Berlin, Germany)
Robert Laterveer (Strasbourg)
Olav Arnfinn Laudal (Oslo, Norway)
Florence Lecomte (Strasbourg)
Gregor Masbaum (IMJ, Paris)
Hiroaki Nakamura (Osaka, Japan)
Rutger Noot (Strasbourg)
Philipp Nuss (Strasbourg)
Oussama Ouriachi (IMJ, Paris)
Athanase Papadopoulos (Strasbourg)
Iris Ren (Ecole Polytechnique, Palaiseau)
Aurélien Sagnier (Paris 7)
Anna-Sofie Schilling (Heidelberg, Germany)
Alexis Seferlis (Montpellier)
Sofiane Souaifi (Strasbourg)
Christophe Soulé (IHES, Bures-sur-Yvette)
Lynda Taleb (Tizi-Ouzou, Algeria)
Mohamed Tadout (Rabat, Morocco)
Pierre Vanhove (IHES, Bures-sur-Yvette)
Walter van Suijlekom (Nijmegen, Netherlands)
Mario Veruete (Montpellier)
Nathalie Wach (Strasbourg)
Bora Yalkinoglu (Strasbourg)