# Laboratoire SPHERE, Sciences, Philosophie, Histoire, UMR 7219
# Novembre 2014, **séminaires** et **colloques, conférences**

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**Dates : 3, 4, 7, 10, 13, 14, 17, 18, 21, 24, 25, 27, 28, 29** **English Version**

**lundi 3, 14:00 – 16:00, salle Gris, 734A**

**Philosophie et physique-mathématique**

Mathieu **Anel** (ERC Philosophie de la Gravitation Quantique Canonique, CNRS) : *Vers les Stacks symplectiques.* (1/4)

**mardi 4, 17:00 – 19:00, salle Malevitch, 483A**

**Histoire et philosophie de la physique**

Jim **Ritter** : *Contes de l'âge du jazz : l'unification de la physique à Princeton dans les années vingt.*

**jeudi 6, 10:00 – 12:00, salle Kandinsky, 631B**

**Philosophie et physique-mathématique**

Urs **Schreiber** (Chercheur invité, projet ERC Philosophie de la Gravitation Quantique Canonique) : *Higher geometric quantization.* (1/4)

**vendredi 7, Thomas Institut, Cologne**

**Striving for Coherence: Readings in Averroes' *Incoherence of the Incoherence***

Jean-Baptiste **Brenet** (Univ. Paris 1, SPHERE) : *Particulars in the* Tahâfut al-tahâfut*: A Cross-Talk between Averroes, al-Ghazâlî and Avicenna.*

**lundi 10, 14:00 – 16:00, salle Gris, 734A**

**Philosophie et physique-mathématique**

Mathieu **Anel** (CNRS, ERC Philosophie de la Gravitation Quantique Canonique) : *Vers les Stacks symplectiques.* (2/4)

**jeudi 13, 9:30 – 17:30, salle Mondrian, 646A**

**Histoire des sciences, histoire du texte**

**:: Forms written knowledge: Compilations, note-taking, commentaries**

Elaine **Leong** (Max Planck Institute for the History of Science) : *Creating Treasuries for Health: Knowledge Codification in the 'Margins'.*

Sho **Hirose** (Univ. Paris Diderot et Projet ERC SAW) : *Revision or new work? What lies between the two* Goladīpikās.

Eva **Wilden** (CSMC, Hamburg) : *Text, pretext, paratext —commentaries in manuscripts of the Tamil literary-grammatical tradition.*

**jeudi 13, 9:30 – 18:00, salle Kandinsky, 631B**

**Atelier sur la théorie des types homotopiques**

Organisation : Gabriel **Catren** et Mathieu **Anel** (ERC Philosophie de la Gravitation Quantique Canonique, CNRS, SPHERE), dans le cadre du projet ERC PhiloQuantum.

9:30 – 11:00 Mathieu **Anel** (ERC Philosophie de la Gravitation Quantique Canonique, CNRS) : *Ambiguity in Mathematics*.

11:15 – 12:45 Eric **Finster** (EPFL - Lausanne) : *In Weyl's Footsteps: Towards a Group-Theoretical Ontology for Quantum Systems.*

14:30 - 16:00 Urs **Schreiber** (Chercheur invité, projet ERC Philosophie de la Gravitation Quantique Canonique) : *The Gauge Principle and Local Quantum Field Theory.*

16:15 - 17:45 David **Corfield** (University of Kent) : *Cohesive Homotopy Type Theory: An opportunity to revive the philosophy of geometry?*

**jeudi 13, 10:00 – 13:00, salle Rothko, 412B**

**Mathématiques et Philosophie, 19e et 20e siècles**

**:: I. Gödel et la philosophie** (3/3)

Gabriella **Crocco** (CEPERC, Univ. Aix-Marseille) : *Autour de manuscrits inédits.*

**vendredi 14, 9:30 – 17:30, salle Malevitch, 483A**

**Séminaire SAW: Mathematical practices in the context of the astral science**

**:: General mathematical practices in the astral sciences and their relation to/contrast with mathematical sources 3 :** Astral sciences and other disciplines.

Cristian **Tolsa** (Universidad de Barcelona) : *Ptolemy's bridge between mathematical astronomy and Platonic philosophy.*

Samuel **Gessner** (Universidade de Lisboa) : *Astral sciences and the making of planetary clocks – a comparison of mechanical translations of planetary theory.*

Caterina **Guenzi** (CEIAS, EHESS) : *The tree of* jyotiṣa *and its branches. Ritual and therapeutic uses of astral sciences in contemporary India.*

Howard L. **Goodman** : *Dynamic Domains of Activity in Early Chinese Harmonometrics and Their Astral Crossovers and Caesuras.*

**vendredi 14, 9:30 – 12:30, salle Kandinsky, 631B**

**Mathématiques « arabes »** et **Mathématiques à la Renaissance**

Pietro **Roccasecca** (Accademia di Belle Arti di Roma, Max Planck Institut) : *Le* De li aspecti *de Alhacen : théorie cognitive de la vision et perspective de peintres.*

**vendredi 14, 10:00 – 12:00, salle Gris, 734A**

**Philosophie et physique-mathématique**

Urs **Schreiber** (Chercheur invité, projet ERC Philosophie de la Gravitation Quantique Canonique) : *Higher geometric quantization.* (2/4)

**vendredi 14, 15:00 – 17:00, salle Rothko, 412B**

**La cosmologie d'Averroès : le Commentaire moyen au *De caelo* d'Aristote**

Cristina **Cerami** (CNRS, CHSPAM-SPHERE) : *Révision de la traduction de CMDC I, 3-4.*

**lundi 17, 10:00 – 12:30, salle Rothko, 412B**

**Histoire de la logique**

**:: Four reformer logicians** (1/4)

Paul **Thom** (The University of Sydney) : *Avicenna's break with Aristotle's logic. The theory of the categories. Propositional forms. Definitions of the syllogism. Modal syllogistic. Hypothetical syllogistic. Averroes' reaction against Avicenna's reforms.*

**lundi 17, 14:00 – 17:00, salle Mondrian, 646A**

**Histoire et philosophie des mathématiques**

**:: Histoire des mathématiques et didactique des mathématiques**

Séance organisée par Renaud Chorlay dans le cadre du projet ERC SAW 'Mathematical Sciences in the Ancient World'.

Charlotte **De Varent** (Projet ERC SAW) : *Relations between history of mathematics and research in mathematics education: a case study.*

Renaud **Chorlay** (ESPE Paris IV, SPHERE) et Cécile **De Hosson** (LDAR) : *History and didactics of mathematics and the sciences: questions of method.*

**lundi 17, 14:00 – 16:00, salle Gris, 734A**

**Philosophie et physique-mathématique**

Mathieu **Anel** (CNRS, ERC Philosophie de la Gravitation Quantique Canonique) : *Vers les Stacks symplectiques.* (3/4)

**mardi 18, 17:00 – 193:00, salle Malevitch, 483A**

**Histoire et philosophie de la physique**

Julian **Barbour** : *Machian notions of time.*

**jeudi 20, 10:00 – 12:00, salle Kandinsky, 631B**

**Philosophie et physique-mathématique**

Urs **Schreiber** (Chercheur invité, projet ERC Philosophie de la Gravitation Quantique Canonique) : *Higher geometric quantization.* (3/4)

**vendredi 21, 14:00 – 16:00, amphithéâtre Pierre-Gilles De Gennes**

**Entretiens HPS de Paris Diderot**

*Physics and necessity : Rationalist pursuits from the Cartesian past to the quantum present**.
Ouvrage présenté par l'auteur : Olivier **Darrigol** (CNRS, SPHERE).
* Oxford University Press, 2014

**vendredi 21, 14:00 – 18:00, salle 126, bâtiment Olympe de Gouges**

**Penser/classer les collections techniques**

**:: Les outils dans les musées d'archéologie et d'ethnographie.**

Catherine **Schwab** (Musée d'Archéologie nationale et Domaine national de Saint-Germain-en- Laye) : *Le classement des collections, des réserves aux vitrines, au Musée d'Archéologie nationale.*

Sophie **Chave-Dartoen** et Solenn **Nieto** (Musée d'ethnographie de l'Université de Bordeaux) : *Les collections techniques issues du pavillon des Douanes Chinoises à l'Exposition universelle de 1878 et déposées au Musée d'ethnographie de l'Université de Bordeaux.*

**lundi 24, 14:00 – 16:00, salle Gris, 734A**

**Philosophie et physique-mathématique**

Mathieu **Anel** (CNRS, ERC Philosophie de la Gravitation Quantique Canonique) : *Vers les Stacks symplectiques. (4/4)*

**mardi 25, 17:00 – 193:00, salle Malevitch, 483A**

**Histoire et philosophie de la physique**

Christiane **Schmitz-Rigal** : *L'art du savoir : formations symboliques et dynamique de l'Apriori chez Cassirer.*

**jeudi 27, auditorium François Jacob, Institut Pasteur de Paris, 28 rue du Dr Roux, 75015 Paris**

**Les Instituts Pasteur au Maghreb. Des origines aux indépendances.**

Organisation : laboratoire SPHERE, avec le soutien de l'Institut des Humanités de Paris (IHP) et l'Institut Pasteur de Paris.
Toutes les informations en page 9.

**jeudi 27, 10:00 – 12:00, salle Mondrian, 646A**

**Philosophie et physique-mathématique**

Urs **Schreiber** (Chercheur invité, projet ERC Philosophie de la Gravitation Quantique Canonique) : *Higher geometric quantization.* (4/4)

**jeudi 27, 10:00 – 13:00, salle Gris, 734A**

**Groupe de travail des doctorants en histoire et philosophie de la physique**

Jonathan **Regier** (Univ. Paris Diderot, SPHERE) : *Sur quelques manières de penser la « cause » en philosophie naturelle au XVI^e siècle.*

**jeudi 27, 15:00 – 17:00, salle Malevitch, 483A**

**Conférence de Patrick Iglesias-Zemmour**

**:: Applications Moment en Difféologie**

Organisation : Gabriel **Catren** et Mathieu **Anel** (ERC Philosophie de la Gravitation Quantique Canonique, CNRS, SPHERE), dans le cadre du projet ERC PhiloQuantum.

**vendredi 28, 10:00 – 13:00, bibliothèque Sorbonne, Université Paris 1**

Séminaire de traduction **La métaphysique d'Aristote d'Alexandre d'Aphrodise**

Traduction de passages du Commentaire au livre Alpha.

**vendredi et samedi 28-29, 9:00, salle Luc Valentin, 454A**

**Workshop on Entanglement**

Pierre **Uzan** (SPHERE), Gabriel **Catren** (ERC Philosophie de la Gravitation Quantique Canonique, CNRS, SPHERE) et Roberto **Angeloni** (SPHERE).
Toutes les informations en page 11.

# Unit Research SPHERE, Science, Philosophy, History, UMR 7219
# November 2014, Seminaires and Conferences

**Dates of the seminars: 3, 4, 7, 10, 13, 14, 17, 18, 21, 24, 25, 27, 28, 29**

**Monday 3, 14:00 – 16:00, Room Gris, 734A**

**Philosophy and mathematical physics**

Mathieu **Anel** (ERC PhiloQuantum Gravity, CNRS) : *Towards Symplectic Stacks*. (1/4)

**Tuesday 4, 17:00 – 19:00, Room Malevitch, 483A**

**History and philosophy of physics**

Jim **Ritter** : *Contes de l'âge du jazz : l'unification de la physique à Princeton dans les années vingt.*

**Thursday 6, 10:00 – 12:00, Room Kandinsky, 631B**

**Philosophy and mathematical physics**

Urs **Schreiber** (Invited Researcher, ERC PhiloQuantum Gravity) : *Higher geometric quantization.* (1/4)

**Wednesday 7, Thomas Institut, Cologne**

**Striving for Coherence: Readings in Averroes' *Incoherence of the Incoherence***

Jean-Baptiste **Brenet** (Univ. Paris 1, SPHERE) : *Particulars in the* Tahâfut al-tahâfut*: A Cross-Talk between Averroes, al-Ghazâlî and Avicenna.*

**Monday 10, 14:00 – 16:00, Room Gris, 734A**

**Philosophy and mathematical physics**

Mathieu **Anel** (ERC PhiloQuantum Gravity, CNRS) : *Towards Symplectic Stacks*. (2/4)

**Thursday 13, 9:30 – 17:30, Room Mondrian, 646A**

**History of Science, History of Text**

**:: Forms of written knowledge: Compilations, note-taking, commentaries.**

Elaine **Leong** (Max Planck Institute for the History of Science) : *Creating Treasuries for Health: Knowledge Codification in the 'Margins'.*

Sho **Hirose** (Univ. Paris Diderot et Projet ERC SAW) : *Revision or new work? What lies between the two* Goladīpikās.

Eva **Wilden** (CSMC, Hamburg) : *Text, pretext, paratext —commentaries in manuscripts of the Tamil literary-grammatical tradition.*

**Thursday 13, 9:30 – 18:00, Room Kandinsky, 631B**

**Workshop on the theory of homotopy type**

Organisation : Gabriel **Catren** (CNRS, SPHERE et ERC PhiloQuantum Gravity) and Mathieu **Anel**, in the context of the ERC Project PhiloQuantum Gravity.

9:30 – 11:00 Mathieu **Anel** (ERC PhiloQuantum Gravity, CNRS) : *Ambiguity in Mathematics*.

11:15 – 12:45 Eric **Finster** (EPFL-Lausanne) : *In Weyl's Footsteps: Towards a Group-Theoretical Ontology for Quantum Systems.*

14:30 - 16:00 Urs **Schreiber** (Invited Researcher, ERC PhiloQuantum Gravity) : *The Gauge Principle and Local Quantum Field Theory.*

16:15 - 17:45 David **Corfield** (University of Kent) : *Cohesive Homotopy Type Theory: An opportunity to revive the philosophy of geometry?*

**Thursday 13, 10:00 – 13:00, Room Rothko, 412B**

**Mathematics and Philosophy, 19th and 20eth Centuries**

**::** I. **Gödel et la philosophie** (3/3)

Gabriella **Crocco** (CEPERC, Univ. Aix-Marseille) : *Autour de manuscrits inédits.*

**Friday 14, 9:30 – 12:30, Room Kandinsky, 631B**

**'Arabic' Mathematics** & **Mathematics in the Renaissance**

Pietro **Roccasecca** (Accademia di Belle Arti di Roma, Max Planck Institut) : *Le* De li aspecti *de Alhacen : théorie cognitive de la vision et perspective de peintres.*

**Friday 14, 9:30 – 17:30, Room Malevitch, 483A**

**Seminar SAW: Mathematical practices in the context of the astral science**

**:: General mathematical practices in the astral sciences and their relation to/contrast with mathematical sources 3 :** Astral sciences and other disciplines

Cristian **Tolsa** (Universidad de Barcelona) : *Ptolemy's bridge between mathematical astronomy and Platonic philosophy.*

Samuel **Gessner** (Universidade de Lisboa) : *Astral sciences and the making of planetary clocks – a comparison of mechanical translations of planetary theory.*

Caterina **Guenzi** (CEIAS, EHESS) : *The tree of jyotiṣa and its branches. Ritual and therapeutic uses of astral sciences in contemporary India.*

Howard L. **Goodman** : *Dynamic Domains of Activity in Early Chinese Harmonometrics and Their Astral Crossovers and Caesuras.*

**Friday 14, 10:00 – 12:00, Room Gris, 734A**

**Philosophy and mathematical physics**

Urs **Schreiber** (Invited Researcher, ERC PhiloQuantum Gravity) : *Higher geometric quantization.* (2/4)

**Friday 14, 15:00 – 17:00, Room Rothko, 412B**

**Averroes's Cosmology: The Middle Commentary on the *De Caelo* of Aristotle**

Cristina **Cerami** (CNRS, CHSPAM–SPHERE) : *Révision de la traduction de CMDC I, 3-4.*

**Monday 17, 10:00 – 13:00, Room Rothko, 412B**

**History of Logic**

**:: Four reformer logicians** (1/4)

Paul **Thom** (The University of Sydney) : *Avicenna's break with Aristotle's logic. The theory of the categories. Propositional forms. Definitions of the syllogism. Modal syllogistic. Hypothetical syllogistic. Averroes' reaction against Avicenna's reforms.*

**Monday 17, 14:00 – 17:00, Room Mondrian, 646A**

**History and Philosophy of Mathematics**

**:: History of mathematics and mathematics education**

Session organised by Renaud **Chorlay** in the context of the ERC Project SAW 'Mathematical Sciences in the Ancient World'.

Renaud **Chorlay** (ESPE Paris IV, SPHERE) and Cécile **De Hosson** (LDAR) : *History and didactics of mathematics and the sciences: questions of method.*

Charlotte **De Varent** (Projet ERC SAW) : *Relations between history of mathematics and research in mathematics education: a case study.*

**Monday 17, 14:00 – 16:00, Room Gris, 734A**

**Philosophy and mathematical physics**

Mathieu **Anel** (ERC PhiloQuantum Gravity, CNRS) : *Towards Symplectic Stacks*. (3/4)

**Tuesday 18, 17:00 – 19:00, Room Malevitch, 483A**

**History and philosophy of physics**

Julian **Barbour** : *Machian notions of time.*

**Thursday 20, 10:00 – 12:00, Room Kandinsky, 631B**

**Philosophy and mathematical physics**

Urs **Schreiber** (Invited Researcher, ERC PhiloQuantum Gravity) : *Higher geometric quantization.* (3/4)

**Friday 21, 14:00 – 16:00, Amphitheater Pierre-Gilles De Gennes**

**Meetings HPS of Paris Diderot**

*Physics and necessity: Rationalist pursuits from the Cartesian past to the quantum present**.
Book presented by the author : Olivier **Darrigol** (CNRS, SPHERE).
* Oxford University Press, 2014

**Friday 21, 14:00 – 18:00, Room 126, Building Olympe de Gouges**

**Thinking / classifying technical collections**

**:: Les outils dans les musées d'archéologie et d'ethnographie**

Catherine **Schwab** (Musée d'Archéologie nationale et Domaine national de Saint-Germain-en- Laye) :
*Le classement des collections, des réserves aux vitrines, au Musée d'Archéologie nationale.*

Sophie **Chave-Dartoen** and Solenn **Nieto** (Musée d'ethnographie de l'Université de Bordeaux) : *Les collections techniques issues du pavillon des Douanes Chinoises à l'Exposition universelle de 1878 et déposées au Musée d'ethnographie de l'Université de Bordeaux.*

**Monday 24, 14:00 – 16:00, Room Gris, 734A**

**Philosophy and mathematical physics**

Mathieu **Anel** (ERC PhiloQuantum Gravity, CNRS) : *Towards Symplectic Stacks*. (4/4)

**Tuesday 25, 17:00 – 19:00, Room Malevitch, 483A**

**History and philosophy of physics**

Christiane **Schmitz-Rigal** : *L'art du savoir : formations symboliques et dynamique de l'Apriori chez Cassirer.*

**Thursday 27, 10:00 – 13:00, Room Gris, 734A**

**PHD Students: Working group in history and philosophy of physics**

Jonathan **Regier** (Univ. Paris Diderot, SPHERE) : *Sur quelques manières de penser la « cause » en philosophie naturelle au XVI^e^ siècle.*

**Thursday 27, auditorium François Jacob, Institut Pasteur de Paris, 28 rue du Dr Roux, 75015 Paris**

**The Institutes Pasteur in Maghreb. From beginnings to Independances.**

Organisation : laboratoire SPHERE, with the support of the Institut des Humanités de Paris (IHP) and of the Institut Pasteur in Paris.
See page 9.

**Thursday 27, 15:00 – 17:00, Room Malevitch, 483A**

**Conference of Patrick Iglesias-Zemmour**

**:: Moment maps in Diffeology**

Organisation : Gabriel **Catren** and Mathieu **Anel** (ERC PhiloQuantum Gravity, CNRS, SPHERE), in the context of the ERC Project PhiloQuantum Gravity.

**Thursday 27, 10:00 – 12:00, Room Mondrian, 646A**

**Philosophy and mathematical physics**

Urs **Schreiber** (Invited Researcher, ERC PhiloQuantum Gravity) : *Higher geometric quantization.* (4/4)

**Friday 28, 10:00 – 13:00, Bibliothèque Sorbonne, Univ. Paris 1**

Seminaire of translation **The Aristotle Metaphysics of Alexander of Aphrodisias**

Translation of Commentaries, book Alpha.

**Friday and Saturday 28-29, 9:00, Room Luc Valentin, 454A**

**Workshop on Entanglement**

Organisation: Pierre **Uzan** (SPHERE), Gabriel **Catren** (CNRS, SPHERE and ERC Project PhiloQuantum Gravity) and Roberto **Angeloni** (SPHERE).
All informations on page 11.

# Les Instituts Pasteur au Maghreb.
# Des origines aux indépendances.

**27 novembre 2014**
**Institut Pasteur**
**Auditorium François Jacob***

Suite aux enjeux liés à la globalisation économique et culturelle et aux révolutions politiques, la nature et le rôle des Instituts Pasteur du Maghreb est en train de se transformer à nouveau. L'étude sur les dimensions scientifiques et sociales de ces prestigieuses institutions revêt donc un intérêt particulier pour comprendre, au passé et au présent, comment se déroule la circulation des chercheurs, des idées et des pratiques.

Le colloque international "Les Instituts Pasteur du Maghreb" rassemblera des spécialistes en histoire de la médecine, de l'histoire coloniale et postcoloniale du Maghreb, des documentalistes et des médecins autour de trois axes thématiques : réseaux internationaux, contextes coloniaux, pratiques et personnalités.



**ORGANIZATION OF THE WORKSHOP**
Laboratoire SPHERE, UMR7219

Avec le soutien
de l'Institut des Humanités de Paris (IHP)
et de l'nstitut Pasteur de Paris

INSTITUT PASTEUR, AUDITORIUM FRANÇOIS JACOB, 28 RUE DU DR ROUX, 75015 PARIS

## PROGRAMME

9:00 Accueil et présentation du colloque

Session I **RESEAUX**
Modérateur : **Francisco Javier Martínez**

9:30 **Anne-Marie Moulin** (SPHERE, IRD)
*L'histoire des instituts Pasteur du Maghreb : mémoires divisées, histoire transversale.*

10:00 **Chantal Chanson-Jabeur** (CESSMA, Université Paris Diderot)
*Les Instituts Pasteur et les politiques coloniales de santé au Maghreb (fin XIXe/début XXe siècle).*

10:30 Coffee Break

11:00 **Jean-Pierre Dedet** (Université de Montpellier 1)
*Contributions majeures des Instituts Pasteur du Maghreb dans le domaine de la recherche et de la santé, durant la période coloniale.*
11:30 Discussion

Session II **CONTEXTES**
Modérateur : Kmar Ben Néfissa

12:00 **Benoit Gaumer** (Université de Montréal)
*D'Adrien Loir à Amor Chedly : engagement en santé publique et gouvernance de l'Institut Pasteur de Tunis.*
12:30 **John Strachan** (University of Lancaster)
*Tuberculosis and population control : the case of the Pasteur Institute of Algeria.*
13:00 **Francisco Javier Martinez-Antonio** (SPHERE)
*Double or nothing ? French imperialism and the early history of Pasteur Institutes in Morocco (1906-1932).*
13:30 Discussion

14:00 pause déjeuner

Session III **PRATIQUES, PERSONNALITES**
Modérateur : Anne-Marie Moulin

15:00 **Kmar Ben Nefissa** (SPHERE)
*Intérêt des manuscrits scientifiques de Charles Nicolle pour les recherches historiques sur la peste.*
15:30 **Claire Fredj** (CNRS, IDHES)
*L'Institut Pasteur d'Alger et la formation des médecins de colonisation (1ere moitié du XXe siècle).*

16:00 pause café

16:30 **Daniel Demellier** et **Sandra Legout** (Institut Pasteur de Paris)
*Les Instituts Pasteur du Maghreb dans les archives de l'Institut Pasteur.*
15:30 **Berkahoum Ferhati** (CNRPAH, Alger)
*Le Dr. Edmond Sergent et l'Institut Pasteur d'Alger : au-delà de la science universelle (1900-1962).*
13:30 – 18:00 Discussion et clôture

# Workshop on Entanglement

PHILOSOPHY OF CANONICAL QUANTUM GRAVITATION erc

SPHERE SCIENCES, PHILOSOPHIE, HISTOIRE UMR 7219

## November 28-29 2014
## University Paris-Diderot
## Room Luc Valentin, 454A*

Initially, the concept of entanglement has been coined by Schrödinger to describe a fundamental property of a composed, physical system whose parts have interacted in their common past (Schrödinger, 1935):

> "When two systems, of which we know the states by their respective representatives, enter into temporary physical interaction due to known forces between them, and when after a time of mutual influence the systems separate again, then they can no longer be described in the same way as before, viz. by endowing each of them with a representative of its own. I would not call that one but rather the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought. By the interaction the two representatives [the quantum states] have become entangled."

Entanglement is the central concept of quantum mechanics, which can explain non-locality phenomena, as in all EPR-like experiments. Entanglement can even be used as a physical resource in information protocols, like quantum cryptography or quantum teleportation.

Moreover, as recently suggested by some researchers, the concept of entanglement can be represented within the framework of a generalized, possibly weakened, version of quantum theory where all a priori references to the physical world have been relaxed –which thus gives rise to applications beyond the strict material domain.

This workshop aims to deal with the concept of entanglement according to its different aspects and its possible interpretations. Historical, physical, metaphysical, informational and generalized approaches to this very fruitful concept will be addressed.

**PARTICIPANTS**

Alexander **Afriat** (Université de Bretagne Occidentale),
Roberto **Angeloni** (BMC, SPHERE),
Harald **Atmanspacher** (Collegium Helveticum, ETH Zurich / IGPP Freiburg),
Guido **Bacciagaluppi** (University of Aberdeen),
Michael **Esfeld** (University of Lausanne), Thomas **Filk** (University of Freiburg),
Alexei **Grinbaum** (CEA-Saclay, SPEC/LARSIM),
Hartman **Römer** (Freiburg University), Pierre **Uzan** (SPHERE),
Harald **Walach** (European University Viadrina, Frankfurt (Oder))

**ORGANIZATION OF THE WORKSHOP**

Pierre **Uzan** (SPHERE), Gabriel **Catren** (CNRS, projet ERC Philosophie de la Gravitation Quantique Canonique) and Roberto **Angeloni** (BMC, SPHERE)

This workshop has received funding from the European Research Council
under the European Community's Seventh Framework Programme
–(FP7/2007-2013 Grant Agreement N° 263523, ERC Project PhiloQuantumGravity)–
from the Marie Curie Intra-European Fellowship
–(BOHRREC FP7-PEOPLE-2013-IEF Grant Agreement N° 624339)–
and from the Research Unit SPHERE, UMR 7219
(CNRS, Universities Paris 7-Diderot and Paris 1 Pantheon-Sorbonne)

To the Programme: Friday 28, Saturday 29
To the Abstracts
To the Practical Informations

## FRIDAY NOVEMBER 28, 2014

9:00 — Pierre **Uzan** (SPHERE)
Presentation of the Workshop

Chair: Olivier **Darrigol** (SPHERE)

9:10 — Guido **Bacciagaluppi** (University of Aberdeen)
*Did Bohr Understand EPR?*

10:10 — Roberto **Angeloni** (BMC, SPHERE)
*The holistic feature of the phenomenon of entanglement.*

11:10 — Coffee Break

11:40 — Michael **Esfeld** (University of Lausanne)
*Quantum entanglement and the primitive ontology of quantum physics.*

12:40 — Lunch Break

Chair: Guido **Bacciagaluppi**

14:00 — Alexander **Afriat** (Université de Bretagne Occidentale)
*Is the world made of loops?*

15:00 — Alexei **Grinbaum** (CEA-Saclay, SPEC/LARSIM)
*Reconstructing the Tsirelson bound.*

16:00 — Coffee Break

Chair: Thomas **Filk**

16:30 — Harald **Atmanspacher** (Collegium Helveticum, ETH Zurich / IGPP Freiburg, Germany)
*Epistemic Entanglement.*

17:30–18:30 — Hartman **Römer** (Freiburg University, Germany)
*Generalised Entanglement: Theory and Applications.*

## SATURDAY NOVEMBER 29, 2014 (restricted access to the building on Saturdays. Thanks for contacting P. Uzan)

Chair: Harald **Atmanspacher**

9:00 — Thomas **Filk** (University of Freiburg, Germany)
*Forms and Signatures of Generalized Entanglement.*

10:00 — Pierre **Uzan** (SPHERE)
*Psychophysical Correlations as Relations of Generalized Entanglement.*

11:00 — Coffee Break

11:30 — Harald **Walach** (European University Viadrina, Frankfurt (Oder), Germany)
*Generalised Non-Locality – Solving Some Riddles and Opening New Avenues.*

12:30–13:00 — Concluding Discussion.

# ABSTRACTS
## FRIDAY NOVEMBER 28, 2014

Guido **Bacciagaluppi** (University of Aberdeen), 9:10
*Did Bohr Understand EPR?*

Contrary to widespread belief, I argue that Niels Bohr's arguments in his reply to Einstein Podolsky and Rosen in 1935 take fully into account the separation between the two particles. Specifically, I argue that there is no sleight of hand in the passage from Bohr's discussion of a single particle passing through a slit and his subsequent discussion of the EPR example.

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Roberto **Angeloni** (BMC, SPHERE), 10:10
*The holistic feature of the phenomenon of entanglement.*

The ambitious task to reconstruct Bohr's philosophy of physics on the basis of entanglement [Howard 1994] has been one of the most refined attempts to shed light on the philosophical foundations of the Copenhagen interpretation of quantum mechanics. It is evident that such an approach straightforwardly leads us to heed of the importance of the so-called doctrine of the classical concepts. In the wake of such an approach, I want to reconsider Bohr's key notion of "quantum postulate" as a fundamental premise of later mature interpretations of the phenomenon of entanglement. Specifically, Bohr stated: "the essence of the quantum theory is the quantum postulate", that is to say that the interaction between object and measuring agencies is conditioned by the very existence of the quantum of action [Bohr 1935]. Although Bohr's idea of the "quantum postulate" is nowadays considered as obsolete, his intuition (and of Heisenberg as well) that a measurement of a quantum-mechanical object triggers an "uncontrollable disturbance" of the latter is right [Landsman 2007].

It is worth remarking that there are holistic features also in Schrödinger's physics, whose origins are traceable back to statistical mechanics.

This presentation aims at comparing Bohr's, Schrödinger's, and Einstein's attitudes with respect to holism and separability. The concept of wholeness will be the term of comparison among the above approaches to quantum mechanics for better explaining such different standpoints with regard to the phenomenon of entanglement.

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Michael **Esfeld** (University of Lausanne), 11:40
*Quantum entanglement and the primitive ontology of quantum physics.*

The workshop argues for an understanding of quantum entanglement in terms of a dynamical structure that governs the temporal development of the distribution of matter in physical space (i.e. the primitive ontology of quantum physics). I show how we can achieve in this way an account of entanglement that makes quantum non-locality intelligible without falling into the pitfall of what Einstein dismissed as "spooky action at a distance".

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Alexander **Afriat** (Université de Bretagne Occidentale), 14:00
*Is the world made of loops?*

Two of the (three or four) standard interpretations of the Aharonov-Bohm effect involve 'entanglements,' of different kinds. Among other things I discuss Richard Healey's 'holonomy' interpretation, in which certain fundamental properties are possessed not by points but (holistically) by much larger regions.

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Alexei **Grinbaum** (CEA-Saclay, SPEC/LARSIM), 15:00
*Reconstructing the Tsirelson bound.*

The amount of correlations allowed by quantum entanglement corresponds to the Tsirelson bound of Bell inequalities. I'll discuss the meaning of this bound and several possible ways to derive it.

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Harald **Atmanspacher** (Collegium Helveticum, ETH Zurich / IGPP Freiburg, Germany), 16:30
*Epistemic Entanglement*.

Quantum entanglement relies on the fact that pure quantum states are dispersive and often inseparable. Since pure classical states are dispersion-free they are always separable and cannot be entangled. However, entanglement is possible for epistemic states (distributions) of classical dynamical systems. The crucial condition for such epistemic entanglement is that the phase space partition defining epistemic states is not generating. This result is relevant for any state-space represented system behavior with limited measurement accuracy, and it raises the problem of how to distinguish epistemic entanglement rigorously from genuine quantum entanglement.

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Hartman **Roemer** (Freiburg University, Germany), 17:30–18:30
*Generalised Entanglement: Theory and Applications*.

Generalised Quantum Theory as developed by the speaker together with H.Atmanspacher and H.Walach is a minimal formal framework in which quantum theoretical notions like complementarity and entanglement can still be defined. Stepwise enrichment up to the full formalism of quantum physics remains possible. We shall discuss the definition of entanglement within Generalised Quantum Theory and give some Examples of possible applications going beyond ordinary quantum physics.

## SATURDAY NOVEMBER 29, 2014 (restricted access to the building on Saturdays. Thanks for contacting P. Uzan)

Thomas **Filk** (University of Freiburg, Germany), 9:00
*Forms and Signatures of Generalized Entanglement*.

In traditional (standard) quantum theory, entanglement has a precise mathematical meaning, and even though measures for and degrees of entanglement are still a subject of research, it is clear how entanglement reveals itself in experiments. However, there are many generalizations of the quantum formalism and, therefore, also many possible generalizations of the concept of entanglement. I will discuss and compare some of these generalizations, with particular emphasis on the options and constraints for empirical tests.

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Pierre **Uzan** (SPHERE), 10:00
*Psychophysical Correlations as Relations of Generalized Entanglement*.

Logical difficulties seem to appear if we try to maintain at the same time that 1) mental states are distinct from physical (or neurophysiological) states, 2) mental states have a causal efficacy, and 3) a materialist position, which leads us to assert the causal closure of the material domain and the supervenience of the mental on the physical. Most of the neuroscientists and the philosophers presently uphold a materialist-reductionist position according to which mental states would, in some way, be "reducible" to their neurophysiological correlates, facing then the difficult question of explaining why and how we can have subjective experience.

I will argue that it is indeed possible to maintain the non-reducibility of the mental to the physical provided that the psychophysical correlations are understood in terms of relations of generalized entanglement –and not in terms of efficient causality. This quantum-like position, which takes its philosophical roots in Spinoza's and Leibniz' psychophysical parallelism, considers the individual as an only system whose states are entangled in their "natural" basis of description (that is, in the basis determined by the usual, somatic and mental properties we can measure). This approach can be applied to deal with phenomena that cannot be fully understood according to a classical mode of thinking, like the placebo effect or the appearance and the development of diseases.

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Harald **Walach** (European University Viadrina, Frankfurt (Oder), Germany), 11:30
*Generalised Non-Locality – Solving Some Riddles and Opening New Avenues*.

A generalised type of non-locality is predicted by Generalised Quantum Theory (GQT) as a form of interrelatedness between various elements of systems under clearly defined preconditions. The program of generalising quantum theory hinges on the answer to the question, whether handling incompatible operations

or variables can be meaningful also outside the realm of quantum physics proper. At face validity this seems to be the case. For the minimal requirement is the fact that a measurement changes the state of the measured variable, and hence the sequence of operations is relevant. There are many examples from psychology, or our lived world, where this is likely the case. Hence it is also a reasonable assumption that the non-locality derived from this situation might be much more widely relevant than hitherto thought.
In this presentation I will give an outline of practical examples and of the explanatory potential of generalised non-locality, as well as some cautionary notes. Experimental results of a recent experiment we did seem to point towards the direction of experimental validation. If accepted, we might have a principle of systematic relationships between systemic elements of various systems of different kinds and sizes, that might complement classical, signal and interaction dependent causal interrelations.
This could be understood as a coordinating principle that helps optimise coordination within systems and thus delineating borders between systems. It can be used to understand such different phenomena as non-local interactions between minds, or mental and material systems, or transference experiences in relationships, or macro-trends in society, as well as the use of ritual and biological phenomena.

## Practical Informations

Registration is free. However, for a question of practical organisation and also of security (ACCESS to the building on Saturdays) please email : pierre.uzan@paris7.jussieu.fr

University Paris Diderot, Room Luc Valentin, 454A (4th floor), Building Condorcet, 10, rue Alice Domon et Léonie Duquet, 75013 Paris

Access map.

Metro: Line 14 and RER C, stop: Bibliothèque François Mitterrand or line 6, stop: Quai de la gare.
Buses: 62 and 89 (stop: Bibliothèque François Mitterrand), 325 (stop: Watt),
64 (stop: Tolbiac-Bibliothèque François Mitterrand)

Website of SPHERE: http://www.sphere.univ-paris-diderot.fr