COLÓQUIO

Poincaré, Filósofo das Ciências: Problemas e Perspectivas

Abstracts e Currículos dos Participantes

Anfiteatro da Fundação da Faculdade de Ciências da Universidade de Lisboa
Edifício C1, Piso 3
26-27 de Janeiro de 2011

Poincaré, Filósofo das Ciências: Problemas e Perspectivas

Poincaré, philosopher of science: Problems and Perspectives
Poincaré, philosophe des sciences: Problèmes et Perspectives

Colóquio Final do Projecto
Poincaré, Filósofo da Ciência/Poincaré Philosopher of science

Organização / Organization / Organisation

Centro de Filosofia das Ciências da Universidade de Lisboa (CFCUL)
Projecto Poincaré (Projecto FCT, PTDC/FIL/64748/2006)

Anfiteatro da Fundação da Faculdade de Ciências da Universidade de Lisboa
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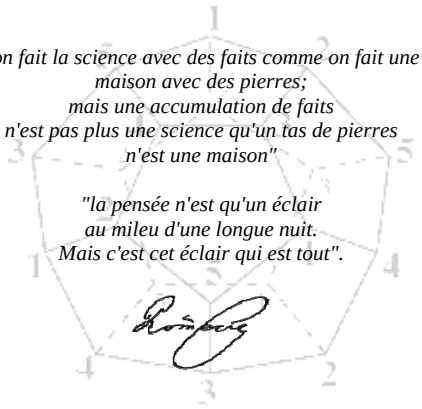

"on fait la science avec des faits comme on fait une maison avec des pierres;
mais une accumulation de faits
n'est pas plus une science qu'un tas de pierres
n'est une maison"

"la pensée n'est qu'un éclair
au mileu d'une longue nuit.
Mais c'est cet éclair qui est tout".

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Centro de Filosofia
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Poincaré, Filósofo da Ciência
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OLGA POMBO
Universidade de Lisboa/CFCUL
Abertura do Colóquio

NOTA CURRICULAR

Olga Maria Pombo Martins é licenciada em Filosofia pela Faculdade de Letras da Universidade de Lisboa (1971), concluiu em 1986 o mestrado em Filosofia Moderna pela Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa, apresentando uma dissertação intitulada Leibniz e o Problema de uma Língua Universal. Em 1998 doutorou-se em História e Filosofia da Educação pela Faculdade de Ciências da Universidade de Lisboa com a apresentação e defesa de uma dissertação intitulada Unidade da Ciência e Configuração Disciplinar dos Saberes. Em 2009 fez agregação em História e Filosofia da Ciência pela Faculdade de Ciências da Universidade de Lisboa. É actualmente professora Auxiliar da Secção Autónoma da História e Filosofia da Ciência da FCUL. Foi coordenadora científica dos projectos Enciclopédia e Hipertexto (FCT- Sapiens, 1999-2002), Cultura Científica. Migrações Conceptuais e Contaminações Sociais (FCT - Sapiens, 2002-2005). É Associated Researcher do Projecto Internacional La Science dans ses Contextes- Pragmatisme Dialogique, membro de diversos projectos internacionais e nacionais e coordenadora do projecto FCT A Imagem na Ciência e na Arte. É coordenadora científica do Centro de Filosofia das Ciências da Universidade de Lisboa (CFCUL) desde 2002 e coordenadora da Secção Autónoma de História e Filosofia das Ciências da FCUL desde 3 de Julho de 2007.

SHAHID RAHMAN
Université Lille 3
Participante honorário/honorary participant

NOTA CURRICULAR

Shahid Rahman est Professeur de logique et épistémologie à l'Université Lille 3 (Sciences Humaines, Lettres et Arts), U.F.R. de Philosophie. Responsable de la Spécialisation "Logique et épistémologie" (Masters et Doctorat). Responsable du Domaine "Concepts et pratiques philosophiques", dans l'UMR 8163 "Savoirs, Textes, Langage" et de la thématique 4 "Logique et argumentation".

Membre de l'Académie Argentine des Sciences. Éditeur avec John Symons (Texas-El-Paso) de la série Logic, Epistemology and the Unity of Science aux Editions Kluwer-Springer.

Membre du comité scientifique des revues suivantes :

- ✓ Synthese publiée par Kluwer sous la direction de Jaakko Hintikka.
- ✓ Philosophia Scientiae, publiée par les Archives-Centre d'Etudes et de Recherche Henri-Poincaré (Nancy) sous la direction de Gerhard Heinzmann.
- ✓ Energeia, publiée par Universidad Nacional de Buenos Aires
- ✓ Methodos, publiée par l'UMR STL sur le portail de Revues.org, sous la direction de Fabienne Blaise
- ✓ Kairos. A Journal of Philosophy & Science (Univ. of Lisboa)
- ✓ Logos & Episteme. An International Journal of Epistemology (Académie Roumaine).

GERHARD HEINZMANN
Université Nancy 2, Archives Henri Poincaré

TÍTULO
Poincaré and the Origins of Analytic Philosophy

ABSTRACT
The main thesis of this paper is that Poincaré conventionalism must be ranked among these sources of Analytic philosophy that seem to be at the same time a source of Quine's criticism of the two dogmas of the logical empiricism and survives consequently logical empiricism. This thesis is based:

1° on the interpretative hypothesis, that Poincaré's most important philosophical work is his article On the Foundations of Geometry (1898)

2° on the interpretative presupposition, that Poincaré defends always the same philosophy: it consists in a reconstruction program of the process of understanding scientific theories where the empirical basis is the occasion of the process of language Learning.

The path of argumentation I intended to follow is this: first to give an overview of some connections between Poincaré's conventionalism in geometry and its "extension" by logical empiricists; secondly, to present a reconstruction of Poincaré's "conventionalism" in geometry and to evaluate in these lights his position with respect to the Origins of Analytic philosophy: it seems that Poincaré's conventions are the tool to close the gap between the exactness of forms and the objectivity of relations of sensations based on an imagined ostensive contact (reflecting on sensations). If this interpretation is right, then Poincaré's project has a strong affinity with Carnap's Aufbau and Schlick's General Theory of Knowledge and survives at the same time their solutions.

NOTA CURRICULAR
Gerhard Heinzmann is a professor of philosophy at the Université Nancy 2. He also taught in Strasbourg and Berkeley. He is the author of several books and many papers in scientific journals, the editor of the Publications of the Henri-Poincaré Archives and the founder and editor of Philosophia scientiae. He chairs the scientific board of the department of philosophy of the Ecole normale supérieure and was awarded in 2006 the Prix scientifique de la fondation Prince Louis de Polignac following a proposal of the Académie des sciences.

MICHEL PATY
Université Paris7- Denis Diderot

TÍTULO
Libre choix et convention. Théorie physique et réalité phénoménale dans la pensée d'Henri Poincaré.

ABSTRACT
On examine la notion de «convention» avancée par Poincaré à propos des mathématiques et de la «physique mathématique» telle qu'il l'entend : cette notion est rapportée à l'idée de «libre choix» par la pensée. D'une manière générale, elle joue, dans ce dernier sens, un rôle-clé dans sa philosophie de l'« invention scientifique ». Concernant plus spécialement la physique mathématique et théorique, elle se tient à l'articulation des rapports entre les mathématiques et la physique, cette dernière étant contrainte par la référence à la réalité phénoménale. Ces deux aspects du rôle des conventions permettent de mieux concevoir le caractère non arbitraire de cette notion chez Poincaré (malgré parfois certaines ambiguïtés de formulation). Quelques éléments de comparaison avec le « libre choix » au sens d'Einstein, inspiré notamment de celui de Poincaré, aident à clarifier ces notions et à préciser leur fonction dans la théorie de la connaissance.

NOTA CURRICULAR
Michel Paty, Físico, Filósofo e Historiador da Ciência é actualmente Directeur de Recherche émérite au Centre National de la Recherche Scientifique (Université Paris 7-Denis Diderot). Entre as suas várias obras, destacam-se: *Etudes d'interactions de neutrinos* (CERN, Genève, 1965), *La Matière dérobée* (Paris, 1988), *L'Analyse critique des sciences* (Paris, 1990), *Einstein philosophe* (Paris, 1993), *Einstein* (Paris, 1997), *D'Alembert* (Paris, 1998), *La Physique du XXe siècle* (Paris, 2003), *Einstein, les quanta et le réel* (no prelo), *Matière et concepts* (no prelo), *Le temps matériel* (no prelo), *L'Intelligibilité du domaine quantique* (no prelo).

ROBERT DI SALLE
University of Western Ontario, London, Ontario, Canada

TÍTULO
Poincaré on the construction of space-time

ABSTRACT
One of the enduring challenges for the interpreter of Poincaré is to understand the connections between his analysis of the geometry of space and his view of the development of the theory of space-time. On the one hand, he saw that the invariance group of electrodynamics determines a four-dimensional space with a peculiar metrical structure. On the other hand, he resisted Einstein's special theory of relativity, and continued to regard the Newtonian space-time structure as a sufficient foundation for the laws of physics. Thus Poincaré did not treat the fundamental symmetry that he discovered in the way that Minkowski did, that is, as the fundamental symmetry group of space-time itself. One way of approaching this circumstance is to ask, to what extent was his comparatively conservative treatment of electrodynamics influenced by his conventionalist approach to geometry in general? I propose to begin with a related but quite different question, namely, why did not Poincaré extend to space-time the kind of epistemological analysis that he had applied, with such success, to the notion of space? It might be argued that his argument for resisting relativity was identical to his argument for resisting non-Euclidean spatial geometry: that it is a matter of conventional choice, in which physicists are justified in choosing the simplest possibility. But this is a crucial part of the context, not a complete explanation. I suggest that a fuller understanding requires an understanding of the privileged position that space plays, according to Poincaré, in our conception of the physical world, and particularly in the construction of the fundamental concepts by which physical processes submit to objective measurement. Poincaré's epistemological analysis of the construction of space could be extended to the construction of space-time, and it was Minkowski who argued that, given the new developments in electrodynamics, such an extension was epistemologically necessary. From this perspective, Poincaré's position results from granting the concept of space an epistemological priority that, in the face of modern physics, it was unable to sustain.

NOTA CURRICULAR
Robert DiSalle is Associate Professor, Department of Philosophy at the University of Western Ontario. His philosophical interests are History and philosophy of science, especially the history and philosophy of physics from Newton to the present; philosophical problems of space and time; history of the philosophy of science, from the 17th century to the present; connections between philosophy of science and analytic philosophy. His publications include *Understanding Space-Time: The Philosophical Development of Physics from Newton to Einstein* (Cambridge University Press, 2006) and "Newton's Philosophical Analysis of Space and Time", a contribution to *The Cambridge Companion to Newton* (Cambridge University Press, 2002).

LAURENT ROLLET
Institut National Polytechnique de Lorraine, Université Henri Poincaré (Nancy 1), Archives Henri Poincaré

TÍTULO
Portrait of Henri Poincaré as a young philosopher: the training years (1860-1880)

ABSTRACT

« Il nous arrivait quelquefois de philosopher : Poincaré souriait doucement de la psychologie et de la théodicée naïves qu'on enseignait alors en vue du baccalauréat. Je me souviens également de longues conversations sur les raisons scientifiques et philosophiques de croire à l'existence de la vie dans d'autres planètes ».
Paul Appell, *Henri Poincaré*, 1925

During his lifetime Henri Poincaré published three major philosophical books which achieved great success: *La science et l'hypothèse* (1902), *La valeur de la science* (1905) and *Science et méthode* (1908). Along with his posthumous *Dernières pensées* (1913), these three books constitute the main corpus of what we usually call 'Poincaré's philosophy' and the influence of his philosophical conceptions concerning the foundations of science on contemporary philosophy is of the utmost importance.
Nevertheless, Poincaré was primarily an engineer and a scientist and not a professional philosopher and did not elaborate a philosophical system. His 'philosophy' can be viewed as an aggregate of epistemological and methodological issues which find their origins in his scientific works. Moreover, apart from his long collaboration with the *Revue de métaphysique et de morale*, Poincaré the most part of his philosophical works was published in science or popularization periodicals and not in philosophical journals.
What is Poincaré's philosophy? Who was Poincaré as a philosopher? How did he become involved in philosophy? What were his relations with the French philosophical community? Is it possible to obtain a precise outlook of the connections between his scientific practice and his philosophical thinking?
These issues have largely been studied, with various degrees of success, by many historians and philosophers of science. Some authors emphasized the scientific origins of Poincaré's epistemology and highlighted for instance the major influence of Hermann von Helmholtz or James Clerk Maxwell on him. Some other focused on the direct or indirect influence of 'profesional' philosophers such as Emile Boutroux or François Evellin. Some researchers tried to analyse Poincaré's works from a systematic point of view in order to disclose a coherent philosophical structure.
But Poincaré has written very little about the origins of his philosophical thought. His books and articles contain very few bibliographical references and let appear very rarely the names of contemporary philosophers. As far as we know, very little effort has been made to bring some light on these issues by looking at Poincaré's early years. What do we know of his youth or of his character? What kind of books did he read? How was he trained in philosophy? What were the philosophical curricula when he was in high school? How did he prepare his *baccalauréat de philosophie*? Who were his teachers at the *lycée impérial*? Did they have an influence on him? Was he interested in philosophy as a student? Did he have close relationships with 'professional' philosophers?
In this conference we shall propose a historical and biographical investigation about Poincaré's philosophical training between 1860 and 1878. This will lead us to analyse the context of the lycée imperial and the Faculté des lettres of Nancy and to examine the possible contacts of Poincaré with little-known philosophers such as Jean-Baptiste Dupond, Armand Biéchy or Amédée de Margerie. We will stop this survey in 1878, when Emile Boutroux married Aline Poincaré thus becoming Henri Poincaré's brother in law.

NOTA CURRICULAR
Maître de Conférences à l'Institut National Polytechnique de Lorraine et à l'Université Henri Poincaré (Nancy 1). Co-responsable de l'axe "Archives, corpus, institutions scientifiques et sociétés" des Archives Poincaré. Responsable de l'équipe « Histoire des institutions scientifiques lorraines » (Maison des Sciences de l'Homme Lorraine). Responsable de l'édition de la correspondance administrative et privée d'Henri Poincaré. Domaines de recherche: Histoire des institutions scientifiques. Histoire des revues mathématiques (répertoire bibliographique des sciences mathématiques, histoire des *Nouvelles annales de mathématiques*). Edition de la Correspondance administrative et privée d'Henri Poincaré.

SCOTT WALTER
Maître de Conférences HDR. UFR Connaissance de l'homme. Université de Nancy 2, Archives Henri Poincaré

TÍTULO
Poincaré and Einstein on Lightwaves and the Foundation of Spacetime Physics

ABSTRACT
Albert Einstein's bold assertion of light-sphere invariance (1905) became, in the space of six years, the preferred foundation of his theory of relativity. Early on, however, universal light-sphere invariance was challenged on epistemological grounds by Henri Poincaré, who promoted an alternative demonstration of the foundations of relativity theory based on the notion of a light-ellipsoid. My talk examines how Poincaré adapted his conventionalist philosophy of space and time to his view of the foundations of relativity theory. In particular, I argue that insights from relativity theory led Poincaré to modify or abandon basic tenets of his theory of space and time, including the principle of free mobility of invariable solids, in favor of a new dynamic principle - the principle of physical relativity -which ushered in the era of spacetime conventionalism.

NOTA CURRICULAR
Scott Walter obtained in 1985 his BS and Ms in Mechanical Engineering at Stanford University. In 1990, obtained at University of Paris 8, his Licence de philosophie and in 1992 obtained at University of Paris 7 his DEA in epistemology and history of exact science and his PhD in 1996 also in epistemology and history of exact science. Between 1998 and 1999 he was Postdoctoral Fellow (MPI for the History of Science) at Berlin (CNRS & Max-Planck-Gesellschaft). In 1999 he became Assistant Professor at the University of Nancy, in the Department of philosophy. In 2001, he was Associate Professor at the University of Nancy, obtaintng his Habilitaiton in 2008 and becoming Graduate program director (from 2009). Between 2007 and 2009 he was Research fellow, in the CNRS, Poincaré Archives, Nancy. He is part of the Editorial board of *Documents for the History of Mathematics*, and also of *Philosophia Scientiae,* Nancy. His Research Activities and Interests: History of physics and mathematics from 1800 to 1930. He is one of the Editors of Henri Poincaré's correspondence with physicists, chemists, and engineers (Birkhäuser, 2007); Co-editor of Henri Poincaré's correspondence with astronomers and geodesists (2010), and with mathematicians (2011).

ANTÓNIO AUGUSTO PASSOS VIDEIRA
Universidade Federal de Rio de Janeiro

TÍTULO
Poincaré, les hypothèses indifférentes et la métaphysique

ABSTRACT
Mon objectif dans cet exposé consiste à présenter les idées de Poincaré sur le rôle des hypothèses indifférentes dans la physique et leur rapport avec la métaphysique. Ce rapport n'étant pas établi par Poincaré lui-même, je le présente ici et propose que l'occurrence des hypothèses indifférentes empêche le savant français d'avoir succès dans son but d'élaborer une épistémologie pour la science en mesure d'expliquer la certitude de cette dernière.

NOTA CURRICULAR
Estudos de Física (1982-1984) e Filosofia (1984-1986). Possui graduação em Filosofia pela Universidade Federal do Rio de Janeiro (1986) e doutorado em Filosofia - Universite de Paris VII - Universite Denis Diderot (1992). Realizou estudos doutorais na Universidade de Heidelberg (1988-1989) e na Universidade de Paris VII (1989-1992). Atualmente é professor adjunto da Universidade do Estado do Rio de Janeiro, além de professor colaborador no Programa de Pós-Graduação em epistemologia e História das Ciências e das Técnicas da UFRJ e pesquisador visitante no CBPF. Foi pesquisador do Observatório Nacional durante cinco anos e meio (1994-1999).Em 2006, estagiou durante um mês no Max-Planck Instut fuer Elementarteilchenphysik in Munique (Alemanha), onde realizou pesquisas no Arquivo Werner HEisenberg. Realizou estágios de pós-doutoramento nas Universidades de Évora (Portugal), Federal da Bahia, Federal de Santa Maria, Estadual de Campinas (2003) e Humdolt-Universität em Berlim (2010, Alemanha). Tem experiência na área de Filosofia, com ênfase em Filosofia da Ciência, atuando principalmente nos seguintes domínios: filosofia da natureza, filosofia da física, história da astronomia, biografias científicas, história da física e divulgação da ciência.

CARLOS RAMOS
Universidade de Évora

TÍTULO
On the legacy of Poincaré: some perspectives for the future

ABSTRACT
The development of dynamical systems since the 70's of the 20th century and, most important, its impact on the applied sciences has been remarkable. This development has its origin on the work of Poincaré, almost a century before. We discuss some of the main Poincaré's achievements and ideas in mathematics and their implication for scientific development. In our perspective the potential of Poincaré's ideas is not yet fully attained.

NOTA CURRICULAR
Carlos Ramos é licenciado em Engenharia Física Tecnológica (1998), mestre em Matemática Aplicada (2001) e doutorado em Matemática (2006), graus obtidos no Instituto Superior Técnico, Lisboa. Actualmente é professor auxiliar no Departamento de Matemática da Universidade de Évora, e investigador no Centro de Investigação em Matemática e Aplicações da mesma Universidade. No referido centro é responsável pelo Laboratório da Complexidade. A sua área de especialização está na intersecção dos sistemas dinâmicos e das álgebras de operadores. Os seus interesses de investigação incidem na relação entre as diversas actividades humanas; arte, humanidades, ciência e tecnologia, nas suas vertentes, reflexão e prática.

DIANA ALDEA MENDES
ISCTE – IUL Instituto Universitário de Lisboa

TÍTULO
Applications of dynamic systems in economy and biology

ABSTRACT
One of the more interesting facts that have emerged in the last decades in the areas of economy and biology was the discovery that very simple dynamic models can produce complex behaviors, such as indeterminacy, instability of cycles, bifurcations and even paths to chaos.
These kinds of results can be obtained in models with perfectly standardized and harmless hypotheses, especially if some form of incompleteness of the markets is taken into account (economy) or if the interaction and cooperation between species is analyzed (biology).
This paper analyzes two-models from economy (discrete system) and biology (continuous system of predator-prey type) that present complex behaviors, illustrating in an elegant way several types of dynamics that may arise when a parameter of reference is varied.

NOTA CURRICULAR
Diana Elisabeta Aldea Mendes é Licenciada em Matemática Pura pela Universidade Babes-Bolyai, Cluj-Napoca, Roménia (1993) e Doutora em Matemática pelo Instituto Superior Técnico, UTL (2005), com a tese intitulada *Produtos Tensoriais em Dinâmicas de Aplicações Triangulares.* É professora associada do Departamento de Métodos Quantitativos do ISCTE – IUL Instituto Universitário de Lisboa. Entre 1996 e 2010 publicou vários artigos científicos na área de sistemas dinâmicos e aplicações. É membro da UNIDE - IUL, integra a linha de investigação *Economics and Dynamic Models* e participou em 6 projectos FCT.

JOÃO P. PRÍNCIPE
Universidade de Évora/ CEHFCi

TÍTULO
Sous l'éclairage de Kant

ABSTRACT
Je mets en rapport certaines réflexions épistémologiques de Poincaré sur la physique avec l'Analytique et la Dialectique transcendantales kantiennes.

NOTA CURRICULAR
Licenciado em Física pela Faculdade de Ciências da Universidade de Lisboa (1993), é mestre em História e Filosofia das Ciências (FCT-UNL) com a tese "Raizes e emergência da mecânica ondulatória", dirigida por Rui Nobre Moreira (2000). Doutorou-se na Universidade de Paris 7, em Epistemologia e História das Ciências, com a tese "La réception française de la mécanique statistique", sob a direcção de Olivier Darrigol (2008, classificação "très honorable avec félicitations"). Foi professor provisório do ensino secundário (1990-1994), docente na UBI (assistente de José Pinto Peixoto) e no IPG (1994-1999). Desde 2000 é docente do departamento de Física da Universidade de Évora. Durante a licenciatura foi colaborador do Museu de Ciência da UL. Tem participado na defesa do ambiente e do património, sobretudo como membro da Associação de defesa do património de Sintra. O seu interesse pela HFC foi despertado por João Andrade e Silva de quem foi aluno. As suas duas grandes outras paixões confessáveis são a poesia e a música. Gosta de caminhadas. Filosoficamente sente-se próximo da tradição intelectualista.Tem trabalhado muito sobre o pensamento de António Sérgio. Em 2004 foi publicado o seu livro "Razão e Ciência em António Sérgio" (Imprensa Nacional).

REINHARD KAHLE
Universidade Nova de Lisboa/Universität Tübingen

TÍTULO
Poincaré, Hilbert and the Paradoxes

ABSTRACT
Hilbert's interest in the Foundations of Mathematics was partly motivated by the problems caused by the set-theoretic paradoxes. He discussed the paradoxes extensively in some of his lectures of which lecture notes are kept in the Mathematical Library in Göttingen. We discuss some textual sources concerning Poincaré's role in Hilbert's interest in the problem of the paradoxes.

NOTA CURRICULAR
Professor at the Universidade Nova de Lisboa, Departamento de Matemática. Privatdozent at the Universität Tübingen. Researcher at CENTRIA, Universidade Nova de Lisboa, Departamento de Informática. Researcher (collaborator) at CMUC, Universidade de Coimbra, Departamento de Matemática. Researcher (collaborator) at CMAF, Universidade de Lisboa.

ROSÁRIO LAUREANO
Instituto Superiro de Ciências do Trabalho e da Empresa (ISCTE)

TÍTULO
Determinism versus predictability in the context of Poincare's work in the restricted three-body problem

ABSTRACT
In response to a challenge posed in 1885 by King Oscar II of Sweden, Poincaré worked in the system defining the restricted 3-body problem and showed (1887) that the problem has not a solution. Instead he found a special kind of behavior - the dynamical instability - when proved the existence of orbits in the system which are nonperiodic, and yet not forever increasing to infinity nor approaching a equilibrium point. The evolution of such a system is often chaotic in the sense that *"It may happen that small differences in the initial conditions produce very great ones in the final phenomena. A small error in the former will produce an enormous error in the latter. Prediction becomes impossible."*, as written by Poincaré in *Science and Method* (1903). One of the judges of the competition, the distinguished mathematician Karl Weierstrass said*: "This work (…) is nevertheless of such importance that its publication will inaugurate a new era in the history of celestial mechanics"*. However, although Poincaré's theoretical research was sufficiently clear from the existence of chaotic deterministic behavior, the evidence to the scientific community provided by his work was only possible due to the use of a computer through the work of the meteorologist Edward Lorenz almost 75 years later. In fact, until the time of Poincaré, there was a tacit assumption that the uncertainty in the output does not arise from any randomness in the dynamical laws, since they are completely deterministic, but rather from the lack of the infinite accuracy in the initial conditions. The purpose of that presentation is to emphasize that the issues of determinism and predictability are distinct.

NOTA CURRICULAR
Maria do Rosário Domingos Laureano é Licenciada em Matemática Pura pela Faculdade de Ciências da Universidade de Lisboa (1990), Mestre em Matemática Aplicada pelo Instituto Superior Técnico (2002), com a dissertação intitulada *Cohomologia em Sistemas Dinâmicos*, e Doutora em Métodos Quantitativos na especialidade de Matemática pelo Instituto Universitário de Lisboa (2009), com a tese intitulada *Sincronização de Sistemas Dinâmicos Caóticos por Ligação Unidireccional e Bidireccional*. É professora auxiliar do Departamento de Métodos Quantitativos do ISCTE – IUL Instituto Universitário de Lisboa. Entre 1990 e 1998 leccionou em várias instituições do ensino superior como a COCITE – Cooperativa de Ensino Superior de Técnicas Avançadas de Gestão e Informática e o ISEC – Instituto Superior de Educação e Ciências de Lisboa. É membro do CFCUL, integra a linha de investigação **Philosophy of Mathematics** e o projecto FCT **Poincaré Filósofo da Ciência**.

HENRIQUE GUIMARÃES
Universidade de Lisboa

TÍTULO
Não disponível/Not available

ABSTRACT
Não disponível/Not available

NOTA CURRICULAR
Henrique Manuel Guimarães é professor auxiliar no Instituto de Educação da Universidade de Lisboa, onde conclui o mestrado (1989) e doutoramento (2003) em Educação, na especialidade de Didáctica da Matemática, com teses na área das concepções dos professores sobre a Matemática e a actividade Matemática e o ensino desta disciplina.
É membro do conselho científico do Instituto de Educação, docente em cursos de mestrado de ensino e mestrados e doutoramento de educação de disciplinas da área da didáctica e metodologia de investigação. Integra o grupo de investigação de Didáctica da Matemática do centro de investigação do Instituto e o projecto financiado pela FCT **Poincaré Filósofo da Ciência** do **Centro de Filosofia das Ciências da Universidade de Lisboa**.
É o director da *Quadrante*, revista de investigação em Educação Matemática, da Associação de Professores de Matemática, membro do seu Grupo de trabalho sobre investigação. É também membro do Seminário Nacional de História da Matemática da Sociedade Portuguesa de Matemática.

AUGUSTO J. FRANCO DE OLIVEIRA
Universidade de Évora/ Unversidade de Lisboa / CFCUL

TÍTULO
Poincaré and the principles of the calculus

ABSTRACT
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NOTA CURRICULAR
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TÍTULO
Poincaré and Ibn al-Haytham: two landmark leaders of scientific change

ABSTRACT
Scientific change is one of the enigmatic questions that puzzled both philosophers and historians alike since the second half of the last century: what is scientific change? When and how change comes to a scientific discipline? And what is the main cause of that change? One of the far reaching consequences of the answers given to such questions is the blurring distinction between science and beliefs. It looks as if we have to choose between change and rationality of the development of science. Contrary to the prevailing view which identifies change with the radical emergence of a new scientific theory, this paper argues that scientific change occurs much earlier during the controversies which represent the means by which new way of thinking surprisingly emerges. By examining one the most critical moments of two fundamental scientific disciplines, mathematics and astronomy, I will show that their turning point took place when Poincaré and Ibn al-Haytham took the landmark decision to openly challenge the course of scientific practice of their time. It turns out that the decisive and irreversible moment of change is the result of a major act of innovation: the triumph of powerful arguments which can only be ingeniously articulated and skillfully asserted and developed by the top leading scientists of their respective domains.

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TÍTULO
Poincaré, Duhem, les théories de la Physique et les Modèles Mécaniques

ABSTRACT
Au XIX^{ème} siècle les modèles mécaniques ont été fondamentaux dans l'interprétation de la réalité physique, en particulier des phénomènes électromagnétiques. Les philosophies de Duhem et de Poincaré se sont positionnées d'une façon tout à fait différente par rapport à cette question.
Duhem fait une lecture que l'on peut appeler «psychologiste» de l'utilisation des modèles mécaniques, qu'il associe aux physiciens anglais, pour qui «la vue du modèle finit par se confondre avec l'intelligence même de la théorie»[1]. La position de Poincaré peut être reliée à son conventionnalisme mais elle peut aussi associée à l'une de ses convictions - «les idées scientifiques sont des constructions libres de la pensée»[2].
Dans cette communication on présentera les arguments des deus physiciens vis-à-vis l'utilisation des modèles mécaniques, en ayant comme point de départ les théories physiques, le cadre où tous les deux placent leurs arguments. C'est aussi dans ce même cadre de référence, celui de la réflexion sur les théories physiques, qu'on essayera de justifier leurs différentes positions.

[1] DUHEM, P. (2007), *La Théorie physique, son objet, sa structure*, J. Vrin, p. 109.
[2] PATY, M., La création scientifique selon Poincaré et Einstein in Serfati, Michel (éd.), *La recherche de la vérité*, Coll. L'Ecriture des Mathématiques, ACLEditions du Kangourou, Paris, 1999, p. 242.

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