Poincar E And The Three Body Problem

Poincare's famous memoir on the three body problem arose from his entry in the competition celebrating the 60th birthday of King Oscar of Sweden and Norway. His essay won the prize and was set up in print as a paper in Acta Mathematica when it was found to contain a deep and critical error. In correcting this error Poincare discovered mathematical chaos, as is now clear from June Barrow-Green's pioneering study of a copy of the original memoir annotated by Poincare himself, recently discovered in the Institut Mittag-Leffler in Stockholm. Poincare and the

Three Body Problem opens with a discussion of the development of the three body problem itself and Poincare's related earlier work. The book also contains intriguing insights into the contemporary European mathematical community revealed by the workings of the competition. After an account of the discovery of the error and a detailed comparative study of both the original memoir and its rewritten version, the book concludes with an account of the final memoir's reception, influence and impact, and an examination of Poincare's subsequent highly influential work in celestial mechanics.

Special relativity and quantum mechanics, formulated early in the twentieth century, are the two most important scientific languages and are likely to remain so for many years to come. In the 1920's, when quantum mechanics was developed, the most pressing theoretical problem was how to make it consistent with special relativity. In the 1980's, this is still the most pressing problem. The only difference is that the situation is more urgent now than before, because of the significant quantity of experimental data which need to be explained in terms of both quantum mechanics and special relativity. In unifying the concepts and algorithms of quantum mechanics and special relativity, it is important to realize that the underlying scientific language for both disciplines is that of group theory. The role of group theory in quantum mechanics is well known. The same is true for special relativity. Therefore, the most effective approach to the problem of unifying these two important theories is to develop a group theory which can accommodate both special relativity and quantum mechanics. As is well known, Eugene P. Wigner is one of the pioneers in developing group theoretical approaches to relativistic quantum mechanics. His 1939 paper on the inhomogeneous Lorentz group laid the foundation for this important research line. It is generally agreed that this paper was somewhat ahead of its time in 1939, and that contemporary physicists must continue to make real efforts to appreciate fully the content of this classic work.

"How do three celestial bodies move under their mutual gravitational attraction? It is a problem that has been studied by Isaac Newton and leading mathematicians over the last two centuries. Poincare's conclusion that the problem represents an example ofchaos in nature, opens new possibilities of dealing with it: a statistical approach. For the first time such methods are presented in a systematic way. The book surveys statistical methods as well as more traditional methods, suitable for students of celestial mechanics at advanced undergraduate level."--BOOK JACKET.

For over 100 years the Poincare Conjecture, which proposes a topological characterization of the 3-sphere, has been the central question in topology. Since its formulation, it has been repeatedly attacked, without success, using various topological methods. Its importance and difficulty were highlighted when it was chosen as one of the Clay Mathematics Institute's seven Millennium Prize Problems. In 2002 and 2003 Grigory Perelman posted three preprints showing how to use geometric arguments, in particular the Ricci flow as introduced and studied by Hamilton, to establish the Poincare Conjecture in the affirmative. This book provides full details of a complete proof of the Poincare Conjecture following Perelman's three preprints. After a lengthy introduction that outlines the entire argument, the book is divided into four parts. The first part reviews necessary results from Riemannian geometry and Ricci flow, including much of Hamilton's work. The second part starts with Perelman's length function, which is used to establish crucial non-collapsing theorems. Then it discusses the classification of noncollapsed, ancient solutions to the Ricci flow equation. The third part concerns the existence of Ricci flow with surgery for all positive time and an analysis of the topological and geometric changes introduced by surgery. The last part follows Perelman's third preprint to prove that when the initial Riemannian 3-manifold has finite fundamental group, Ricci flow with surgery becomes extinct after finite time. The proofs of the Poincare Conjecture and the closely related 3-dimensional spherical space-form conjecture are then immediate. The existence of Ricci flow with surgery has application to 3-manifolds far beyond the Poincare Conjecture. It forms the heart of the proof via Ricci flow of Thurston's Geometrization Conjecture. Thurston's Geometrization Conjecture, which classifies all compact

3-manifolds, will be the subject of a follow-up article. The organization of the material in this book differs from that given by Perelman. From the beginning the authors present all analytic and geometric arguments in the context of Ricci flow with surgery. In addition, the fourth part is a much-expanded version of Perelman's third preprint; it gives the first complete and detailed proof of the finite-time extinction theorem. With the large amount of background material that is presented and the detailed versions of the central arguments, this book is suitable for all mathematicians from advanced graduate students to specialists in geometry and topology. Clay Mathematics Institute Monograph Series The Clay Mathematics Institute Monograph Series publishes selected expositions of recent developments, both in emerging areas and in older subjects transformed by new insights or unifying ideas.

The Three-Body Problem and the Equations of Dynamics
From Conventionalism to Phenomenology
Massless Representations of the Poincaré Group
The Foundations of Chaos Revisited: From Poincaré to Recent Advancements
The Value of Science
The Mathematical Heritage of Henri Poincar

Henri Poincaré was one of the greatest mathematicians of the late nineteenth and early twentieth century. He revolutionized the field of topology, which studies

properties of geometric configurations that are unchanged by stretching or twisting. The Poincaré conjecture lies at the heart of modern geometry and topology, and even pertains to the possible shape of the universe. The conjecture states that there is only one shape possible for a finite universe in which every loop can be contracted to a single point. Poincaré's conjecture is one of the seven "millennium problems" that bring a one-million-dollar award for a solution. Grigory Perelman, a Russian mathematician,

has offered a proof that is likely to win the Fields Medal, the mathematical equivalent of a Nobel prize, in August 2006. He also will almost certainly share a Clay Institute millennium award. In telling the vibrant story of The Poincaré Conjecture, Donal O'Shea makes accessible to general readers for the first time the meaning of the conjecture, and brings alive the field of mathematics and the achievements of generations of mathematicians whose work have led to Perelman's proof of this famous conjecture.

Collects three of the French mathematician's classic works interpreting the philosophy of science and mathematics.

On April 7-10, 1980, the American Mathematical Society sponsored a Symposium on the Mathematical Heritage of Henri Poincari, held at Indiana University, Bloomington, Indiana. This volume presents the written versions of all but three of the invited talks presented at this Symposium (those by W. Browder, A. Jaffe, and J. Mather were not written up for publication). In

addition, it contains two papers by invited speakers who were not able to attend, S. S. Chern and L. Nirenberg. If one traces the influence of Poincari through the major mathematical figures of the early and midtwentieth century, it is through American mathematicians as well as French that this influence flows, through G. D. Birkhoff, Solomon Lefschetz, and Marston Morse. This continuing tradition represents one of the major strands of American as well as world mathematics, and it is as a testimony to this

tradition as an opening to the future creativity of mathematics that this volume is dedicated. This part contains sections on topological methods in nonlinear problems, mechanics and dynamical systems, ergodic theory and recurrence, and historical material.

This book is a study of how a particular vision of the unity of mathematics, often called geometric function theory, was created in the 19th century. The central focus is on the convergence of three mathematical topics:

the hypergeometric and related linear differential equations, group theory, and on-Euclidean geometry. The text for this second edition has been greatly expanded and revised, and the existing appendices enriched. The exercises have been retained, making it possible to use the book as a companion to mathematics courses at the graduate level.

In Search of the Shape of the Universe

Henri Poincaré: Electrons to Special Relativity

Chaos Theorists

The Poincare Conjecture
The Poincaré and Geometrization Conjectures
Linear Differential Equations and Group Theory from Riemann to Poincare

Galileo Unbound traces the journey that brought us from Galileo's law of free fall to today's geneticists measuring evolutionary drift, entangled quantum particles moving among many worlds, and our lives as trajectories traversing a health space with thousands of dimensions. Remarkably, common themes

persist that predict the evolution of species as readily as the orbits of planets or the collapse of stars into black holes. This book tells the history of spaces of expanding dimension and increasing abstraction and how they continue today to give new insight into the physics of complex systems. Galileo published the first modern law of motion, the Law of Fall, that was ideal and simple, laying the foundation upon which Newton built the

first theory of dynamics. Early in the twentieth century, geometry became the cause of motion rather than the result when Einstein envisioned the fabric of space-time warped by mass and energy, forcing light rays to bend past the Sun. Possibly more radical was Feynman's dilemma of quantum particles taking all paths at once – setting the stage for the modern fields of quantum field theory and quantum computing. Yet as concepts of motion have evolved, one

thing has remained constant, the need to track ever more complex changes and to capture their essence, to find patterns in the chaos as we try to predict and control our world.
Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 23. Chapters: Stephen Wolfram, Henri Poincare, Aleksandr Lyapunov, Benoit Mandelbrot, Edward Norton Lorenz, Steven Strogatz,

Vladimir Damgov, Boris Chirikov, Brosl Hasslacher, Denis Blackmore, Mitchell Feigenbaum, James Murdoch Austin, J. Doyne Farmer, Norman Packard, Floris Takens, Otto Rossler, Harry Swinney, James A. Yorke, David Ruelle, Michael Barnsley, Michel Henon, Theodor Schwenk. Excerpt: Jules Henri Poincare (29 April 1854 - 17 July 1912) (French pronunciation:) was a French mathematician, theoretical physicist, engineer, and a philosopher of science.

He is often described as a polymath, and in mathematics as The Last Universalist, since he excelled in all fields of the discipline as it existed during his lifetime. As a mathematician and physicist, he made many original fundamental contributions to pure and applied mathematics, mathematical physics, and celestial mechanics. He was responsible for formulating the Poincare conjecture, one of the most famous problems in mathematics. In his

research on the three-body problem, Poincare became the first person to discover a chaotic deterministic system which laid the foundations of modern chaos theory. He is also considered to be one of the founders of the field of topology. Poincare introduced the modern principle of relativity and was the first to present the Lorentz transformations in their modern symmetrical form. Poincare discovered the remaining relativistic velocity

transformations and recorded them in a letter to Dutch physicist Hendrik Lorentz (1853-1928) in 1905. Thus he obtained perfect invariance of all of Maxwell's equations, an important step in the formulation of the theory of special relativity. The Poincare group used in physics and mathematics was named after him. Poincare was born on 29 April 1854 in Cite Ducale neighborhood, Nancy, ..

The first of Henri Poincar?'s several

path-breaking contributions to mathematics was the theory of Fuchsian functions discovered in 1880. Poincar? pioneered the study of differential equations on Riemann surfaces by means of geometry and group theory, thereby establishing new fields of mathematical research which are still highly active. The three supplementary essays transcribed here originally accompanied a long essay submitted for the Grand Prix des Sciences Mathimatiques offered by the Paris Academy. They document Poincar?'s discovery of Fuchsian functions, showing in detail how he made and exploited a series of insights relating non-Euclidean geometry to complex function theory. An introductory essay considers both the original and supplementary essays in context, and discusses, among other topics, their relation to Lazarus Fuchs' earlier work on the integration of linear differential equations with

rational coefficients, the correspondence with Fuchs and Felix Klein, and the traces of German and French mathematical traditions in Poincar?'s first major discovery. Recent research on the theory of perturbations, the analytical approach and the quantitative analysis of the three-body problem have reached a high degree of perfection. The use of electronics has aided developments in quantitative analysis and has helped to

disclose the extreme complexity of the set of solutions. This accelerated progress has given new orientation and impetus to the qualitative analysis that is so complementary to the quantitative analysis. The book begins with the various formulations of the three-body problem, the main classical results and the important questions and conjectures involved in this subject. The main part of the book describes the remarkable progress achieved in

qualitative analysis which has shed new light on the three-body problem. It deals with questions such as escapes, captures, periodic orbits, stability, chaotic motions, Arnold diffusion, etc. The most recent tests of escape have yielded very impressive results and border very close on the true limits of escape, showing the domain of bounded motions to be much smaller than was expected. An entirely new picture of the three-body problem is emerging, and

the book reports on this recent progress. The structure of the solutions for the three-body problem lead to a general conjecture governing the picture of solutions for all Hamiltonian problems. The periodic, quasi-periodic and almost-periodic solutions form the basis for the set of solutions and separate the chaotic solutions from the open solutions. Essays on Henri Poincaré's Philosophy of Science and the Conventionalist

Tradition
Structure of Three-dimensional Space
Problems and Perspectives
The Poincaré Conjecture
Impatient Genius
Poincaré Duality Pairs of Dimension Three

With contributions from a number of pioneering researchers in the field, this collection is aimed not only at researchers and scientists in nonlinear dynamics but also at a broader audience interested in understanding and exploring how modern chaos theory has developed since the days of Poincaré. This book was motivated by and is an outcome of the CHAOS 2015 meeting held at the Henri Poincaré Institute in Paris, which provided a perfect opportunity to gain inspiration and discuss new perspectives on the history, development and modern aspects of chaos theory. Henri Poincaré is remembered as a great mind in mathematics, physics and astronomy. His works, well beyond their rigorous mathematical and analytical style, are known for their deep insights into science and research in general, and the philosophy of science in particular. The Poincaré conjecture (only proved in 2006) along with his work on the three-body problem are considered to be the foundation of modern chaos theory.

Produced by an award-winning translator of Henri Poincaré, this book contains translations of several seminal articles by Poincaré and discusses the experimental and theoretical investigations of electrons that form their context. In the 1950s, a dispute ignited about the origin of the theory of special relativity and thrust considerable notoriety on a paper written by Henri Poincaré in 1905.

Accordingly, Part I presents the relevant translations of Poincaré’s work showing that radiation carries momentum and the covariance of the equations of electrodynamics, the continuity equation for charge, and the spacetime interval. Part II then discusses investigations by Thomson, Becquerel, and Kaufmann of electrons in diverse contexts; contributions of Abraham, Lorentz and Poincaré to a theory of electrons that includes Lorentz transformations and explains the dependence of mass on velocity; and finally, Poincaré’s exploration of the relativity principle, electron stability, and gravitation while rejecting absolute motion (ether) and an electromagnetic origin of mass. Part III contains the 1904 article by H. A. Lorentz presenting his transformations.This book will be a fascinating read to graduate-level students, physicists, and science historians who are interested in the development of electrodynamics and the classical, relativistic theory of electrons at the beginning of the 20th century.

The author's results on difference equations are applied to produce a new type of proof for Poincare's non-exstence theorem. The new proof/method

avoids cirticisms of all earlier proofs.
Henri Poincare (1854-1912) was one of the greatest scientists of his time, perhaps the last one to have mastered and expanded almost all areas in mathematics and theoretical physics. He created new mathematical branches, such as algebraic topology, dynamical systems, and automorphic functions, and he opened the way to complex analysis with several variables and to the modern approach to asymptotic expansions. He revolutionized celestial mechanics, discovering deterministic chaos. In physics, he is one of the

fathers of special relativity, and his work in the philosophy of sciences is illuminating. For this book, about twenty world experts were asked to present one part of Poincare's extraordinary work. Each chapter treats one theme, presenting Poincare's approach, and achievements, along with examples of recent applications and some current prospects. Their contributions emphasize the power and modernity of the work of Poincare, an inexhaustible source of inspiration for researchers, as illustrated by the Fields Medal awarded in 2006 to Grigori Perelman for his proof of the Poincare conjecture stated a century before. This book can be read by anyone with a master's (even a bachelor's) degree in mathematics, or physics, or more generally by anyone who likes mathematical and physical ideas. Rather than presenting detailed proofs, the main ideas are explained, and a bibliography is provided for those who wish to understand the technical details.

Ricci Flow and the Poincare Conjecture
Essential Writings of Henri Poincare
Theory and Applications of the Poincaré Group
The Hundred-Year Quest to Solve One of Math's

Greatest Puzzles
Translation of Selected Papers and Discussion
Science and Convention

Stemming from the IHP trimester "Stochastic Dynamics Out of Equilibrium", this collection of contributions focuses on aspects of nonequilibrium dynamics and its ongoing developments. It is common practice in statistical mechanics to use models of large interacting assemblies governed by stochastic dynamics. In this context "equilibrium" is understood as

stochastically (time) reversible dynamics with respect to a prescribed Gibbs measure. Nonequilibrium dynamics correspond on the other hand to irreversible evolutions, where fluxes appear in physical systems, and steady-state measures are unknown. The trimester, held at the Institut Henri Poincaré (IHP) in Paris from April to July 2017, comprised various events relating to three domains (i) transport in non-equilibrium statistical mechanics; (ii) the design of more efficient simulation methods; (iii)

life sciences. It brought together physicists, mathematicians from many domains, computer scientists, as well as researchers working at the interface between biology, physics and mathematics. The present volume is indispensable reading for researchers and Ph.D. students working in such areas.
Geometry through its fundamental transformations, the Poincaré group, requires that wavefunctions belong to representations. Massless and massive representations are very different and

their coupling almost impossible. Helicity-1 gives electromagnetism, helicity-2 gives gravitation; no higher helicities are possible. Basis states, thus the fundamental fields, are the potential and connection. General relativity is derived and is the unique theory of gravity, thus the only possible quantum theory of gravity. It is explained why it is. Because of transformations trajectories must be geodesics. Momenta are covariant derivatives and must commute. Covariant derivatives of the

metric are zero.

The Poincaré Conjecture tells the story behind one of the world's most confounding mathematical theories. Formulated in 1904 by Henri Poincaré, his Conjecture promised to describe the very shape of the universe, but remained unproved until a huge prize was offered for its solution in 2000. Six years later, an eccentric Russian mathematician had the answer. Here, Donal O'Shea explains the maths behind the Conjecture and its proof, and illuminates the curious personalities

surrounding this perplexing conundrum, along the way taking in a grand sweep of scientific history from the ancient Greeks to Christopher Columbus. This is an enthralling tale of human endeavour, intellectual brilliance and the thrill of discovery.

Poincare and the Three Body ProblemAmerican Mathematical Soc.

Science and Hypothesis

Poincaré, Philosopher of Science

Three-dimensional Visualization of the Poincaré Invariant Associated with the ABC

Flow

Institut Henri Poincaré, Paris, France, 2017

Poincaré's Foundational Work on Dynamical Systems Theory

Poincaré's Philosophy

A comprehensive look at the mathematics, physics, and philosophy of Henri Poincaré Henri Poincaré (1854-1912) was not just one of the most inventive, versatile, and productive mathematicians of all time--he was also a leading physicist who almost won a Nobel Prize for physics and a prominent philosopher of science whose fresh and surprising essays are still in print a century later. The first in-depth and comprehensive look at his many accomplishments, Henri Poincaré explores all the fields that Poincaré touched, the debates sparked by his original investigations, and how his discoveries still contribute to society today. Math historian Jeremy Gray shows that Poincaré's influence was wide-ranging and permanent. His novel interpretation of non-Euclidean geometry challenged contemporary ideas about space, stirred heated discussion, and led to flourishing research. His work in topology began the modern study of the subject, recently highlighted by the successful resolution of the famous Poincaré conjecture. And Poincaré's reformulation of celestial mechanics and discovery of chaotic motion started the modern theory of dynamical systems. In physics, his insights on the Lorentz group preceded Einstein's, and he was the first to indicate that space and time might be fundamentally atomic. Poincaré the public intellectual did not shy away from scientific controversy, and he defended mathematics against the attacks of logicians such as Bertrand Russell, opposed the views of Catholic apologists, and served as an expert witness in probability for the notorious Dreyfus case that polarized France.

Richly informed by letters and documents, Henri Poincaré demonstrates how one man's work revolutionized math, science, and the greater world.

Poincare invariant models for the three-nucleon system are examined which have the same heuristic relation to field theories as the nonrelativistic nuclear models. The generators of the infinitesimal dynamical transformations can be obtained as functions of the kinematic generators, the invariant mass operator of the interacting system, and additional operators. These additional operators are the components of the Newton-

Wigner position operator in the instant form, and the transverse components of the spin in the front form. The relativistic dynamics of Poincare transformations is examined, and then these concepts are applied to two-nucleon systems. The transition to a fully interacting three-nucleon system is made. (LEW).

Here is an accurate and readable translation of a seminal article by Henri Poincaré that is a classic in the study of dynamical systems popularly called chaos theory. In an effort to understand the stability of orbits in the solar system, Poincaré applied a Hamiltonian formulation to the equations of planetary motion and studied these differential equations in the limited case of three bodies to arrive at properties of the equations ' solutions, such as orbital resonances and horseshoe orbits. Poincaré wrote for professional mathematicians and astronomers interested in celestial mechanics and differential equations. Contemporary historians of math or science and researchers in dynamical systems and planetary motion with an interest in the origin or history of their field will find his work fascinating.

This volume presents a selection of papers from the Poincaré Project of the Center for the

Philosophy of Science, University of Lisbon, bringing together an international group of scholars with new assessments of Henri Poincaré's philosophy of science—both its historical impact on the foundations of science and mathematics, and its relevance to contemporary philosophical inquiry. The work of Poincaré (1854-1912) extends over many fields within mathematics and mathematical physics. But his scientific work was inseparable from his groundbreaking philosophical reflections, and the scientific ferment in which he participated was inseparable from the philosophical controversies in which he played a pre-eminent part. The subsequent history of the mathematical sciences was profoundly influenced by Poincaré's philosophical analyses of the relations between and among mathematics, logic, and physics, and, more generally, the relations between formal structures and the world of experience. The papers in this collection illuminate Poincaré's place within his own historical context as well as the implications of his work for ours.

On the Estimation of Poincaré Maps of Three-dimensional Vector Fields Near a Hyperbolic Critical Point

Henri Poincare: Trois plements sur la decouverte

des fonctions fuchsiennes /Three plementary Essays on the Discovery of Fuchsian Functions
Stochastic Dynamics Out of Equilibrium
Poincaré Series of Almost Complete Intersections of Embedding Dimension Three

Poincare's Prize

Edited by Daniel Goroff, Harvard University This English-language edition of Poincare's landmark work is of interest not only to historians of science, but also to mathematicians. Beginning from an investigation of the three-body problem of Newtonian mechanics, Poincare lays the foundations of the qualitative solutions of

differential equations. To investigate the long-unsolved problem of the stability of the Solar System, Poincare invented a number of new techniques including canonical transformations, asymptotic series expansions, and integral invariants. These "new methods" are even now finding applications in chaos and other contemporary disciplines. Contents: Volume I: Periodic and asymptotic solutions: Introduction by Daniel Goroff. Generalities and the Jacobi method. Series integration. Periodic solutions. Characteristic exponents. Nonexistence of uniform integrals. Approximate development of the perturbative function. Asymptotic solutions. Volume II: Approximations by series: Formal calculus. Methods of

Newcomb and Lindstedt. Application to the study of secular variations. Application to the three-body problem. Application to orbits. Divergence of the Lindstedt series. Direct calculation of the series. Other methods of direct calculation. Gylden methods. Case of linear equations. Bohlin methods. Bohlin series. Extension of the Bohlin method. Volume III: Integral invariants and asymptotic properties of certain solutions: Integral invariants. Formation of invariants. Use of integral invariants. Integral invariants and asymptotic solutions. Poisson stability. Theory of consequents. Periodic solutions of the second kind. Different forms of the principle of least action.

Science and Convention: Essays on Henri Poincare's Philosophy of Science and The Conventionalist Tradition contains essays concerned with Henri Poincare's philosophy of science, physics in particular, and with the conventionalist tradition in philosophy that he revived and reshaped, simultaneously with, but independently of, Pierre Duhem. Separating five essays as chapters, the book discusses the main ideas of the philosophy (Essays 1 and 5), traces at least some of its historical background (Essays 1, 2, and 3), and provides some of its developments (Essays 2 and 4).

Henri Poincare (1854–1912) was one of the greatest mathematicians and philosophers of all time. He founded

topology and made important contributions to theoretical physics. Yet despite his numerous achievements Poincare never constructed a systematic philosophy. In this book, Elie Zahar presents Poincare's work for the first time as a unified system of thought.

Here is an accurate and readable translation of a seminal article by Henri Poincaré that is a classic in the study of dynamical systems popularly called chaos theory. In an effort to understand the stability of orbits in the solar system, Poincaré applied a Hamiltonian formulation to the equations of planetary motion and studied these differential equations in the limited case of three bodies to arrive at properties of the equations' solutions, such as

orbital resonances and horseshoe orbits. Poincaré wrote for professional mathematicians and astronomers interested in celestial mechanics and differential equations. Contemporary historians of math or science and researchers in dynamical systems and planetary motion with an interest in the origin or history of their field will find his work fascinating. .

Electromagnetism, Gravitation, Quantum Mechanics, Geometry

Poincaré and the Three Body Problem

On Poincaré's Non-existence of Integrals for the Three-body Problem

The Three-Body Problem

Galileo Unbound

A Scientific Biography

This thirteenth volume of the Poincaré Seminar Series, Henri Poincaré, 1912-2012, is published on the occasion of the centennial of the death of Henri Poincaré in 1912. It presents a scholarly approach to Poincaré's genius and creativity in mathematical physics and mathematics. Its five articles are also highly pedagogical, as befits their origin in lectures to a broad scientific audience. Highlights include "Poincaré's Light" by Olivier Darrigol, a leading historian of science, who uses light as a guiding thread through much of Poincaré's physics and philosophy, from the application of his superior mathematical skills and the theory of diffraction to his subsequent reflections on the foundations of electromagnetism and the electrodynamics of moving bodies; the authoritative "Poincaré and the Three-Body Problem" by Alain Chenciner, who offers an exquisitely detailed, hundred-page perspective, peppered with vivid excerpts from citations, on the monumental work of Poincaré on this subject, from the famous (King Oscar's) 1889 memoir to the foundations of the modern theory of chaos in "Les méthodes nouvelles de la mécanique céleste." A profoundly original and scholarly presentation of the work by Poincaré on probability theory is given by Laurent Mazliak in "Poincaré's Odds," from the incidental first appearance of the word "probability" in Poincaré's famous 1890 theorem of recurrence for dynamical systems, to his later acceptance of the unavoidability of probability calculus in Science, as developed to a great extent by Emile Borel, Poincaré's main direct disciple; the article by Francois Béguin, "Henri Poincaré and the Uniformization of Riemann Surfaces," takes us on a fascinating journey through the six successive versions in twenty-six years of the celebrated uniformization theorem, which exemplifies the Master's distinctive signature in the foundational fusion of mathematics and physics, on which conformal field theory, string theory and quantum gravity so much depend nowadays; the final chapter, "Harmony and Chaos, On the Figure of Henri Poincaré" by the filmmaker Philippe Worms, describes the homonymous poetical film in which eminent scientists, through mathematical scenes and physical experiments, display their emotional relationship to the often elusive scientific truth and universal "harmony and chaos" in Poincaré's legacy. This book will be of broad general interest to physicists, mathematicians, philosophers of science and historians.

The book describes the life of Henri Poincaré, his work style and in detail most of his unique achievements in mathematics and physics. Apart from biographical details, attention is given to Poincaré's contributions to automorphic functions, differential equations and dynamical systems, celestial mechanics, mathematical physics in particular the theory of the electron and relativity, topology (analysis situs). A chapter on philosophy explains Poincar é 's conventionalism in mathematics and his view of conventionalism in physics; the latter has a very different character. In the foundations of mathematics his position is between intuitionism and axiomatics. One of the purposes of the book is to show how Poincar é reached his fundamentally new results in many different fields, how he thought and how one should read him. One of the new aspects is the description of two large fields of his attention: dynamical systems as presented in his book on `new methods for celestial mechanics' and his theoretical physics papers. At the same time it will be made clear how analysis and geometry are intertwined in Poincar é 's thinking and work.In dynamical systems this becomes clear in his description of invariant manifolds, his association of differential equation flow with mappings and his fixed points theory. There is no comparable book on Poincar é , presenting such a relatively complete vision of his life and achievements. There exist some older biographies in the French language, but they pay only restricted attention to his actual work. The reader can obtain from this book many insights in the working of a very original mind while at the same time learning about fundamental results for modern science

The amazing story of one of the greatest math problems of all time and the reclusive genius who solved it In the tradition of Fermat ' s Enigma and Prime Obsession, George Szpiro brings to life the giants of mathematics who struggled to prove a theorem for a century and the mysterious man from St. Petersburg, Grigory Perelman, who fi nally accomplished the impossible. In 1904 Henri Poincar é developed the Poincar é Conjecture, an attempt to understand higher-dimensional space and possibly the shape of the universe. The problem was he couldn ’ t prove it. A century later it was named a Millennium Prize problem, one of the seven hardest problems we can imagine. Now this holy grail of mathematics has been found. Accessibly interweaving history and math, Szpiro captures the passion, frustration, and excitement of the hunt, and provides a fascinating portrait of a contemporary noble-genius.

Une edition des manuscripts avecune introduction /A critical

edition of the original manuscripts with an introductory essay
The Scientific Legacy of Poincaré
New Methods of Celestial Mechanics
Poincaré Seminar 2012
A Path Across Life, the Universe and Everything
Henri Poincaré