without a consideration of evolution. ■

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Exhibition

And all was light

The Newtonian Moment: Science and the Making of Modern Culture
Curated by Mordechai Feingold
At The New York Public Library until 5 February 2005.

Alan Packer

Isaac Newton is rarely out of the news these days. Last year there was the publication of *Isaac Newton*, James Gleick's elegant distillation of Newton's character and science. Last month came the final instalment of *The Baroque Cycle*, Neal Stephenson's rollicking trilogy of novels, in which Newton plays a pivotal role. Now he gets the scholarly treatment in *The Newtonian Moment: Science and the Making of Modern Culture*, an exhibition at The New York Public Library.

Curated by Mordechai Feingold of the California Institute of Technology, the exhibit presents maps, prints, books and models from the library's collection, and manuscripts from the Cambridge University library. Newton's death mask, once owned by Thomas Jefferson, is also on display. The narrative focuses on Newton as "innovator and icon of the Enlightenment", and traces the reception of his ideas in their historical context.

Who would not be moved by the sight of one of Newton's early notebooks, remarkably well preserved, or an early edition of the *Principia Mathematica* (1687) with handwritten notes for proposed revisions? Bibliophiles will enjoy the different editions of the *Principia*, and *Opticks* (1704), translated into a variety of languages. Some of these are adorned with a dramatic allegorical frontispiece celebrating Newton's mastery of celestial and terrestrial mechanics and his revelatory insights into light and colour.

But if the exhibition emphasizes the apotheosis of Newton, it makes clear that his was not an easy road to glory. For every Voltaire — whose *Elements of Newton's Philosophy* was one of the most successful popularizations of newtonian thought — there was a *Celestino Cominale* (*Anti-Newtonianism pars prima*), or an Etienne Simon de Gamaches, who held fast to his compatriot Descartes' theory of vortices in the face of Newton's theory of universal gravitation. And there was a long-running dispute between Newton and Leibniz over which of them deserved the credit for discovering the calculus.

Feingold also presents the texts and drawings of important figures whose work and world-views were affected by Newton: William Blake and his illustrations of reason and imagination; Alexander Pope ("God said Let Newton be! and All was Light"); as well as Immanuel Kant, Johann Wolfgang von Goethe and Denis Diderot. All of these were forced to confront the revolution in mathematical rigour that Newton had launched.

Newton's passion for mathematics also fuelled his idiosyncrasies. Accompanying his diagrams is a floor-plan of Solomon's Temple, whose dimensions he painstakingly derived from biblical descriptions. Newton kept this obsession, among others, carefully concealed during his lifetime. ■

Alan Packer is senior editor at Nature Genetics.

Page proofs? A first edition of *Principia Mathematica* with Newton's handwritten notes on the left page.

CAMBRIDGE UNIV. LIBRARY

A walk on the wild side

Out of this World: Colliding Universes, Branes, Strings, and Other Wild Ideas of Modern Physics
by Stephen Webb
Copernicus: 2004. 308 pp. €29.95, £17.50, $27.50

Frank Close

"This book is about some really wild ideas," is how *Out of This World* begins, so readers cannot say they have not been warned. I lost count of the number of times that 'wild' was juxtaposed with 'ideas', although other adjectives, including 'outrageous', 'phenomenal' and 'outlandish' are also used to describe the "amazing recent theories" on hidden dimensions, branes and modern particle physics.

The book is about high-energy physics; if readers have enough energy of their own, they might pick up some of the sense of excitement in the current research, but they shouldn't expect suddenly to see the light. I remember seminars where the speaker attempts to review the field in the first three minutes to set the stage for the presentation; those who know the field don't need it, and those who don't aren't likely to learn much. Too often I was left with this feeling as I ploughed through this book: we are given brief glimpses of the standard model, grand unification theories and supersymmetry, superstrings and more.

Stephen Webb tries to describe the panoply of particle physics without using equations, which is a noble aim. He must have read widely to achieve this, although on occasion his sources can be rather visible; an allusion to the strength of the weak force being like Cleopatra falling off her barge in 50 BC but not yet hitting the water rang a bell, for example. The book falls short of existing books, such as Brian Greene's *The Elegant Universe* (W. W. Norton, 1999), which covers much of the material with greater assurance. There is too much in Webb's book that raises doubts about the reliability of the material and suggests that *Out of This World* is out of its depth.

Here is a sample, by no means exhaustive. The book states that a particle with "zero rest *(sic)* mass" always travels at the speed of light. Poorly drawn or incorrectly labelled diagrams violate electric charge, illegally convert quarks into leptons, or show the strength of the weak force, an SU(2) structure, strengthening at energies above 100GeV, whereas it actually starts to become feeble again.

There is the wild idea that "on average, two quarks in a free neutron come close enough to exchange a W boson about once every ten minutes". If the author is equating the ten-minute half-life of the neutron with the chance that the W boson can initiate the "weak" beta decay, this is misleading. The typical lifetime of a particle resisting beta decay is of the order of nanoseconds or less: the longer lifetime of the neutron is mainly due to the fact that the combined masses of proton and electron, into which the neutron decays, are so close to that of the free neutron that there is almost no 'phase space' available.

To popularize using metaphor requires the author to have a deep understanding of the material. To do this over some 300 pages without using equations is a challenge of the highest order, so it is perhaps not surprising that Webb does not always succeed. Readers might have found it easier to persevere if he had shown less ambition, following the maxim that 'less is more'. The book does provide a sense of the development of ideas, and how the frontiers of current mathematical particle physics are developing, but the descriptions are patchy and the "wild ideas" rather overstated. Without a sense of irony, the dust-jacket puff reads: "Then, in a series of increasingly astonishing chapters…". Astonishing indeed! ■

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