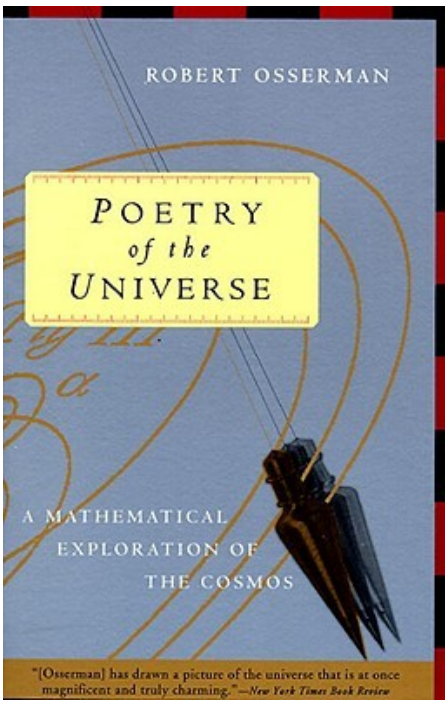

Poetry of the Universe

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An exciting intellectual tour through the ages showing how mathematical concepts and imagination have helped to illuminate the nature of the observable universe, this book is a delightful narrative "math for poets." Osserman traces the mathematical breakthroughs over the centuries and explains their significance. 40 illustrations throughout.

Poetry of the Universe Details

Date	:	Published January 15th 1996 by Anchor (first published 1995)
ISBN	:	9780385474290
Author	:	Robert Osserman
Format	:	Paperback 224 pages
Genre	:	Science, Physics, Mathematics, Nonfiction

From Reader Review Poetry of the Universe for online ebook

Germancho says

Es un libro que realza el valor del ingenio matemático y su influencia en el desarrollo de las teorías físicas. Es muy sencillo, aunque a veces las explicaciones matemáticas son confusas para el ojo no entrenado. Además parece que estuviese cortado a la mitad, y las anotaciones muchas veces son innecesarias. Merece un "Bueh..."

Maurizio Codogno says

L'appunto principale che mi sento di fare a questo libro è che il titolo è assolutamente fuorviante. Sì, è lo stesso dell'edizione originale, e il motivo è spiegato nella quarta di copertina: secondo Osserman la matematica che serve per spiegare la fisica è spesso bella di suo e quindi poetica. Io non sono d'accordo con l'affermazione, ma il libro è davvero bello: solo che avrei preferito fosse intitolato come il sottotitolo, *L'esplorazione matematica del cosmo*. L'opera tratta proprio di questo tema, e lo fa con un percorso poco standard visto che parte dalla cartografia terrestre, il che ha senso perché è un ottimo modo per spiegare con un'analogia come si può rappresentare un'ipersfera nello spazio quadridimensionale. Forse la parte finale è un po' datata (il testo originale è del 1995), ma in ogni caso il libro merita la lettura. In un paio di punti anche il grande Libero Sosio ha dormicchiato durante la traduzione, che nel complesso è però come sempre ottima.

JTRyan says

I feel smarter for having read this book. I'll even save it for when my guys are old enough to read it. The only issue I had was with the lay out. The diagrams are important, but who puts them in mid-sentence?

David says

this book is a good start to finish history of mathematics linked to a more or less corresponding history of physics: understanding in one area would lead to discoveries and understandings in the other. As the book - and math/physics - progressed, mir became more and more challenging to understand. But this book is not written and a page turner thriller. the concepts and ideas of one chapter are built upon in the next. So, taking the time to understand one chapter is a prerequisite for the next.

Ian Mathers says

Got lent this by the same coworker who lent me the book on the history of zero. This one is a bit more formless - Osserman is great at most of the particular bits of description, but when it comes to setting out what the book is trying to do he tries but can't quite nail it down. The best way he puts it is in pointing out that much as going from a flat earth to a round earth required a conceptual hurdle, not just understanding the

math behind it, so does some like relatively. And that's a hard goal to make pithy! But everything he's describing, the history of maps, relatively, quantum mechanics, etc, is well told, and I'd appreciate this book for making me feel like I actually am beginning to grasp what "curved space" means for the first time.

Roberto Rigolin F Lopes says

With such striking title my first impression was: Heck, this is going to be fun! But it delivers much more than expected. This is about a guy using simple language to describe outstanding breakthroughs. He managed to put together a bunch of ingenious people who changed our view permanently. His endeavour shows how sexy the universe is, together with some tools to undress it a bit. Enjoy!

Jacquelyn says

I picked this up from the library without any real expectations for it. I ended up being surprised about how well written it was. Some of the mathematics mentioned can be hard to get your head around but the clear and concise language used made it exponentially easier to understand. This book definitely changed my perception of the universe and was especially great to read after books like A Brief History of Time and Michio Kaku's Hyperspace.

India Clamp says

Osserman’s study in physics delineating the poetry of imaginative inspiration---so vital to mathematics---floods the mind. Math and art join for eruptive results being both asymmetrical and symmetrical. Poetry of math is delineated with (Osserman, 136) “Gravity is geometry” though erudite scientists claimed this was “nonsense” and thus termed the very thought of such as “Voodoo Physics.” In Osserman’s “Mathematical Exploration of the Cosmos” the reader finds mystery and imagination coupling along with expansion and contraction of the cosmos. Explosive theories explained simply and once read it may close or open doors to a universe denied to the inflexible. Required reading for anyone involved, teaching or discussing physics! Truly this is a delightful text resplendent with big knowledge in a tiny book.

Mangieto says

It was love at first sight when it catches my eye on the shelves of the library, now I just wished the book was mine to keep gazing it every day, and to quote it or something to my fellow scientist in training.
So, I found it fun and accurate, even tho it doesn't get deep into the matter. And for that reason I think it is a proper read for every person interested in how the science has evolved through time, specially because there's little knowledge about a bunch of people whom changed our lives from their desks, to say something. In my case, I just love physics so much and reading someone who seems to enjoy it as much as I do was amazing.

Andy Cyca says

[3.5/5] Osserman nos regala un viaje sobre los conceptos matemáticos detrás de la inmensa pregunta "¿qué es eso que llamamos universo y cómo se mide?". Gracias a sus analogías, es fácil digerir las partes más técnicas, aunque sí requiere una buena dosis de lecturas previas para seguirle el paso a gusto.

En mi opinión, aunque los capítulos individuales son buenos, no siempre están bien unidos unos a otros. Quizá funcionaria mejor como una serie de capítulos sobre divulgación general sobre matemáticas de las ciencias espaciales que como un solo tomo con un solo tema. A pesar de ello, es ameno y se lee sin problemas en unas horas.

Dan says

An easy-to-read account of history through the eyes of those who tried to measure and define the dimensions of the Earth, and then the universe. The only problem is that it was written in the mid-1990s so it could use an update on more recent discoveries. Still, I'd recommend it.

Terry says

Interesting book. Short. Author lost me around Riemman's introduction, but it is not too bad. Not exactly sure how I got from measuring the size of the Earth to the Retrosphere. Still, a decent brisk read.

Daniel Bastian says

"Studying mathematics in order to understand the laws of physics is not unlike learning enough of a foreign language to capture some of the special flavor and beauty of prose or poetry written in that language. In the process, one may well become fascinated by the language itself." (pp. 169-170)

Mathematics has always occupied the mythical verge between reality and abstraction, between beauty and physics. For those acquainted with its rhythms, descending into the mathematical realm is like peeking behind the cosmic curtain and seeing how nature is choreographed. In this brief volume Robert Osserman opens up the aesthetic space as he volleys philosophy in between sets of mathematical exposition.

Do numbers, geometric patterns, proofs and equations inhabit a reality independent of the mind? Were they sealed off in their own ontological antechamber just waiting to be discovered? Or is mathematics an uncannily useful quirk of cognition gradually refined by human ingenuity? Such questions may leap to the fore as you make your way through *Poetry of the Universe: A Mathematical Exploration of the Cosmos* (1995).

The idea for this book, Osserman tells us, began as a course at Stanford. A colleague of his once posed the question, 'How is it that mathematics is such a beautiful subject, yet students can go through four years of college and never find out?' This fed into a focused course created to give aesthetic attention to the symbiotic nature of math and science. A number of subtopics—from geometry and topology to cartography and

cosmology—are emotively presented throughout the book.

Humble Beginnings

There is certainly something amazing about the ability of mathematics to describe this vast, wild universe. Of course, its secrets were not passed stamped and sealed through the veil of heaven to enlighten us mortals on what we could never achieve by ourselves. To the contrary, mathematics became a collective enterprise, with each successive generation adding a bit more to the knowledge of the previous.

Modern mathematics owes a great deal to ancient Greece. In particular, the legendary triumvirate of Pythagoras, Euclid and Archimedes were among the first to traffic in theorems and proofs, rendering viable such feats as determining the shape and circumference of the Earth. (Osserman explodes the myth about Medieval sophisticates thinking the Earth was flat; they didn't.) Extraordinarily, much of their work has stood the test of time and continues to form the foundation of several fields of study today.

When the curtain fell on ancient Greece, the adventure was just beginning. Mathematicians in the Middle Ages would later recover the Greek classics and inaugurate a whole new era of esoterica. Indeed, the story of mathematics is littered with more abstract theory than anything else. Though we use it to model and describe our universe to an "unreasonably effective" degree (per Eugene Wigner), much of it has no connection whatever to anything we find in nature and operates quite independently of the physical sciences.

Osserman revisits some of the mighty moments, linking the efforts of Euler, Gauss, Lobachevsky, Bolyai, Fermat, Riemann, Minkowski and Einstein, whose intrepid excursions into the arcane would occasionally reap massive payouts on the practical side of things. Bernhard Riemann's contributions to differential geometry laid the groundwork for Einstein's general relativity. Standing on the shoulders of their predecessors, Maxwell and his equations ushered in radar, radio and television, while Newton's and Einstein's completely revolutionized our picture of physics and cosmology. Our modern understanding of the observable universe is indebted to mathematics in the same way *Homo sapiens* and its common ancestors are beholden to the Chicxulub impact.

Mathematics as Lingua Franca

It is not easy for some people to think mathematically; it has its own structure, its own grammar and its own jargon. Much of the book touches on conceptually very difficult areas, such as curvature and geodesy, and it takes a skillful communicator to convey them to the nonspecialist without devolving into indecipherable froth. Unfortunately, Osserman is uneven in this regard. He rushes through too many topics, which is doubtless a symptom of the extreme brevity of the book but isn't alleviated by his roughshod presentation.

While the many illustrations are handy, they won't do much without a solid background in abstract, non-applied mathematics, in particular geometry and topology which absorb roughly three quarters of the book. This is ultimately a flaw fatal to the book's theme, as a true appreciation of mathematical elegance requires at minimum an understanding of the underlying ideas. For those lacking firm footing in these areas, expect to do a lot of companion reading to resolve your inevitably many clarifying questions.

Expansion and Contraction

His tie-ins with cosmology in the latter sections of the book fare better. The excitement level trebles as he undresses the Big Bang and the interplay of intelligence that led to its formulation. The canonical astronomers of the early 20th century, Edwin Hubble and Georges Lemaître, paired their pioneering spirit

with Einstein's relativity equations to derive the redshift-distance relation and hence the basis of the Big Bang model of the universe. This was a lively time for astronomy and for anyone interested in deep time, and the book would have benefited from giving more space to this era and its many achievements.

Given the publication date of 1995, there is also a good amount here that is outdated. The book was released three years before the Nobel Prize-winning discovery of the accelerating universe and eighteen years before the landmark release of ESA's Planck data, which revised the Hubble constant as well as the age and overall composition of the universe. And there is curiously no mention of cosmic inflation, a key model within Big Bang cosmology that may have recently received powerful confirmation from a discovery at the South Pole. No mention of Alan Guth and eternal inflation; no mention of Andrei Linde and chaotic inflation, which is made all the more curious considering the book lingers so long in geometry territory and inflationary expansion certainly has some rather remarkable geometrical ramifications.

It's also interesting to hear his skepticism on how far back to the beginning of time we will be able to reach, in which he notes that our curtain suddenly drops in the vicinity of the Big Bang. If the 2014 announcement of gravitational waves detected in the cosmic microwave background holds up, portions of this book would benefit from an update.

Closing Thoughts

Osserman's *Poetry of the Universe* is the story of man's obsessive affair with the mathematical and the riches of possibility. Explorations in the mathematical space subsidize our inquest of the cosmos, sparking new opportunities in the physical as well as mental space. The book shines when figuring in the key players along the road to us and contextualizing their breakthroughs. Where it falls short is in its explanation and presentation, which is too technical, too terse and too scattershot for introductory readers to piece together. Even with the supplemental notes provided in the back, this is a challenging read not recommended for the mathematical neophyte. For better and more up-to-date treatments on the intersection of science, math and beauty, see Brian Greene's *The Fabric of the Cosmos* and Hawking's *A Brief History of Time*.

Note: This review is republished from my official website. Click through for additional footnotes and imagery.

Michael Fitzpatrick says

The stories and information is good, but the writing is really poor. Also, the explanation of the concepts isn't particularly great. I left the book still not sure what he meant by several ideas. Hawking and Brian Greene are definitely better popular science writers.

Anna says

Poetry of the Universe (1996) begins with a beautiful vantage: to tell the story of how scientific and mathematic discoveries revealed our world and our universe (in a process that is, of course, still unfolding). Moving from ancient revelations of geometry (literally, "measuring the earth") through the problems of making maps of an ellipsoidal earth to shifting conceptions of the shape of the universe, these tales are told briskly, in less than two hundred pages. It therefore gives the impression of an action-packed book. The

author, Robert Osserman, is explicit about hinging this book on the excitement of discovery and the potency of imagination. In the acknowledgements, Osserman says that his primary debt is to a colleague at Stanford University that asked him: How is that mathematics is such a beautiful subject, yet students can go through for years of college taking many math courses and never finding out?

In response, Osserman takes the broad view--moving, by name, from scientist to mathematician to scientist in a quick chronicle of the unfolding universe; it is a strategy that makes the clear point about how discoveries build upon one another, and how scientists work within a vast community of other curious minds, unbound by time and space. This is not limited to Western history: there is a fascinating story about how, early in the ninth century, the spherical shape of the earth was derived by measurements and came to be accepted fact in Islamic science. Neither is this story limited to scientists: much attention is given to Georg Riemann's depiction of the spherical universe in the nineteenth century--which mirrors almost exactly the spherical universe conceived by Dante in The Divine Comedy.

The poet (in the Divine Comedy) is led by Beatrice from the surface of the earth, through the various spheres of the visible universe, and all the way to the Primum Mobile. Looking out from there, he finds himself looking in to the sphere of the Empyrean. There is no indication that one must choose a particularly point on the Primum Mobile; presumably, looking out at any point would give a view into the Empyrean. In other words, we are to think of the empyrean as somehow both surrounding the visible universe and adjacent to it. If that is the case, then the universe according to Dante would coincide exactly with the universe according to Riemann; they would differ only in the labels.

While mathematics is centered in Poetry of the Universe, it is approached conceptually; little of the fine points are outlined, though the text is buoyed by thorough endnotes and clear illustrations. I appreciate this stance, as it makes the book appropriate precisely for its target audience (those unconvinced of the beauty of mathematics, unschooled in it, and perhaps phobic of it). However, I could have used more explanation of several points in the text, and, despite my minimal training in mathematics, I would have liked to be walked through the math step by step, rather than being offered a swift analogy, would have helped me.

Most compelling to me is the book's discussion of how abstractions crept into our science and mathematics, which in turn quite literally abstracted our worldview. It is difficult for me to imagine a time when negative numbers did not exist. But indeed, that level of abstraction of numbers didn't exist relatively recently--and it met with strong resistance when they were tentatively proposed. Likewise with imaginary numbers, hyperbolic (non-euclidean) geometry, infinity, and shapes that don't exist in nature but are conceived by scientists. This is a powerful point: concepts that we imagine, that we cull purely from our capacity for irreality, are often are most efficient and purposeful pathway to reality. There seems to me to be a striking correlation here with the concept of faith.

Poetry of the Universe ends abruptly, with only the thinnest nod to a wrap-up. I found that particularly surprising for a book that, indeed, emphasizes poetics. All the same, it is an enjoyable read that filled in more than a few gaps in my understanding of the shape of the cosmos, and thereby deepening my sense of wonder.
