

The Visual Guide To Extra Dimensions: Visualizing The Fourth Dimension, Higher-Dimensional Polytopes, And Curved Hypersurfaces

By Chris McMullen

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AUTHOR: Chris McMullen earned his Ph.D. in particle physics from Oklahoma State University. Dr. McMullen currently teaches physics at Northwestern State University of Louisiana. His background on the geometry and physics of a possible fourth dimension of space includes a half-dozen research papers on the prospects of discovering large extra dimensions at the Large Hadron Collider.

DESCRIPTION: This book takes you on a visual tour of a fourth dimension of space. It is much more visual and conceptual than algebraic, yet it is detailed and technical, with the intention of satisfying the needs of mathematically-minded readers familiar with the fundamentals of algebra, geometry, and graphing. Here is a sample of what you will find:

- A fascinating tour of the second and lower dimensions, which will help to understand the fourth dimension by analogy.
- A chapter dedicated toward imagining what it might be like to live in a hypothetical 4D hyperuniverse. This includes details like 4D wheels with axles, a 4D staircase, and a 4D room.
- Pictures of flat 4D objects called polytopes, like the tesseract, pentachoron, and icositetrachoron. A unique graph of a hecatonicosachoron has 12 of its 120 bounding dodecahedra highlighted to help visualize its complicated structure.
- In-depth discussion of the hypercube, including numerical patterns, rotations, cross sections, and perspective. Watch a tesseract unfold.
- Visual intersections of 15 pairs of perpendicular planes and 6 pairs of orthogonal hyperplanes in 4D space.
- Unique graphs of curved hypersurfaces in 4D space, like the glome, spherinder, cubinder, and hyperparaboloid.

PUZZLES: Several puzzles are included to challenge the reader to contemplate the fourth dimension. Answers are included at the back of the book.

AUDIENCE: This book is highly visual and very conceptual such that anyone

with an appreciation for geometry may understand it, while at the same time including ample detail to also satisfy readers with a strong background in mathematics.

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Editorial Review

From the Author

What Readers Like about Dr. McMullen's Books on the Fourth Dimension

Readers appreciate that these books are dedicated to the geometry (and science) of a fourth dimension of space, without detours into philosophy and religion. (There are philosophical and spiritual books on the subject for readers looking for those topics.) Readers also appreciate the numerous illustrations, including a variety of unique perspectives (like the 4D graphs of curved hypersurfaces in Extra Dimensions Vol. 1, or possible 4D structures from a 4D world). They also appreciate the range and depth of the geometric concepts, without having to navigate through advanced mathematical expressions to enjoy contemplating them.

More books on the fourth dimension by Chris McMullen, Ph.D.

Available in both paperback and Kindle editions.

(1) *A Visual Guide to Extra Dimensions*, Volume 1. A clear, detailed introduction to the basic geometry of a fourth dimension of space. Packed with black-and-white illustrations.
(2) *A Visual Guide to Extra Dimensions*, Volume 2. Gets into the physics of a possible fourth dimension of space. Explores what is meant by an extra compact dimension of space.
(3) *A Visual Introduction to the Fourth Dimension*. Not quite as detailed as the books on Extra Dimensions, but in **full color**. The use of color helps to visualize the fourth dimension.
(4) *Full-Color Illustrations of the Fourth Dimension*, Volume 1. Packed with color illustrations of tesseracts and glomes. Each page includes images and a paragraph of text describing the concept.
(5) *Full-Color Illustrations of the Fourth Dimension*, Volume 2. Packed with color illustrations of tesseracts and glomes. Each page includes images and a paragraph of text describing the concept. Really shows you what it would be like to live in 4D space, from hyperchess to Rubik's tesseract to hyperhomes with hyperfurniture to hyperstairs to hypertelevision to hyperbowling to reading a hyperbook.

Popular science books by Chris McMullen, Ph.D.

- *An Introduction to Basic Astronomy Concepts*.
- *Understand Basic Chemistry Concepts*.
- The author has also published university-level introductory physics textbooks.

Math workbooks by Chris McMullen, Ph.D.

- The *Improve Your Math Fluency* series of math workbooks offers practice with essential math skills in arithmetic, fractions, decimals, percents, algebra, and trigonometry.

About the Author

Chris McMullen is a physics instructor at Northwestern State University of Louisiana. He earned his Ph.D. in phenomenological high-energy physics (particle physics) from Oklahoma State University in 2002. Originally from California, he earned his Master's degree from California State University, Northridge, where his thesis was in the field of electron spin resonance. He has published several papers on the prospects for discovering large superstring-inspired extra dimensions at the Large Hadron Collider, which is his area of specialization. Dr. McMullen published The Visual Guide to Extra Dimensions, Volumes 1 and 2, to share

his passion for the geometry and physics of the fourth dimension. He also wrote these books, Full-Color Illustrations of the Fourth Dimension, Volumes 1 and 2, to help illustrate the geometry of a fourth dimension of space. Dr. McMullen was fascinated with a fourth dimension of space when he first read Rudy Rucker's introduction to the subject during high school. He happened to be working on his Ph.D. in particle physics when Arkani-Hamed, Dimopoulos, and Dvali wrote a famous technical paper motivating large superstring-inspired extra dimensions, which transformed the subject of the fourth dimension from philosophy to a plausibly experimental science. Dr. McMullen has published these general-audience books on the fourth dimension to share his passion for the math and physics of extra dimensions. One of his favorite sayings is: May your contemplation of a fourth dimension of space enhance the dimensionality of your thoughts.

Users Review

From reader reviews:

Cynthia Hughes:

What do you think of book? It is just for students since they are still students or the idea for all people in the world, the particular best subject for that? Only you can be answered for that problem above. Every person has different personality and hobby for each other. Don't to be forced someone or something that they don't would like do that. You must know how great and important the book The Visual Guide To Extra Dimensions: Visualizing The Fourth Dimension, Higher-Dimensional Polytopes, And Curved Hypersurfaces. All type of book is it possible to see on many methods. You can look for the internet sources or other social media.

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Donald Fujita:

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