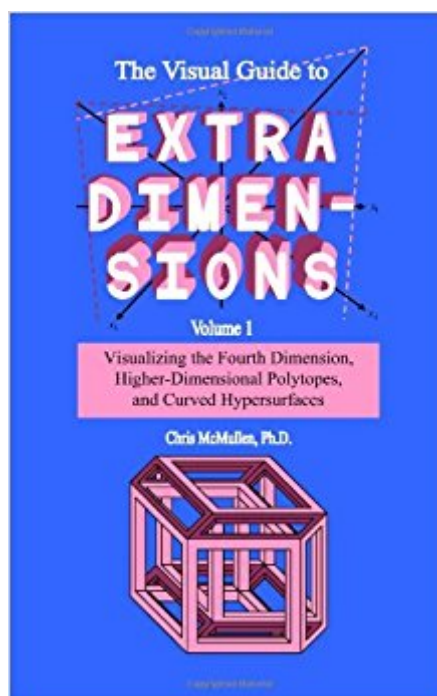




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# The Visual Guide To Extra Dimensions: Visualizing The Fourth Dimension, Higher-Dimensional Polytopes, And Curved Hypersurfaces



## Synopsis

**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.

## Book Information

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## Customer Reviews

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.

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.

Great book! Complex concepts are made easily understandable, and fun. The author encourages investigative thought and abstract thinking. I love how the book builds on itself - you grow with the book. I have a new way to visualize extra-dimensions and have had fun building with pipe cleaners and my kids to try out these different constructs of dimension. This book really pulls you in and keeps you hooked on one concept after another. A nice educational tool and fun read.

McMullen's "Visual Guide" is well-written and engaging. The hard-core math was downplayed in an effort to present the material in a way that most laymen could follow. Extra-dimensional space is still a bit of a visual mind-bender to me, but McMullen provides a good introduction to the topic.

Very good book. If can read the rest of my response- you can then see the fourth dimension

Very nice illustrations. Still very hard to visualize the 4th dimension.

Not the best quality book or layout but the general points are understandable.

These two volumes of "The Visual Guide To Extra Dimensions" are excellent in the field of extra

dimension. Dr Chris McMullen gives a detailed mathematical as well as graphical explanation in discussion of fourth spatial dimension. The two volumes, as mentioned also in the other comment, keep distance from common spiritual discussions and remain fully on scientific grounds. Should fourth dimension gain a serious role in science in future, these two volumes should be considered as a reference book.

This is a very good introduction to four dimensions. I've read about 4D before, and very much enjoyed it. However, the depths it goes into are astoundingly deep, and consequently may not be the best for total beginners. For beginners, I would more strongly recommend the chapter on 4D in Things to Make and Do in the Fourth Dimension. However, this is still a good book for those slightly acquainted with the subject.

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