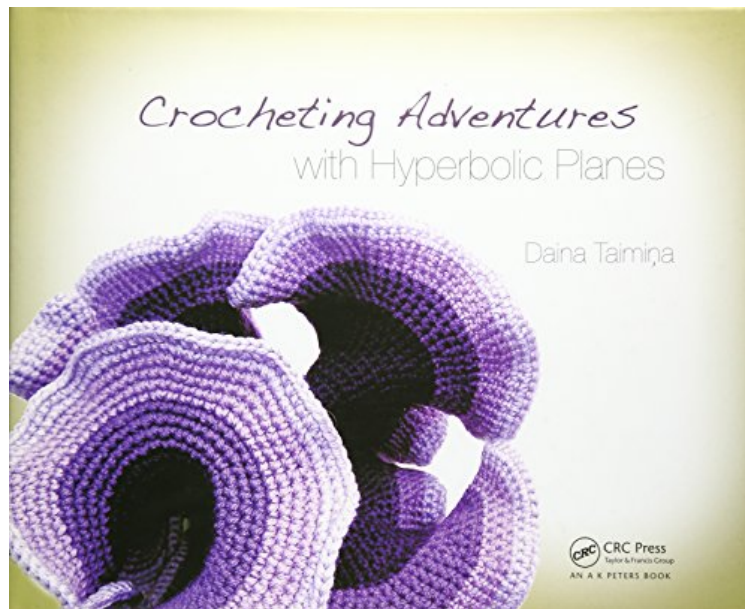



Crocheting Adventures with Hyperbolic Planes

Daina Taimina

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Winner of the Euler Book Prize -- Awarded by the Mathematical Association of America With more than 200 full color photographs, this non-traditional, tactile introduction to non-Euclidean geometries also covers early development of geometry and connections between geometry, art, nature, and sciences. For the crafter or would-be crafter, there are detailed instructions for how to crochet various geometric models and how to use them in explorations. From the Foreword by William Thurston: "These models have a fascination far beyond their visual appearance. As illustrated in the book, there is actually negative curvature and hyperbolic geometry all around us, but people generally see it without seeing it. You will develop an entirely new understanding by actually following the simple instructions and crocheting! The models are deceptively interesting. Perhaps you will come up with your own variations and ideas. In

any case, I hope this book gives you pause for thought and changes your way of thinking about mathematics."

2012 Euler Book Prize Winner...elegant,novel approach... that is perfectly capable of standing on its mathematical feet as a clear, rigorous, and beautifully illustrated introduction to hyperbolic geometry. It is truly a book where art, craft, science, and mathematics come together in perfect harmony.--MAA, December 2011 This book is richly illustrated with photographs and colored illustrations and it has been produced on high-quality paper. It would be a useful addition to the library of a school or university.--Gazette-Australia, May 2011 Daina's crochet models break through the austere, formal stereotype of mathematics and present a path to a whole-brain understanding of a beautiful cluster of simple and significant ideas. The book helps to change the way of thinking about mathematics - an art of human understanding!--Corina Mohorianu, Zentralblatt MATH, September 2009 The models illustrated in this book are prime examples of art influencing mathematics. Daina provides the necessary instructions for even novices to crochet and create hyperbolic models of their own.--Swami Swaminathan, Canadian Mathematical Society Notes, October 2009 It lays out the fundamental knowledge for appreciation of tactile hyperbolic manifolds cautiously and accessibly. ...an enjoyable read for a general audience.--David Jacob Wildstrom, Mathematical s, December 2009 2012 Euler Book Prize Winner By bringing crochet technology to the subject, she makes it easy and fun to construct hyperbolic surfaces that vividly illustrate essential features of non-Euclidean geometry. The book is elegant, from both a visual and mathematical point of view. a novel approach to geometry that has brought a whole new audience to mathematics. In this respect it has greater outreach potential than any book we have previously considered. But it is much more than that; it is perfectly capable of standing on its mathematical feet as a clear, rigorous, and beautifully illustrated introduction to hyperbolic geometry. It is truly a book where art, craft, science, and mathematics come together in perfect harmony. MAA, December 2011 This book is richly illustrated with photographs and colored illustrations and it has been produced on high-quality paper. It would be a useful addition to the library of a school or university. Gazette-Australia, May 2011 Non-Euclidean or hyperbolic geometry is a topic of great mystery (for a lot of people) and very important in mathematics. Now, Daina's crochet models break through the austere, formal stereotype of mathematics and present a path to a whole-brain understanding of a beautiful cluster of simple and significant ideas. These crochet models have a fascination far beyond their visual appearance (a lot of beautiful pictures are in this book!) ... Following the simple instructions and crocheting the reader will develop a new understanding of the hyperbolic geometry which is all around us. The book helps to change the way of thinking about mathematics - an art of human understanding! Corina Mohorianu, Zentralblatt MATH, September 2009 The models illustrated in this book are prime examples of art influencing mathematics. Daina provides the necessary instructions for even novices to crochet and create hyperbolic models of their own. Swami Swaminathan, Canadian Mathematical Society Notes, October 2009 Daina Taimina's hyperbolic-manifold crochet is a durable and easy-to-construct model useful for demonstrating the features of hyperbolic geometry. ... The book... [has] a greater grounding in historical and scientific context, and in a style more accessible to a lay audience. It lays out the fundamental knowledge for appreciation of tactile hyperbolic manifolds cautiously and accessibly. ... One of the benefits of the crocheted hyperbolic manifold as a manipulable is its ease of creation. Even for readers who have no familiarity with crochet, the instructions for producing a simple manifold are lucid, concise, and easily followed. ... it remains an enjoyable read for a general audience. David Jacob Wildstrom, Mathematical s, December 2009 Taimina's book is not only a coffee-table book of the highest quality, but it is also, first and foremost, a book about mathematics. ... I highly recommend this book because of its unique combination of a historical account of hyperbolic geometry with the use of crochet as a tool for its understanding. Finally, we have a beautiful coffee-table book that uses visual delight to emphasise rather than hide serious mathematics. Readers with little knowledge of geometry or mathematics in general may find it hard to understand everything, but as Bill Thurston writes in his foreword: I hope this book gives you pause for thought and changes your way of thinking about mathematics. Hinke Osinga, The London Mathematical Society, December 2009 This book takes the simple but highly imaginative step of trying to show Einstein's fourth dimension by writing it into a knitting pattern. The results are extraordinarily beautiful, closely resembling coral reefs. It's a great coffee table book and conversation starter ... Geoff Robbins, Cool Science Books Blog, February 2010 Daina Taimina's crocheted pieces are works of art that have been photographed in settings that emphasize their artistic beauty and remind us that hyperbolic shapes are familiar and occur naturally around us. ... I highly recommend this book.... Journal of Mathematics and the Arts, March 2010 I must say that the title of Daina Taimina's book is a bit misleading, since it's far from being only about hyperbolic planes and crocheting. It does indeed contain simple and beautifully illustrated explanations of those two subjects, along with scholarly histories of both of them. However, it does the same for many other parts of art and science and mathematics, and all this in a beautifully simple and simply beautiful book. John Conway, Princeton University, February 2009 Crocheting Adventures with Hyperbolic Planes is a work of gargantuan proportions whose influence will be measured for decades to come. Delightfully brilliant yet down to earth, Daina Taimina brings together the best aspects of "right brain" imagination and risk-taking with "left brain" facts, practicality, and pattern perception, creating a win-win that everyone will enjoy. Lavish with photos throughout the book, the art is creatively placed in nature and the math schematics are crisp and clear. Daina's compendium of crochet

history is the best I have seen, and this book is a must for the bookshelves of crochet and math students alike. Gwen Blakley Kinsler, Crochet Guild of America, February 2009 Taimina's beautiful crochet works hooked me into unraveling her all of a piece book in one sitting. I realized that when my father's mother introduced me to crochet (I was five or so) she really taught me intrinsic algorithms for generating spherical, plane, and hyperbolic geometries. Daina Taimina has wrapt my earliest memories in glorious colors, intricate histories, and marvelous theorems. Helaman Ferguson, February 2009 The women of Latvia are making a coral reef, with help from Daina Taimina, inventor of hyperbolic crochet. The Latvian Reef Project was initiated by Tija Viksna, a fiber artist and owner of Gallery Consentio, a small craft store and gallery in the Latvian capital, Riga. On January 12, 2009, the Latvian Reef got under way seriously with a Hyperbolic Crochet Day held at the Musturs (Latvian for "pattern") Knitting Club. With help from Dr Taimina, Tija had prepared a short introduction to the Reef Project and a helpful handout flier for participants. It was the first in a series of workshops that will be held throughout the year, leading up to the debut of the Latvian Reef in Gallery Consentio in August. . . . Daina Taimina specially made a hyperbolic crochet homage to the Baltic Sea, entitled "Land and Sea," as a contribution to the Latvian Reef, to which Dr Taimina is acting as an advisor, supporter, and inspirer. The Latvian Reef, May 2009 It all amounts to an eye- and brain-opening journey connecting the history of ideas to their natural sources and practical applications. Lots to ponder. It takes a mind like Daina's to bring material like this together, and to convey it in scuptures that sit tranquilly in the natural landscape. Dora Ohrenstein, Crochet Insider, June 2009 Winner of the 2009 Diagram Prize, having received the majority of the public vote for the oddest titled book of the year at thebookseller.com The Bookseller.com, March 2010 This artfully created book belongs on a mathematics classroom coffee table. . . . Those interested in crocheting or hyperbolic geometry will certainly find something interesting here. If you know someone who likes both, you have just found the perfect gift! Keith R. Leatham, Brigham Young University From the Author Writing this book I kept in mind that "a picture is worth 1000 words" - therefore 300 pictures in the book with expanded captures. So it is possible to read this book as a picture book. This is what children like to do. Then next level in this book is the text - if some of the pictures have caught the interest of a reader, then it is possible to get more explanation by reading the text close to the picture. For those who really want to know more and deeper - look in endnotes where I put a lot of references for further reading. The idea to write this book grew out of many questions I was asked after my talks. Hope I have answered many of these questions. And I keep waiting for new ones! From the Inside Flap "These models have a fascination far beyond their visual appearance. As illustrated in the book, there is actually negative curvature and hyperbolic geometry all around us, but people generally see it without seeing it. You will develop an entirely new understanding by actually folliwng the simple instructions and crocheting! The models are deceptively interesting. Perhaps you will come up with your own variations and ideas. In any case, I hope this book gives you pause for thought and changes your way of thinking about mathematics." - From the Foreword by William Thurston