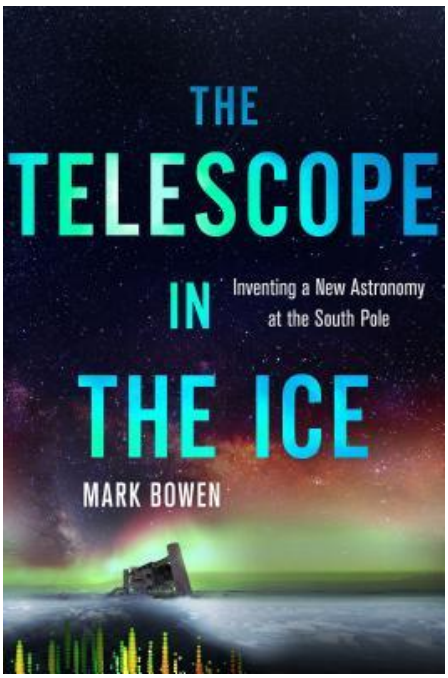

The Telescope in the Ice: Inventing a New Astronomy at the South Pole

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****One of *Forbes'* 10 Best Astronomy, Physics And Mathematics Books of 2017****

"Richly intimate, drawing on Mr. Bowen's long involvement with the IceCube project and its participants...Human emotions are palpable in the author's you-are-there framing." --*The Wall Street Journal*

Alan Lightman: "A masterpiece of storytelling, bringing to life in rich detail not only the world of science but also the men and women who inhabit that world."

George Musser, author of *Spooky Action at a Distance:* "If you want to know how science really works, this is your book."

Sheldon Lee Glashow, 1979 Nobel Laureate in Physics: "A page-turning chronicle of the decades-long struggle by hundreds of physicists and engineers to create a frontier laboratory for the pursuit of the new discipline of neutrino astronomy."

The IceCube Observatory has been called the "weirdest" of the seven wonders of modern astronomy by *Scientific American*. In *The Telescope in the Ice,* Mark Bowen tells the amazing story of the people who built the instrument and the science involved.

Located near the U. S. Amundsen-Scott Research Station at the geographic South Pole, IceCube is unlike most telescopes in that it is not designed to detect light. It employs a cubic kilometer of diamond-clear ice, more than a mile beneath the surface, to detect an elementary particle known as the neutrino. In 2010, it detected the first extraterrestrial high-energy neutrinos from outer space and thus gave birth to a new field of astronomy.

IceCube is also the largest particle physics detector ever built. Its scientific goals span not only astrophysics and cosmology but also pure particle physics. And since the neutrino is one of the strangest and least understood of the known elementary particles, this is fertile ground. Neutrino physics is perhaps the most active field in particle physics today, and IceCube is at the forefront.

The Telescope in the Ice is, ultimately, a book about people and the thrill of the chase: the struggle to understand the neutrino and the pioneers and inventors of neutrino astronomy. It is a success story.

The Telescope in the Ice: Inventing a New Astronomy at the South Pole Details

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Genre : Science, Nonfiction, Physics, Astronomy

From Reader Review The Telescope in the Ice: Inventing a New Astronomy at the South Pole for online ebook

Sarah Christianson says

I found this book to be quite dry -to be expected considering the genre. However, I very much enjoyed learning about what happened behind the scenes of the IceCube Observatory. All the stress, frustration, and drama the scientists have to deal with, has heavily attributed to making this book worthwhile. It reminds us that these people aren't just walking talking computers, they're people with families, emotions, and hobbies. I appreciate that the author put a timeline of the events in the back of the book -very helpful.

Chad says

Mark Bowen is a great writer. In this book he manages quite a few very difficult tasks with aplomb. He makes difficult scientific concepts approachable to those who may not share a scientific background. He keeps a cast of dozens of players lined up and presented in a way that the reader can mostly keep track of them. He takes a story that developed over decades, or, if you include backstory, over a full century, and narrates it in a way that makes it engaging and readable. He presents the triumphs as well as the ugly side of humans in a way that feels mostly fair to all individuals, though he definitely forms his own opinions, good and bad, about some of them. He highlights the raw and gritty sides of science, where construction realities conflict with engineering, where engineering problems limit the usefulness of experimentation, where experimentation concerns trump scientific theory, and where scientists find they have to play politics in order to do their jobs. There is often a long, difficult road from taking a scientific theory and turning it into a measurement, and that journey is illustrated amazingly in this book.

The idea of IceCube, a neutrino “telescope” that occupies the volume of a cubic kilometer buried more than a kilometer beneath the ice at the South Pole but pointed toward the sky above the North Pole, at first sounds like the stuff of science fiction. Who could have thought of that? Who would have the audacity to attempt to construct it? And who would actually go to the South Pole and engage in that type of effort at such environmental extremes?

I’m completely in awe of these people and the contributions they have made toward understanding the universe. I’m so happy that our society sometimes chooses to spend its money on people and projects like this. (Just a strange thought: the IceCube telescope cost less than some movies. To be fair, fewer people know about IceCube than know about those more-expensive movies.)

The book is pretty well done. I think it could have used a stronger editor: the end of the book seemed a bit meandering, and there were a dozen or so places where an extra word seemed to have crept into the manuscript. I loved that the book had a glossary of terms and a timeline of events at the back of the book, in addition to the more customary end-notes, bibliography, and index. The end-notes actually have some interesting information in them, but none of them were notated in the main text, so I didn’t discover them until I was about two-thirds through the book. And it includes photographs (yeah, only in black and white, bummer) so that the reader can get a bit of an idea of the people and the structures and the machinery involved.

I wouldn’t necessarily recommend this book to everyone. It can be a bit dry at times. But if you are

interested in both science and history, this book is a fabulous choice.

Scott Kardel says

Mark Bowen's The Telescope in the Ice is a great history of AMANDA and its successor IceCube, two projects built at Earth's South Pole to detect elusive subatomic particles known as neutrinos. It's a very enjoyable read for those interested in science that delves into the trials and tribulations in building these deep under-the-ice observatories.

Ben Thompson says

vivid account of the creation of an amazing project, full of characters and accounts of how "big science" happens

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Read Ng says

It has been a very long time since I studied particle physics. I thought it was a bit confusing at the time. Now that I have read this book, I understand why.

The first part covers the history of developing modern particle physics theory. I was surprised at just how short a time ago modern science was working on these theories. This may be part of the reason I had a difficult time understanding some of imp early education. The science I was being exposed to was (and continues to be) still under development. Oh, we know more, but there is always more to learn. The history puts my early education into a different perspective for me.

I was very excited to read the mechanics of construction of an ice telescope. It must be the engineer in my that wants to build to solve a problem. I found this telling to be exciting. I am such a geek.

This was a GoodReads. I think those geeks out there will really enjoy it also.

Jordan says

Come for the amateur interest in astronomy, stay for the lectures on particle physics, which is to say, this book isn’t at all what I expected when I picked it up at the library.

This is a fascinating story on the development of the theories and questions that led to the building of two telescopes in the ice of the South Pole. The science is complex but presented in an accessible manner, and the stories of the people involved - from funding to engineering to management to “actual” science - are well told.

Jon Stone says

Received an advanced copy of this book in exchange for an honest review. I have to start by saying that if advanced particle physics shuns you away from a read like this, you need to forget that misconception and give this a shot. It’s written in a manner that allows someone with only a basic knowledge of particle physics to understand the history of the field, and where it’s going. It doesn’t make you feel dumb...it defines concepts and principals with enough rigor that you get it, but doesn’t push you through a crash course in the subject from MIT. I really enjoyed this book. I didn’t expect to like it so much honestly, but I will buy a hard copy for myself.

Maureen says

This is a very interesting book about a group of unique characters who decide to turn the South Pole into a giant telescopic lens. This book doesn't read like general fiction. It reads a bit like a history book and is packed with fascinating facts. The author is a physicist as well as a writer, so the story has strong scientific elements embedded within. The characters are pretty quirky which makes this book enjoyable if you're more of a fiction than science book fan. I also felt like I learned a lot from reading this. I received this book as a Goodreads Giveaway in exchange for a review -- and I'm trying not to give away any spoilers. Overall, worthwhile reading.

Brian says

I enjoyed the book, but it felt longer than it needed to be. The first several chapters that cover the history of the neutrino itself could have been removed or condensed considerably. And the later chapters, while showing the author's access to the participants, could have also been reduced as well. As someone who studied astrophysics, the book would sometimes put me to sleep trying to read it.

Matthew Fitzgerald says

It would take a truly gifted writer to carefully balance the alchemical mixture of history, physics, engineering and cutting-edge science necessary to tell the story that's waiting to be told in this book, to distill that heady neutrino soup into book palatable to the average reader. Sadly, this book and Bowen's obsessive attention to detail is not up to the task, and it left this reader slogging through chapter after chapter of details waiting for the magic of this crazy new kind of science to kick in. It simply never did.

Read the book's introduction. It's perhaps the best distillation of what the author has to say, and what the reader needs to learn, in the entire book. Nowhere in the following 400+ pages does Bowen surpass the clarity or concision of this intro. It's brisk, it's carefully worded, it's devoid of needless detail, and it orbits a carefully honed core message of what this is all about. It reads like a good magazine piece, in fact. The rest of the book is nowhere near as focused, and it's to the books detriment, because the whole experience suffers as a result.

Bowen could be forgiven for the seemingly endless details he conjures up for his story, the academic turf

wars and ego expositions and post-doc assignments and such. We know he was deeply embedded with many of these people for years as they tried, failed, and tried again to make neutrino astronomy happen. Some of them are certainly geniuses, and Bowen's own PhD in physics occasionally helps the reader focus on what's happening by giving some short-and-sweet explainers of the more obtuse physics concepts. But far too often in this book, all that extra time and detail simply bloats the whole story, causes the narrative to lose focus, taking endless discursive detours that don't add much and ultimately make for a very laborious read. The math and science don't get in the way of enjoying this story; it's the copious detail (which, I have to add, hardly enrich the reader's understanding of the science and experiments going on) that sink it.

If Bowen could have taken an editorial chainsaw to this book, and turned in a manuscript half as long but as tight and clear as his introduction, this could have be a much better book. As it stands, unless you really want to know the gory details who who's studying what where and with whom, who's pessimism is propelling another round of tests, the goings-on of endless conferences and projects and research papers, and the build-up and fallout to various grants, proposals, and research studies, this book will leave you sorely wanting. There's simply too little of anything resembling a core narrative to keep anyone but the most hardcore physics nerd (or physicist) engaged.

The neutrino telescope at the South Pole is in the ice, but for all the unnecessary baggage in this book, it'll leave the reader just as cold.

Richard says

Particle physics, astrophysics, astronomy. These subjects would generally present a daunting read to a layman. Not so, in the case of Mark Bowen's "The Telescope in the Ice". Part particle physics tutorial, part scientific soap opera, and part South Pole adventure, Bowen places the reader smack in the middle of this unlikely tale so adroitly that by time you finish the book, you feel as if you are now an expert on the subject. Quite simply, this work is a masterpiece, and no, this is not a hyperbolic statement. Breathing literary life into such a dry and arcane subject is a difficult task, but Bowen does so in magnificent fashion, completely immersing the reader in this extraordinary tale by demystifying the science, and going to great lengths to make flesh and blood people out of all the major players. I honestly can't imagine how this unique subject could have been presented in a more comprehensible and interesting manner, and I extend many thanks to Mark Bowen for making a subject that is generally over everyone's head so accessible.

Sean says

I like reading science-topic books that expect the reader to already like/know science. This author dives right into whatever physics topic is necessary to explain the latest findings of the Telescope In The Ice. The explanations were fantastic without needing equations. I liked the physics-strong first half of the book. The book gives details that feel like the author was consulting video from a go-pro camera that recorded the events. I appreciated all the research and notes that must have been reviewed to get to this level. The later half of the book was a little strong on all the politics going on behind the scenes of the personalities within the project. But this frank earnestness needs to be told, as this is all part of the process of getting funding. I finished the book wanting to join their team in Antarctica! The leadership/attitude of Francis Halzen sounds like the kind of person that really can inspire "we would do it even if we were not paid for it".

Kathleen says

I am not certain of the intended audience for this book. (My last course in physics was as an undergraduate.) The book does not "talk down" to the reader. In fact, it is comprehensible and fascinating. It is also quite dense and not as humorous as some popular scientific works ---for example, Sam Kean's writing. I'm not saying it should be amusing, just mentioning the fact. The author quotes Robert Millikan, "Physicists are more interesting than physics," and Bowen writes quite a bit about the lives, personalities, and even appearance of the scientists involved. I enjoyed this but don't know if everyone will.

The book traces the history of the neutrino from the appearance of the idea in 1930 through the attempts to detect it. The struggle and journey to build the IceCube Neutrino Observatory in Antarctica comprises much of the exciting story. Its success is almost a postscript.

Peter Mcloughlin says

There is a telescope made of fiber optic tubes and detectors buried in the Antarctic ice called Ice Cube. It detects neutrinos (ghostly particles that pass through the earth with ease). It brings a new set of eyes to astronomy by detecting neutrinos from stellar cataclysms like collisions of neutron stars, supernova, and gamma-ray bursts. It opens a new spectrum to observe the skies. This book is about the science and the scientists who made this happen.

Adam Ferrell says

This book soars past my expectations in the following ways:

As history of science - tracing the development of the neutrino from Wolfgang Pauli and Niels Bohr's handwritten disagreements on quantum mechanics to the latest data from the South Pole's neutrino telescope, with photographs.

As biography - not of an individual but of an experiment, the myriad researchers, committees, alterations, and influences it must navigate from idea to instantiation to pillar of cosmology.

As narrative - Is the science correct, is the engineering feasible, will it get funded... are competing teams sabotaging the progress?? (Yes!) Bowen does a terrific job showing the project as a prize-fighter, bobbing and weaving out of the way of obstacles.

I wrote my Master's (in History) on the creation (not discovery!) of the neutrino as a tool to solve spin and conservation of energy questions during the development of quantum mechanics so I approached this text with a scientifically and historically skeptical eye. I am floored by Mark's achievement here - he does justice to the people, the science, and the telescope. It's terrifically entertaining and Mark puts a marvelous light on humanity and our frequently halting and sometimes inspired search for the truth.