

# What Are Stars

## What are the Stars?

The outstanding question in astronomy at the turn of the twentieth century was: What are the stars and why are they as they are? In this volume, the story of how the answer to this fundamental question was unravelled is narrated in an informal style, with emphasis on the underlying physics. This book discusses recent developments in the context of discussing the nature of the stars, their stability and the source of the energy they radiate. Reading this book will get young students excited about the presently unfolding revolution in astronomy and the challenges that await them in the world of physics, engineering and technology. General readers will also find the book appealing for its highly accessible narrative of the physics of stars.

## What are Germs?

Very First Questions and Answers is a new series to sit below First Questions and Answers, aimed at pre-school children and with more of a picture book approach. What are Germs? is the second title in the series, which follows on from What is Poo which sold over 100,000 copies worldwide since publication in November 2016. A very simple illustrated explanation of germs and hygiene.

## What We See in the Stars

What We See in the Stars Kelsey Oseid is a richly illustrated guide to the myths, histories, and science of the celestial bodies of our solar system, with stories and information about constellations, planets, comets, the northern lights, and more. Combining art, mythology, and science, What We See in the Stars is a tour of the night sky through more than a hundred magical pieces of original art, all accompanied by text that weaves related legends and lore with scientific facts. This beautifully packaged book covers the night sky's most brilliant features such as constellations, the moon, the bright stars, and the visible planets, as well as less familiar celestial phenomena like the outer planets, nebulae, and deep space. Adults seeking to recapture the magic of youthful stargazing, younger readers interested in learning about natural history and outer space, and those who appreciate beautiful, hand-painted art will all delight in this charming book.

## What Stars Are Made Of

A New Scientist Book of the Year A Physics Today Book of the Year A Science News Book of the Year The history of science is replete with women getting little notice for their groundbreaking discoveries. Cecilia Payne-Gaposchkin, a tireless innovator who correctly theorized the substance of stars, was one of them. It was not easy being a woman of ambition in early twentieth-century England, much less one who wished to be a scientist. Cecilia Payne-Gaposchkin overcame prodigious obstacles to become a woman of many firsts: the first to receive a PhD in astronomy from Radcliffe College, the first promoted to full professor at Harvard, the first to head a department there. And, in what has been called “the most brilliant PhD thesis ever written in astronomy,” she was the first to describe what stars are made of. Payne-Gaposchkin lived in a society that did not know what to make of a determined schoolgirl who wanted to know everything. She was derided in college and refused a degree. As a graduate student, she faced formidable skepticism. Revolutionary ideas rarely enjoy instantaneous acceptance, but the learned men of the astronomical community found hers especially hard to take seriously. Though welcomed at the Harvard College Observatory, she worked for years without recognition or status. Still, she accomplished what every scientist yearns for: discovery. She revealed the atomic composition of stars—only to be told that her conclusions were wrong by the very man who would later show her to be correct. In What Stars Are Made Of, Donovan

Moore brings this remarkable woman to life through extensive archival research, family interviews, and photographs. Moore retraces Payne-Gaposchkin's steps with visits to cramped observatories and nighttime bicycle rides through the streets of Cambridge, England. The result is a story of devotion and tenacity that speaks powerfully to our own time.

## **The History of Our Universe in 21 Stars**

Previously published as *A History of the Universe in 21 Stars*. 'REVISED AND UPDATED \_\_\_\_' 'A wonderful book about the science, history and mythology of 21 stars (and 3 impostors).' Dr David Whitehouse Look up on a clear evening, and you'll see thousands of stars shining in the night sky, each telling a story of their own. With star maps to help easily identify key celestial bodies, astronomer Giles Sparrow takes 21 stars (and three impostors) to look at what each pinprick of light can tell us about the birth, life and death of our universe. From red giants to supernovae and from stellar cities to our own Sun, *The History of Our Universe in 21 Stars* shows how the lights we see in the sky can help us unravel the mysteries of the cosmos. 'Beautifully written and extremely accessible ... It's extremely difficult to put down! Gemma Lavender

## **Massive Stars in Starbursts**

This book reviews the importance of massive stars in several areas of astrophysics. Massive stars are objects that are 10-100 times the mass of our Sun. Above ten solar masses, loss through stellar winds begins to have a major impact on the evolution of a star. The upper limit of 100 solar masses is derived from observations. Significant progress has now been achieved in massive star research. New models, along with high quality observations, have improved our understanding of the formation, structure, atmosphere, and evolution of these massive objects. They are formed in violent bursts of star formation and are probably related to the phenomena observed in active galactic nuclei. The workshop at the Space Telescope Science Institute examined the interplay between the astrophysics of massive stars and their location in extragalactic starburst regions. There are eighteen chapters by leading researchers. Each has been carefully edited to ensure that the book is a comprehensive introduction to the theory and observation of massive stars in starburst regions.

## **How Do Stars Die?**

Have you ever looked up into the sky and thought about the names of star groupings and where they came from? Through glossy pages situated in an easy-to-read layout, *What Star* gives in-depth explanations of star patterns and their history. Constellations are groupings of stars that resemble a pattern when an observer looks up into the night sky. Ancient civilizations designated 88 constellations, giving them names corresponding to mythological objects or individuals that they felt the star patterns represented. Almost all the constellations have some legend associated with them. Most of these are mythological figures who were given a place in the sky by Greek gods. These include King Cepheus, his wife Cassiopeia, and daughter Andromeda, Hercules, Perseus, Pegasus, and more. The International Astronomical Union began to recognize these 88 constellations in 1922, based on the 48 listed by Ptolemy in his *Almagest*, written in the 2nd century. Ptolemy's catalogue is informed by Exodorus of Cnidus, a Greek astronomer of the 4th century BC who introduced early Babylonian astronomy to the Hellenistic culture. *What Star* gives an easy reference to each constellation in our night's sky, both historical constellations and more modern constellations, their location, their form, their history and the mythology surrounding them.

## **What Star?**

A Mighty Girl Best Book of 2020! From debut author Sarah Allen comes a pitch-perfect, heartwarming middle grade novel about growing up, finding yourself, and loving people with everything you're made of. Twelve-year-old Libby Monroe is great at science, being optimistic, and talking to her famous, accomplished friends (okay, maybe that last one is only in her head). She's not great at playing piano, sitting still, or

figuring out how to say the right thing at the right time in real life. Libby was born with Turner Syndrome, and that makes some things hard. But she has lots of people who love her, and that makes her pretty lucky. When her big sister Nonny tells her she's pregnant, Libby is thrilled—but worried. Nonny and her husband are in a financial black hole, and Libby knows that babies aren't always born healthy. So she strikes a deal with the universe: She'll enter a contest with a project about Cecilia Payne, the first person to discover what stars are made of. If she wins the grand prize and gives all that money to Nonny's family, then the baby will be perfect. Does she have what it takes to care for the sister that has always cared for her? And what will it take for the universe to notice?

## **What Stars Are Made Of**

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## **Star-Names and Their Meanings**

Before GPS, before the compass, and even before cartography, humankind was navigating. Now this singular guide helps us rediscover what our ancestors long understood—that a windswept tree, the depth of a puddle, or a trill of birdsong can help us find our way, if we know what to look and listen for. Adventurer and navigation expert Tristan Gooley unlocks the directional clues hidden in the sun, moon, stars, clouds, weather patterns, lengthening shadows, changing tides, plant growth, and the habits of wildlife. Rich with navigational anecdotes collected across ages, continents, and cultures, *The Natural Navigator* will help keep you on course and open your eyes to the wonders, large and small, of the natural world.

## **The Natural Navigator**

'Understanding Stellar Evolution' is based on a series of graduate-level courses taught at the University of Washington since 2004, and is written for physics and astronomy students and for anyone with a physics background who is interested in stars. It describes the structure and evolution of stars, with emphasis on the basic physical principles and the interplay between the different processes inside stars such as nuclear reactions, energy transport, chemical mixing, pulsation, mass loss, and rotation. Based on these principles, the evolution of low- and high-mass stars is explained from their formation to their death. In addition to homework exercises for each chapter, the text contains a large number of questions that are meant to stimulate the understanding of the physical principles. An extensive set of accompanying lecture slides is available for teachers in both Keynote(R) and PowerPoint(R) formats.

## **Understanding Stellar Evolution**

'Krumholz has a strong writing style, didactic to be sure, but also fairly conversational within the limits of the material. While hardly casual reading, this text would be a good resource for a stellar astrophysicist, or any individual seeking to become one.'  
CHOICE This book provides a modern introduction to the study of star formation, at a level suitable for graduate students or advanced undergraduates in astrophysics. The first third of the book provides a review of the observational phenomenology and then the basic physical processes that are important for star formation. The remainder then discusses the major observational results and theoretical models for star formation on scales from galactic down to planetary. The book includes recommendations for complementary reading from the research literature, as well as five problem sets with solutions.

## Star Formation

Designed to meet the needs of both general readers and students, The Solar System Singles cover all major topics on Earth's solar system as it is understood from the latest perspectives. Each of the 35-45 essays begins with standard, ready-reference information. An "Overview" section details basic information about the subject and discusses the main facts about the topic. "Knowledge Gained/Methods of Study/Applications" details how the topic is investigated, what scientific knowledge we have accumulated, or the uses of the knowledge we have gained.

## Study of the Universe

In her second book, award-winning actor Divya Dutta recounts her experiences with some of the stalwarts of Bollywood who played a significant role in her film journey. She talks about the inspirations they have proved to be in her life through what they did for her and what she learnt from them. From winning an acting scholarship with Sonali Bendre to sharing a vanity van with Juhi Chawla and her bond with Shabana Azmi, she tells it all with rare candour and humility. Her interactions with stars like Irfan Khan, Amitabh Bachchan, Rakeysh Mehra and many more shows not only the deep impact they had on her life but also how that defined the trajectory of her own career.

## The Stars in My Sky

"... Concise explanations and descriptions - easily read and readily understood - of what we know of the chain of events and processes that connect the Sun to the Earth, with special emphasis on space weather and Sun-Climate."--Dear Reader.

## The Sun, the Earth, and Near-earth Space

From #1 New York Times bestselling author Dava Sobel, the "inspiring" (People), little-known true story of women's landmark contributions to astronomy A New York Times Book Review Notable Book Named one of the best books of the year by NPR, The Economist, Smithsonian, Nature, and NPR's Science Friday Nominated for the PEN/E.O. Wilson Literary Science Writing Award "A joy to read." —The Wall Street Journal In the mid-nineteenth century, the Harvard College Observatory began employing women as calculators, or "human computers," to interpret the observations their male counterparts made via telescope each night. At the outset this group included the wives, sisters, and daughters of the resident astronomers, but soon the female corps included graduates of the new women's colleges—Vassar, Wellesley, and Smith. As photography transformed the practice of astronomy, the ladies turned from computation to studying the stars captured nightly on glass photographic plates. The "glass universe" of half a million plates that Harvard amassed over the ensuing decades—through the generous support of Mrs. Anna Palmer Draper, the widow of a pioneer in stellar photography—enabled the women to make extraordinary discoveries that attracted worldwide acclaim. They helped discern what stars were made of, divided the stars into meaningful categories for further research, and found a way to measure distances across space by starlight. Their ranks included Williamina Fleming, a Scottish woman originally hired as a maid who went on to identify ten novae and more than three hundred variable stars; Annie Jump Cannon, who designed a stellar classification system that was adopted by astronomers the world over and is still in use; and Dr. Cecilia Helena Payne, who in 1956 became the first ever woman professor of astronomy at Harvard—and Harvard's first female department chair. Elegantly written and enriched by excerpts from letters, diaries, and memoirs, The Glass Universe is the hidden history of the women whose contributions to the burgeoning field of astronomy forever changed our understanding of the stars and our place in the universe.

## The Glass Universe

Starting from Newton's times this follow-up to the author's Springer book "Our Place in the Universe -

Understanding Fundamental Astronomy from Ancient Discoveries” addresses the question of “our place in the Universe” from astronomical, physical, chemical, biological, philosophical and social perspectives. Using the history of astronomy to illustrate the process of discovery, the emphasis is on the description of the process of how we learned and on the exploration of the impacts of discoveries rather than on the presentation of facts. Thus readers are informed of the influence of science on a broad scale. Unlike the traditional way of teaching science, in this book, the author begins by describing the observations and then discusses various attempts to find answers (including unsuccessful ones). The goal is to help students develop a better appreciation of the scientific process and learn from this process to tackle real-life problems.

## **Our Place in the Universe - II**

Every atom in our bodies has an extraordinary history. Our blood, our food, our books, our clothes - everything contains atoms forged in blistering furnaces deep inside stars, which were blown into space by those stars' cataclysmic explosions and deaths. From red giants - stars so enormous they could engulf a million suns - to supernova explosions - the most violent events in the universe - the birth of every atom was marked by cosmic events on an enormous scale, against a backdrop of unimaginable heat and cold, brightness and darkness, space and time. But how did we discover the astonishing truth about our cosmic origins? *THE MAGIC FURNACE* is Marcus Chown's extraordinary account of how scientists unravelled the mystery of atoms, and helped to explain the dawn of life. It is one of the greatest detective stories in the history of science. In fact, it is two puzzles intertwined, for the stars contain the key to unlocking the secret of atoms, and the atoms the solution to the secret of stars.

## **The Magic Furnace**

Until the publication of the first edition of 'Star Maps,' books were either general histories of astronomy using examples of antiquarian celestial maps as illustrations, or catalogs of celestial atlases that failed to trace the flow of sky map development over time. The second edition focuses on the development of contemporary views of the heavens and advances in map-making. It captures the beauty and awe of the heavens through images from antiquarian celestial prints and star atlases. This book uniquely combines a number of features: 1) the history of celestial cartography is traced from ancient to modern times; 2) this development is integrated with contemporary cosmological systems; 3) the artistry of sky maps is shown using beautiful color images from actual celestial atlases and prints; 4) each illustration is accompanied by a legend explaining what is being shown; and 5) the text is written for the lay reader based on the author's experience with writing articles for amateur astronomy and map collector magazines. This updated second edition of 'Star Maps' contains over 50 new pages of text and 44 new images (16 in color), including completely new sections on celestial frontispieces, deep-sky objects, playing card maps, additional cartographers, and modern computerized star maps. There is also expanded material about celestial globes, volvelles, telescopes, and planets and asteroids.

## **Star Maps**

Doing well with money isn't necessarily about what you know. It's about how you behave. And behavior is hard to teach, even to really smart people. Money—investing, personal finance, and business decisions—is typically taught as a math-based field, where data and formulas tell us exactly what to do. But in the real world people don't make financial decisions on a spreadsheet. They make them at the dinner table, or in a meeting room, where personal history, your own unique view of the world, ego, pride, marketing, and odd incentives are scrambled together. In *The Psychology of Money*, award-winning author Morgan Housel shares 19 short stories exploring the strange ways people think about money and teaches you how to make better sense of one of life's most important topics.

## **The Psychology of Money**

Taking as its starting point a child's natural desire to understand the world, this is a series designed to entertain and to inform. This book focuses on astronomy, and each spread investigates a specific theme or topic, with answers to questions, plus additional snippets of information.

## **I Wonder why Stars Twinkle and Other Questions about Space**

\["Introduces early readers to subjects about space in Q&A format"--Provided by publisher.

### **What Are Stars?**

Stars are a constant source of fascination. In this Very Short Introduction Andrew King introduces us to the science of stars; how they are born, how they live, and how they die. He shows how understanding the stars is the key to understanding the galaxies they inhabit, and how they provide us with clues to the existence of planets like our own.

### **Stars: A Very Short Introduction**

Ptolemy's Almagest is one of the most influential scientific works in history. A masterpiece of technical exposition, it was the basic textbook of astronomy for more than a thousand years, and still is the main source for our knowledge of ancient astronomy. This translation, based on the standard Greek text of Heiberg, makes the work accessible to English readers in an intelligible and reliable form. It contains numerous corrections derived from medieval Arabic translations and extensive footnotes that take account of the great progress in understanding the work made in this century, due to the discovery of Babylonian records and other researches. It is designed to stand by itself as an interpretation of the original, but it will also be useful as an aid to reading the Greek text.

### **Ptolemy's Almagest**

'Light on Dark Matter', held from 10-14 June 1985 in the Dutch seaside resort of Noordwijk, was the first international conference devoted to the results of the all-sky survey by the US-Dutch-UK Infra-Red Astronomical Satellite (IRAS). As such, it was a homage to the scientists, engineers and technicians who conceived, built and operated this extremely successful satellite. That this was generally felt to be the case, was proven by the large number of participants (over 200 from seventeen different nations), the lively discussions, and the great variety of topics presented during the meeting. All this notwithstanding a typical Dutch summer: gale-force winds, heavy cloud cover, and meter-high surf crashing onto a beach on which only the hardy ventured. Most participants contented themselves by watching the lonely seagulls patrolling the North Sea coastline through the panoramic windows of the conference center. Parallel to the IRAS Conference, a Workshop on Infrared Properties of Interstellar Grains was organized by J. M. Greenberg of the Leiden Laboratory Astrophysics Group: a busy shuttling of participants between the Workshop room and the Main Conference Hall showed that many found it hard to choose. A large number of people were involved in making the Conference a success: in the first place the scientific organizers with their valuable advice and the conference speakers, among which I would like to mention Dr. J. H.

### **Light on Dark Matter**

The night sky is a place of wonder for all young readers. Stars are of particular fascination, especially once they learn that the sun is a star. In this book, learners explore the gases and life cycle of a star. Incredible, colorful photographs straight from NASA's telescopes and probes will thrill the reader's eyes. Thought-provoking text answers the title's question with easy, accessible language, while igniting interest. This book is right at home in any collection.

## **What Are Stars Made Of?**

"Not just a shimmering guide to our personal cosmologies written in precise and lucid prose, this book is also a devastating collection of cultural-criticism essays cum meditations on the very nature of being alive."--Emma Copley Eisenberg, author of *The Third Rainbow Girl* A soulful exploration of the twelve astrological signs embodied by our living \"stars\"--from divas to philosophers, poets to punks--and the ways they can help us better understand ourselves and each other, from the wildly popular astrology columnist for New York magazine's *The Cut*. Whether you believe in it or not, astrology's job has never been to give us a preordained vision of the future, nor to sort us into twelve neat personality types, but to provide the tools and language for delving into our weirdest, best, most thorny contradictions, and for understanding ourselves and each other in our full complexity. The stars and the planets then are more like mirrors that show us who we are, that give us an understanding of how to be and how to move through the world; how certain people do it differently, and what we can learn by studying them. In *Madame Clairevoyant's Guide to the Stars*, Claire Comstock-Gay brings the sky down to Earth and points to our popular \"stars\"--from Aretha Franklin to Mr. Rogers, from poets in Cancer to punk singers in Scorpio--to reveal what the sky has to teach us about being human. In this wise, lyrically written guide, she examines the twelve astrological signs, illuminating the ways each one is more complicated, beautiful, and surprising than you might have been told. Claire suggests that actually it's okay, and even important, to be a seeker, to hunger for self-knowledge, and if astrology is the vehicle for that inquiry, so be it. *Madame Clairevoyant's Guide to the Stars* offers a clear introduction to the basics and an innovative new framework for creatively using astrology to illuminate our lives on earth. It's a road map to our internal world, yes, but Claire also reminds us that it's still our job to navigate it. Combining both heavenly insights and the earthly wisdom of writers like Cheryl Strayed and Heather Havrilesky and the poetry of Patricia Lockwood and Mary Oliver, *Madame Clairevoyant's Guide to the Stars* offers a fresh, profound, and fun way to look at ourselves and others, and perhaps see each more clearly. And in that way, this book is not just beautiful, but transformative.

## **Madame Clairevoyant's Guide to the Stars**

Browsers and young students alike will enjoy these lively question and answer books with their unique mix of realistic illustration and engaging cartoons. The enticing questions will amaze, amuse and inspire, while the highly visual format encourages kids to keep reading.

## **I Wonder Why Stars Twinkle**

The aim of this book is to serve as a reference work which not only reviews the progress made since the early days of pulsar astronomy, but especially focuses on questions such as: \"What have we learned about the subject and how did we learn it?\"

## **Neutron Stars and Pulsars**

Gathers information about physics, chemistry, space, the earth sciences, biology, medicine, transportation, and communication

## **The Handy Science Answer Book**

A small comet heads for earth and arrives at the manger where Baby Jesus lies.

## **What Star is This?**

A young boy goes on a journey to discover what it takes to become famous. Through meeting the people he looks up to most, he quickly learns that it takes a lot more than a dream, and ends up on a mission of self-discovery. Will he be able to uncover the mystery of stardom and understand what it takes to become a star?

## **Astroquizzical - the Illustrated Edition**

Serves as a useful reference guide to stargazers around the world.

## **What Does It Take to Be a Star?**

A perfect fun activity book designed for early learners to develop pencil control and motor skills. By following the arrows and tracing the dotted lines, the little scholars can complete the tracing exercises and creative activities leading to development of their early writing skills. The child will also learn to identify, write and revise straight, curvy, zig zag lines and multiple patterns. The book is also an excellent first step to prepare for school.

## **NightWatch**

This book covers the numerous, paradigm changing scientific discoveries in exoplanets and other areas of astrophysics made possible by the NASA Kepler and K2 Missions. It is suitable for the interested layperson, pupils of science and space missions, and advanced science students and researchers.

## **My First Book of Patterns: Pencil Control**

Wishing she could play with the stars, a tiny lassie sets out to obtain them.

## **The NASA Kepler Mission**

Astronomy and Cosmogony

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