

# Physics And Music The Science Of Musical Sound Donald H White

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*Measured Tones* - Ian Johnston 2009-06-01

Most books concerned with physics and music take an approach that puts physical theory before application. Consequently, these works tend to dampen aesthetic fascination with preludes burdened by an overabundance of algebraic formulae. In *Measured Tones: The Interplay of Physics and Music Third Edition*, Ian Johnston a professor of astrophysics and a connoisseur of music, offers an informal historical approach that shows the evolution of both theory and application at the intersection of physics and music. Exceptionally accessible, insightful, and now updated to consider modern technology and recent advances, the new edition of this critically acclaimed and bestselling classic – Features a greater examination of psycho-acoustics and

its role in the design of MP3s Includes expanded information on the gamelan and other Asian percussion instruments Introduces detailed discussions of binary notation, digitization, and electronic manipulation of music We believe that order exists, and we look for it. In that respect the aims of science and of music are identical—the desire to find harmony. And surely, without that very human desire, science would be a cold and sterile undertaking. With myriad illustrations and historical anecdotes, this volume will delight those student required to approach this topic from either a physics and music concentration, as well as anyone who is fascinated with concepts of harmony expressed in nature, as well as in the instruments and composition of human expression's purest form. A complementary website

provides sound files, further reading, and instructional support.

Physics and Music - Harvey E. White 2014-06-18

Comprehensive and accessible, this foundational text surveys general principles of sound, musical scales, characteristics of instruments, mechanical and electronic recording devices, and many other topics. More than 300 illustrations plus questions, problems, and projects.

Woodwind Instruments and Their History - Anthony Baines 1963

This definitive text combines a history of woodwinds with detailed descriptions and photographs of the various instruments in use today. Includes 34 halftones, 41 line illustrations, 25 musical examples and 16 fingering charts.

**Physics of the Piano** - Nicholas J. Giordano 2016-10-27

Why does a piano sound like a piano? A similar question can be asked of virtually all musical instruments. A particular note—such as middle C—can be produced by a piano, a violin, a clarinet, and many other instruments, yet it is easy for even a musically untrained listener to distinguish between these different instruments. A central quest in the study of musical instruments is to understand why the sound of the "same" note depends greatly on the instrument, and to elucidate which aspects of an instrument are most critical in producing the musical tones characteristic of the instrument. The primary goal of this book is to investigate these questions for the piano. The explanations in this book use a minimum of mathematics, and are intended for anyone who is interested in music and musical instruments. At the same time, there are many insights relating physics and the piano that will likely be

interesting and perhaps surprising for many physicists. The Science of Musical Sound - William Ralph Bennett Jr. 2018-09-04

This textbook is a product of William Bennett's work in developing and teaching a course on the physics of music at Yale University to a diverse audience of musicians and science students in the same class. The book is a culmination of over a decade of teaching the course and weaves together historical descriptions of the physical phenomena with the author's clear interpretations of the most important aspects of the science of music and musical instruments. Many of the historical examples are not found in any other textbook available on the market. As the co-inventor of the Helium-Neon laser, Prof. Bennett's knowledge of physics was world-class. As a professor at one of the most prestigious liberal-arts universities in the world, his appreciation for culture and humanities shines through. The book covers the basics of oscillations, waves and the analysis techniques necessary for understanding how musical instruments work. All types of stringed instruments, pipe organs, and the human voice are covered in this volume. A second volume covers the remaining families of musical instruments as well as selected other topics. Readers without a background in acoustics will enjoy learning the physics of the Science of Musical Sound from a preeminent scientist of the 20th century. Those well versed in acoustics will discover wonderful illustrations and photographs depicting familiar concepts in new and enlightening ways.

*Introduction to the Physics and Psychophysics of Music* - Juan G. Roederer 2012-12-06

Viii book we shall refer a great deal to the discipline of psycho physics, which in a broad sense tries to

establish in a quantitative form the causal relationship between the "physical" input from our senses and the psychological sensations and physiological reactions evoked in our mind and body, respectively. Actually, we shall try to weave a rather close mesh between physics and psychophysics-or, more precisely, psychoacoustics. After all, they appear naturally interwoven in music itself: not only pitch, loudness and timbre are a product of physical and psychoacoustical processes, but so are the sensations related to consonance and dissonance, tonic dominance, trills and ornamentation, vibrato, phrasing, beats, tone attack, duration and decay, rhythm, and so on. Many books on physics of music or musical acoustics are readily available. An up-to-date text is the treatise of John Backus (1969). No book on psychoacoustics is available at the elementary level, though. Several review articles on pertinent topics can be found in Tobias (1970) and in Plomp and Smoorenburg (1970). A comprehensive discussion is given in Flanagan's book on speech (1972). And, of course, there is the classical treatise of von Bekesy (1960). A comprehensive up-to-date analysis of general brain processes can be found in Sommerhoff (1974); musical psychology is discussed in classical terms in Lundin (1967).

**The Physics of Sound** - Richard E. Berg 1995

Appropriate for an introductory course in acoustics for non-scientists. This book incorporates the remarkable changes in digital audio technology -- including consumer products--into a firm foundation of physics of sound.

**The Jazz of Physics** - Stephon Alexander 2016-04-26

More than fifty years ago, John Coltrane drew the twelve musical notes in a circle and connected them by straight

lines, forming a five-pointed star. Inspired by Einstein, Coltrane put physics and geometry at the core of his music. Physicist and jazz musician Stephon Alexander follows suit, using jazz to answer physics' most vexing questions about the past and future of the universe. Following the great minds that first drew the links between music and physics-a list including Pythagoras, Kepler, Newton, Einstein, and Rakim-The Jazz of Physics reveals that the ancient poetic idea of the Music of the Spheres," taken seriously, clarifies confounding issues in physics. The Jazz of Physics will fascinate and inspire anyone interested in the mysteries of our universe, music, and life itself.

*Music and Science in the Age of Galileo* - V. Coelho  
2013-03-09

*Music and Science in the Age of Galileo* features twelve new essays by leading specialists in the fields of musicology, history of science, astronomy, philosophy, and instrument building that explore the relations between music and the scientific culture of Galileo's time. The essays take a broad historical approach towards understanding such topics as the role of music in Galileo's experiments and in the scientific revolution, the musical formation of scientists, Galileo's impact on the art and music of his time, the scientific knowledge of instrument builders, and the scientific experiments and cultural context of Galileo's father, Vincenzo Galilei. This volume opens up new areas in both musicology and the history of science, and twists together various strands of parallel work by musicians and scientists on Galileo and his time. This book will be of interest to musicologists, historians of science and those interested in interdisciplinary perspectives of the late Renaissance -- early Baroque.

For its variety of approaches, it will be a valuable collection of readings for graduate students, and those seeking a more integrated approach to historical problems. The book will be of interest to historians of science, philosophers, musicologists, astronomers, and mathematicians.

**Acoustics of Musical Instruments** - Antoine Chaigne

2016-05-12

This book, the first English-language translation of *Acoustique des instruments de musique*, Second Edition, presents the necessary foundations for understanding the complex physical phenomena involved in musical instruments. What is the function of the labium in a flute? Which features of an instrument allow us to make a clear audible distinction between a clarinet and a trumpet? With the help of numerous examples, these questions are addressed in detail. The authors focus in particular on the significant results obtained in the field during the last fifteen years. Their goal is to show that elementary physical models can be used with benefit for various applications in sound synthesis, instrument making, and sound recording. The book is primarily addressed to graduate students and researchers; however it could also be of interest for engineers, musicians, craftsmen, and music lovers who wish to learn about the basics of musical acoustics.

The Physics of Music and Musical Instruments - 2003

"Covers the physics of waves, sound, music, and musical instruments at a level designed for high school physics. However, it is also a resource for those teaching or learning waves and sound from the middle school through college, at the mathematical or conceptual level. The material will be most useful for high school physics teachers and for high school physics students who have

neither a background in waves nor in music but who desire a firm foundation in both. Most books written on the topic of musical acoustics tend to be either very theoretical or very cookbook style. The theoretical ones provide for little student interaction other than some end of the chapter questions and problems. The "cookbook" style provides instructions for building musical instruments with little or no explanation of the physics behind the construction. This curriculum attempts to not only marry the best ideas from both types of books, but to include pedagogical aids not found in other available resources."--Introduction on website.

**An Introduction to Acoustics** - Robert H. Randall

2005-01-01

Undergraduate-level text examines waves in air and in three dimensions, interference patterns and diffraction, and acoustic impedance, as illustrated in the behavior of horns. 1951 edition.

*Physics and Music* - Kinko Tsuji 2021-05-31

This book explores the fascinating and intimate relationship between music and physics. Over millennia, the playing of, and listening to music have stimulated creativity and curiosity in people all around the globe. Beginning with the basics, the authors first address the tonal systems of European-type music, comparing them with those of other, distant cultures. They analyze the physical principles of common musical instruments with emphasis on sound creation and particularly charisma. Modern research on the psychology of musical perception – the field known as psychoacoustics – is also described. The sound of orchestras in concert halls is discussed, and its psychoacoustic effects are explained. Finally, the authors touch upon the role of music for

our mind and society. Throughout the book, interesting stories and anecdotes give insights into the musical activities of physicists and their interaction with composers and musicians.

Physics and Music - Harvey Elliott White 1980

Good Vibrations - Barry Parker 2009-12-15

Peppered throughout with anecdotes and examples illustrating key concepts, this invitingly written book provides a firm grounding in the actual and theoretical physics of music.

Musical Mathematics - Cris Forster 2010-07-14

Musical Mathematics is the definitive tome for the adventurous musician. Integrating mathematics, music history, and hands-on experience, this volume serves as a comprehensive guide to the tunings and scales of acoustic instruments from around the world. Author, composer, and builder Cris Forster illuminates the mathematical principles of acoustic music, offering practical information and new discoveries about both traditional and innovative instruments. With this knowledge readers can improve, or begin to build, their own instruments inspired by Forster's creations shown in 16 color plates. For those ready to step outside musical conventions and those whose curiosity about the science of sound is never satisfied, Musical Mathematics is the map to a new musical world.

Musical Sound - Michael J. Moravcsik 2012-12-06

This text has been out of print since 1990; it was originally published by Solomon Press in 1987. Several experts in the field have verified that the information in the book remains constant; nothing has, or will, change in the basic science of musical sound. It explains the science of musical sound without the

encumbrance of detailed mathematics. It will appeal to music lovers as well as students of music and students of physics. It can easily be promoted with our physics program.

How Music Works - John Powell 2010-11-03

"Any readers whose love of music has somehow not led them to explore the technical side before will surely find the result a thoroughly accessible, and occasionally revelatory, primer."—Seattle Post-Intelligencer What makes a musical note different from any other sound? How can you tell if you have perfect pitch? Why do ten violins sound only twice as loud as one? Do your Bob Dylan albums sound better on CD vinyl? John Powell, a scientist and musician, answers these questions and many more in *How Music Works*, an intriguing and original guide to acoustics. In a clear and engaging voice, Powell leads you on a fascinating journey through the world of music, with lively discussions of the secrets behind harmony timbre, keys, chords, loudness, musical composition, and more. From how musical notes came to be (you can thank a group of stodgy men in 1939 London for that one), to how scales help you memorize songs, to how to make an oboe from a drinking straw, John Powell distills the science and psychology of music with wit and charm.

Music by the Numbers - Eli Maor 2020-03-10

How music has influenced mathematics, physics, and astronomy from ancient Greece to the twentieth century.

Music and the Making of Modern Science - Peter Pesic 2022-09-13

A wide-ranging exploration of how music has influenced science through the ages, from fifteenth-century cosmology to twentieth-century string theory. In the natural science of ancient Greece, music formed the

meeting place between numbers and perception; for the next two millennia, Pesic tells us in *Music and the Making of Modern Science*, “liberal education” connected music with arithmetic, geometry, and astronomy within a fourfold study, the quadrivium. Peter Pesic argues provocatively that music has had a formative effect on the development of modern science—that music has been not just a charming accompaniment to thought but a conceptual force in its own right. Pesic explores a series of episodes in which music influenced science, moments in which prior developments in music arguably affected subsequent aspects of natural science. He describes encounters between harmony and fifteenth-century cosmological controversies, between musical initiatives and irrational numbers, between vibrating bodies and the emergent electromagnetism. He offers lively accounts of how Newton applied the musical scale to define the colors in the spectrum; how Euler and others applied musical ideas to develop the wave theory of light; and how a harmonium prepared Max Planck to find a quantum theory that reengaged the mathematics of vibration. Taken together, these cases document the peculiar power of music—its autonomous force as a stream of experience, capable of stimulating insights different from those mediated by the verbal and the visual. An innovative e-book edition available for iOS devices will allow sound examples to be played by a touch and shows the score in a moving line.

*The Science and Psychology of Music Performance* -  
Richard Parncutt 2002-04-18

What type of practice makes a musician perfect? What sort of child is most likely to succeed on a musical instrument? What practice strategies yield the fastest improvement in skills such as sight-reading,

memorization, and intonation? Scientific and psychological research can offer answers to these and other questions that musicians face every day. In *The Science and Psychology of Music Performance*, Richard Parncutt and Gary McPherson assemble relevant current research findings and make them accessible to musicians and music educators. This book describes new approaches to teaching music, learning music, and making music at all educational and skill levels. Each chapter represents the collaboration between a music researcher (usually a music psychologist) and a performer or music educator. This combination of expertise results in excellent practical advice. Readers will learn, for example, that they are in the majority (57%) if they experience rapid heartbeat before performances; the chapter devoted to performance anxiety will help them decide whether beta-blocker medication, hypnotherapy, or the Alexander Technique of relaxation might alleviate their stage fright. Another chapter outlines a step-by-step method for introducing children to musical notation, firmly based on research in cognitive development. Altogether, the 21 chapters cover the personal, environmental, and acoustical influences that shape the learning and performance of music.

*The Physics of Music and Color* - Leon Gunther 2011-09-23  
*The Physics of Music and Color* deals with two subjects, music and color - sound and light in the physically objective sense - in a single volume. The basic underlying physical principles of the two subjects overlap greatly: both music and color are manifestations of wave phenomena, and commonalities exist as to the production, transmission, and detection of sound and light. This book aids readers in studying both subjects, which involve nearly the entire gamut of the fundamental

laws of classical as well as modern physics. Where traditional introductory physics and courses are styled so that the basic principles are introduced first and are then applied wherever possible, this book is based on a motivational approach: it introduces a subject by demonstrating a set of related phenomena, challenging readers by calling for a physical basis for what is observed. The Physics of Music and Color is written at level suitable for college students without any scientific background, requiring only simple algebra and a passing familiarity with trigonometry. It contains numerous problems at the end of each chapter that help the reader to fully grasp the subject.

**This Is Your Brain on Music** - Daniel J. Levitin  
2006-08-03

In this groundbreaking union of art and science, rocker-turned-neuroscientist Daniel J. Levitin explores the connection between music—its performance, its composition, how we listen to it, why we enjoy it—and the human brain. Taking on prominent thinkers who argue that music is nothing more than an evolutionary accident, Levitin poses that music is fundamental to our species, perhaps even more so than language. Drawing on the latest research and on musical examples ranging from Mozart to Duke Ellington to Van Halen, he reveals:

- How composers produce some of the most pleasurable effects of listening to music by exploiting the way our brains make sense of the world
- Why we are so emotionally attached to the music we listened to as teenagers, whether it was Fleetwood Mac, U2, or Dr. Dre
- That practice, rather than talent, is the driving force behind musical expertise
- How those insidious little jingles (called earworms) get stuck in our head

A Los Angeles Times Book Award finalist, *This Is Your Brain on*

Music will attract readers of Oliver Sacks and David Byrne, as it is an unprecedented, eye-opening investigation into an obsession at the heart of human nature.

**Music, Physics and Engineering** - Harry F. Olson  
2013-04-22

This extraordinarily comprehensive text, requiring no special background, discusses the nature of sound waves, musical instruments, musical notation, acoustic materials, elements of sound reproduction systems, and electronic music. Includes 376 figures.

**The Science of String Instruments** - Thomas D. Rossing  
2010-12-15

Thomas D. Rossing String instruments are found in almost all musical cultures. Bowed string instruments form the backbone of symphony orchestras, and they are used widely as solo instruments and in chamber music as well. Guitars are used universally in pop music as well as in classical music. The piano is probably the most versatile of all musical instruments, used widely not only in ensemble with other musical instruments but also as a solo instrument and to accompany solo instruments and the human voice. In this book, various authors will discuss the science of plucked, bowed, and hammered string instruments as well as their electronic counterparts. We have tried to tell the fascinating story of scientific research with a minimum of mathematics to maximize the usefulness of the book to performers and instrument builders as well as to students and researchers in musical acoustics. Sometimes, however, it is difficult to “translate” ideas from the exact mathematical language of science into words alone, so we include some basic mathematical equations to express these ideas. It is impossible to

discuss all families of string instruments. Some instruments have been researched much more than others. Hopefully, the discussions in this book will help to encourage further scientific research by both musicians and scientists alike.

### 1.1 A Brief History of the Science of String Instruments

Quite a number of good histories of acoustics have been written (Lindsay 1966, 1973; Hunt 1992; Beyer 1999), and these histories include musical acoustics.

**The Evolution of Music Through Culture and Science** - Peter Townsend 2019-11-25

The Evolution of Music by Culture and Science aims to recognise the impact of science on music, why it occurs, how we respond, and even to tentatively see if we can predict future developments. Technology has played an immense role in the development of music as it has enabled the production of new sounds, introduced new instruments and continuously improved and modified existing ones. Printing, musical notation, and modern computer aids to composition, plus recordings and electronic transmission have equally enabled us to have access to music from across the world. Such changes, whether just more powerful pianos, or new sounds as from the saxophone, have inspired composers and audiences alike. Acoustics and architecture play similar roles as they changed the scale and performance of concert halls, and with the advent of electronics, they enabled vast pop music festivals. No aspect of modern music making has been untouched by the synergy with scientific innovation. This is not a one-way interaction as the early attempts to make recordings were a major motivating force to design the electronics for amplifiers and these in turn inspired and enabled the designs of semiconductor electronics and modern computer

technology. To appreciate the impact of technology on music does not require any prior scientific background as the concepts are invariably extremely simple and are presented here without technical detail. Understanding music and why we like different genres is far more complex, as this involves our personal background and taste. Both aspects change with time, and there is no contradiction in enjoying items as diverse as baroque madrigals, symphonies, jazz or pop music, or music from totally different cultures.

*The Acoustical Foundations of Music* - John Backus 1977  
Explores music's scientific principles, the physiological properties of sound, how the ear perceives music, the effect of the acoustic environment, how instruments produce their sounds, and new computer applications in music

Principles of Musical Acoustics - William M. Hartmann 2013-07-26

Principles of Musical Acoustics focuses on the basic principles in the science and technology of music. Musical examples and specific musical instruments demonstrate the principles. The book begins with a study of vibrations and waves, in that order. These topics constitute the basic physical properties of sound, one of two pillars supporting the science of musical acoustics. The second pillar is the human element, the physiological and psychological aspects of acoustical science. The perceptual topics include loudness, pitch, tone color, and localization of sound. With these two pillars in place, it is possible to go in a variety of directions. The book treats in turn, the topics of room acoustics, audio both analog and digital, broadcasting, and speech. It ends with chapters on the traditional musical instruments, organized by family. The



mathematical level of this book assumes that the reader is familiar with elementary algebra. Trigonometric functions, logarithms and powers also appear in the book, but computational techniques are included as these concepts are introduced, and there is further technical help in appendices.

*The Science of Brass Instruments* - Murray Campbell

2021-01-19

This book provides an in-depth account of the fascinating but far from simple actions and processes that take place when a brass instrument is played. Written by three leading researchers in brass instrument acoustics who are also experienced brass players, it draws together the many recent advances in our understanding of the subtly interrelated factors shaping the musician's control of the instrument's sound. The reader is introduced to models of sound generation, propagation and radiation. In particular, the current understanding of the behaviour of the player's lips, the modes of vibration of the air column inside the instrument, and the radiation of sound from a brass instrument bell are explained. The functions of the mouthpiece and of mutes are discussed. Spectral enrichment arising from nonlinear propagation of the internal sound wave in loud playing is shown to be an important influence on the timbre of many types of brass instrument. The characteristics of brass instruments in contemporary use (including cornets, trumpets, french horns, trombones and tubas) are identified, and related to those of the great variety of instruments at earlier stages in the evolution of the brass family. This copiously illustrated book concludes with case studies of the recreation of ancient instruments and some of the current applications of electronics and information

technology to brass instrument performance. While most of the material presented is accessible by a general readership, the topic of musical instrument modelling is developed at a mathematical level which makes it a useful academic resource for advanced teaching and research. Written by three internationally acknowledged experts in the acoustics and organology of brass instruments who are also experienced brass instrument players. Provides both an accessible introduction to brass instrument science and a review of recent research results and mathematical modeling techniques Represents the first monograph on the science underlying the design and performance of musical instruments of the brass family

**The Physics of Music and Color** - Leon Gunther 2019-10-14

This undergraduate textbook aids readers in studying music and color, which involve nearly the entire gamut of the fundamental laws of classical as well as atomic physics. The objective bases for these two subjects are, respectively, sound and light. Their corresponding underlying physical principles overlap greatly: Both music and color are manifestations of wave phenomena. As a result, commonalities exist as to the production, transmission, and detection of sound and light. Whereas traditional introductory physics textbooks are styled so that the basic principles are introduced first and are then applied, this book is based on a motivational approach: It introduces a subject with a set of related phenomena, challenging readers by calling for a physical basis for what is observed. A novel topic in the first edition and this second edition is a non-mathematical study of electric and magnetic fields and how they provide the basis for the propagation of electromagnetic waves, of light in particular. The book provides details

for the calculation of color coordinates and luminosity from the spectral intensity of a beam of light as well as the relationship between these coordinates and the color coordinates of a color monitor. The second edition contains corrections to the first edition, the addition of more than ten new topics, new color figures, as well as more than forty new sample problems and end-of-chapter problems. The most notable additional topics are: the identification of two distinct spectral intensities and how they are related, beats in the sound from a Tibetan bell, AM and FM radio, the spectrogram, the short-time Fourier transform and its relation to the perception of a changing pitch, a detailed analysis of the transmittance of polarized light by a Polaroid sheet, brightness and luminosity, and the mysterious behavior of the photon. The Physics of Music and Color is written at a level suitable for college students without any scientific background, requiring only simple algebra and a passing familiarity with trigonometry. The numerous problems at the end of each chapter help the reader to fully grasp the subject.

The Music Instinct - Philip Ball 2010-09-02

From Bach fugues to Indonesian gamelan, from nursery rhymes to rock, music has cast its light into every corner of human culture. But why music excites such deep passions, and how we make sense of musical sound at all, are questions that have until recently remained unanswered. Now in *The Music Instinct*, award-winning writer Philip Ball provides the first comprehensive, accessible survey of what is known--and still unknown--about how music works its magic, and why, as much as eating and sleeping, it seems indispensable to humanity. Deftly weaving together the latest findings in brain science with history, mathematics, and philosophy, *The*

*Music Instinct* not only deepens our appreciation of the music we love, but shows that we would not be ourselves without it. The Sunday Times hailed it as "a wonderful account of why music matters," with Ball's "passion for music evident on every page."

*The Structure of Musical Sound* - Willard Charles Sperry 2010

*The Structure of Musical Sound* is about science from the point of view of musical sound. It is also a book about musical sound from science's point of view. First and foremost, however, it is a science text for nonscientists. You, the reader, will be introduced to the methods of science; and you will be shown how these methods are used to discover more about musical sound. You will be an active participant in both of these quests, and as a result you will become a more "scientific" person than you might have realized possible. Parts of musical sound have scientific explanations. Examples of these parts include the rules for the formation and propagation of sound waves, the operation of musical instruments as they produce their sounds, and the acoustic conditions for good listening to musical sound in rooms and halls. *The Structure of Musical Sound* explains all of these scientific aspects of music. Questions are included throughout the book. They will challenge you to demonstrate your understanding of the ideas just presented. The solutions, not just the answers, to these questions are provided at the end of this book.

*The Sound Book: The Science of the Sonic Wonders of the World* - Trevor Cox 2014-02-10

"A lucid and passionate case for a more mindful way of listening. . . . Anyone who has ever clapped, hollered or yodeled at an echo will delight in [Cox's] zestful

curiosity.”—New York Times Trevor Cox is on a hunt for the sonic wonders of the world. A renowned expert who engineers classrooms and concert halls, Cox has made a career of eradicating bizarre and unwanted sounds. But after an epiphany in the London sewers, Cox now revels in exotic noises—creaking glaciers, whispering galleries, stalactite organs, musical roads, humming dunes, seals that sound like alien angels, and a Mayan pyramid that chirps like a bird. With forays into archaeology, neuroscience, biology, and design, Cox explains how sound is made and altered by the environment, how our body reacts to peculiar noises, and how these mysterious wonders illuminate sound’s surprising dynamics in everyday settings—from your bedroom to the opera house. *The Sound Book* encourages us to become better listeners in a world dominated by the visual and to open our ears to the glorious cacophony all around us.

*The Time of Our Singing* - Richard Powers 2004-01-01  
From the Pulitzer Prize-winning author of *The Overstory* and the Oprah's Book Club selection *Bewilderment* comes Richard Powers's magnificent, multifaceted novel, *The Time of Our Singing*, about a supremely gifted—and divided—family, set against the backdrop of postwar America. On Easter day, 1939, at Marian Anderson's epochal concert on the Washington Mall, David Strom, a German Jewish émigré scientist, meets Delia Daley, a young Philadelphia Negro studying to be a singer. Their mutual love of music draws them together, and—against all odds and better judgment—they marry. They vow to raise their children beyond time, beyond identity, steeped in song. But their three children must survive America's brutal here and now. Jonah, Joseph, and Ruth grow up during the Civil Rights era, come of age in the

violent 1960s, and live out adulthood in the racially retrenched late century. Jonah, the eldest, "whose voice could make heads of state repent," follows a life in his parents' beloved classical music. Ruth, the youngest, chooses a militant activism and repudiates the white culture her brother represents. Joseph, the middle child and the narrator of this generational tale, struggles to remain connected to them both. *The Time of Our Singing* is a story of self-invention, allegiance, race, cultural ownership, the compromised power of music, and the tangled loops of time that rewrite all belonging.

***Music, Math, and Mind*** - David Sulzer 2021-03-23  
This book offers a lively exploration of the mathematics, physics, and neuroscience that underlie music. Written for musicians and music lovers with any level of science and math proficiency, including none, *Music, Math, and Mind* demystifies how music works while testifying to its beauty and wonder.

*The Physics of Musical Instruments* - Neville H. Fletcher 2013-11-09

While the history of musical instruments is nearly as old as civilisation itself, the science of acoustics is quite recent. By understanding the physical basis of how instruments are used to make music, one hopes ultimately to be able to give physical criteria to distinguish a fine instrument from a mediocre one. At that point science may be able to come to the aid of art in improving the design and performance of musical instruments. As yet, many of the subtleties in musical sounds of which instrument makers and musicians are aware remain beyond the reach of modern acoustic measurements. This book describes the results of such acoustical investigations - fascinating intellectual and practical exercises. Addressed to readers with a

reasonable grasp of physics who are not put off by a little mathematics, this book discusses most of the traditional instruments currently in use in Western music. A guide for all who have an interest in music and how it is produced, as well as serving as a comprehensive reference for those undertaking research in the field.

**Physics and Music** - Harvey E. White 2014-04-15

Comprehensive and accessible, this foundational text surveys general principles of sound, musical scales, characteristics of instruments, mechanical and electronic recording devices, and many other topics. More than 300 illustrations plus questions, problems, and projects.

**Physics in the Arts** - Pupa U.P.A. Gilbert 2021-01-16

Physics in the Arts, Third Edition gives science enthusiasts and liberal arts students an engaging, accessible exploration of physical phenomena, particularly with regard to sound and light. This book offers an alternative route to science literacy for those interested in the arts, music and photography. Suitable for a typical course on sound and light for non-science majors, Gilbert and Haeberli's trusted text covers the nature of sound and sound perception as well as important concepts and topics such as light and light waves, reflection and refraction, lenses, the eye and the ear, photography, color and color vision, and additive and subtractive color mixing. Additional sections cover color generating mechanisms, periodic oscillations, simple harmonic motion, damped oscillations and resonance, vibration of strings, Fourier analysis, musical scales and musical instruments. Offers an alternative route to science literacy for those interested in the visual arts, music

and photography Includes a new and unique quantitative encoding approach to color vision, additive and subtractive color mixing, a section on a simplified approach to quantitative digital photography, how the ear-brain system works as a Fourier analyzer, and updated and expanded exercises and solutions Provides updated online instructor resources, including labs, chapter image banks, practice problems and solutions  
*The Science of Sci-Fi Music* - Andrew May 2020-06-30  
The 20th century saw radical changes in the way serious music is composed and produced, including the advent of electronic instruments and novel compositional methods such as serialism and stochastic music. Unlike previous artistic revolutions, this one took its cues from the world of science. Creating electronic sounds, in the early days, required a well-equipped laboratory and an understanding of acoustic theory. Composition became increasingly "algorithmic", with many composers embracing the mathematics of set theory. The result was some of the most intellectually challenging music ever written – yet also some of the best known, thanks to its rapid assimilation into sci-fi movies and TV shows, from the electronic scores of *Forbidden Planet* and *Dr Who* to the other-worldly sounds of *2001: A Space Odyssey*. This book takes a close look at the science behind "science fiction" music, as well as exploring the way sci-fi imagery found its way into the work of musicians like Sun Ra and David Bowie, and how music influenced the science fiction writings of Philip K. Dick and others.  
[Why You Hear what You Hear](#) - Eric J. Heller 2013  
This title makes possible a deep intuitive understanding of many aspects of sound, as opposed to the usual approach of mere description. This goal is aided by hundreds of original illustrations and examples, many of

which the reader can reproduce and adjust using the same tools used by the author.