

# Music Inspired by Astronomy, Organized by Topic

An Annotated Listing by Andrew Fraknoi

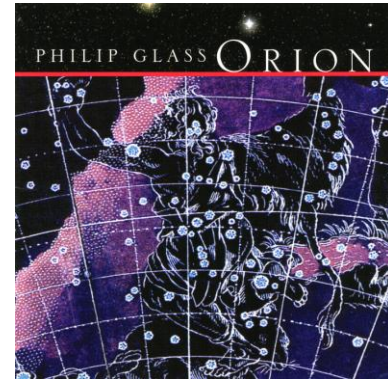
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Borresen: At Uranienborg



Cage: Atlas Eclipticalis



Glass: Orion

Connections between astronomy and music have been proposed since the time of the ancient Greeks. This annotated listing of both classical and popular music inspired by astronomy restricts itself to music that has connections to *real science* -- not just an astronomical term or two in the title or lyrics. For example, we do not list Gustav Holst's popular symphonic suite *The Planets*, because it draws its inspiration from the *astrological*, and not astronomical, characteristics of the worlds in the solar system. Similarly, songs like Soundgarden's "Black Hole Sun" or the Beatles' "Across the Universe" just don't contain enough serious astronomy to make it into our guide. When possible, we give links to a CD and a *YouTube* recording or explanation for each piece. The music is arranged in categories by astronomical topic, from asteroids to Venus. Additions to this list are most welcome (as long as they follow the above guidelines); please send them to the author at: [fraknoi {at} fhda {dot} edu](mailto:fraknoi@fhda.edu)

## Table of Contents

Asteroids	Meteors and Meteorites
Astronomers	Moon
Astronomy in General	Nebulae
Black Holes	Physics Related to Astronomy
Calendar, Time, Seasons	Planets (in General)
Comets	Pluto
Constellations	Saturn
Cosmology	SETI (Search for Intelligent Life Out There)
Earth	Sky Phenomena
Eclipses	Space Travel
Einstein	Star Clusters
Exoplanets	Stars and Stellar Evolution
Galaxies and Quasars	Sun
History of Astronomy	Telescopes and Observatories
Jupiter	Venus
Mars	

## Asteroids

- Coates, Gloria *Among the Asteroids on At Midnight* (on Tzadik). A 1962 piece for string quartet, written for a production of *The Little Prince*; she has other music with science titles, so we took the liberty of including this. (<https://www.youtube.com/watch?v=7fB68dscne4>)
- Dean, Brett *Komarov's Fall* (with *The Planets* by Holst, conducted by Simon Rattle, on EMI Classics CD). Honoring the astronaut, who was the first person to die in space, and after whom asteroid 1836 is named. (<https://www.youtube.com/watch?v=9ePOpm6xGVI>)
- Saariaho, Kaija *Asteroid 4179: Toutatis* (with *The Planets* by Holst, conducted by Simon Rattle, on EMI Classics CD). Short piece based on the complex rotational motion of this near-Earth asteroid. (<https://www.youtube.com/watch?v=MIOANAo7xJo>)
- Turnage, Mark-Anthony *Ceres* (with *The Planets* by Holst, conducted by Simon Rattle, on EMI Classics). Inspired by the composer reading about asteroids. Tries to portray collisions between asteroids and other bodies, like Earth. On YouTube: <https://www.youtube.com/watch?v=EhM1sHu3msY> (The composer later wrote two companion pieces called *Juno* and *Torino scale*.)
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## Astronomers

### Classical:

- Adams, John *Dr. Atomic* An opera; DVD's available with the Metropolitan Opera and the Netherlands Opera. Focuses on the emotions and thoughts of J. Robert Oppenheimer and those closest to him on the eve of the first test of the atomic (nuclear fission) bomb. We include this because, early in his career, Oppenheimer did work on neutron stars and black holes. (A long 2008 discussion at City University of NY about the making of the opera can be seen at: <https://www.youtube.com/watch?v=LS9wuuqKrxqI>)
- Bentzon, Niels "Chronicle on Rene Descartes" on *Contemporary Danish Orchestra Music, vol. 1* (Danish National Radio Symphony Orchestra on BIS). One movement is inspired by Descartes' ideas on "vortexes," which are part of the history of thinking about how the solar system formed. (No website or YouTube available.)
- Borresen, Hakon *At Uranienborg: Tycho Brahe's Dream* (Aalborg Symphony on Dacapo or Naxos). A 1924 ballet that takes place at Tycho's observatory on the island of Hven, and features dancers who are stars, a comet, and the supernova of 1572. ([https://www.youtube.com/watch?v=o4Nce2n7T3U&list=OLAK5uy\\_krnOBGKKTv8F2LOxErWUrbgRqi9g50SRA](https://www.youtube.com/watch?v=o4Nce2n7T3U&list=OLAK5uy_krnOBGKKTv8F2LOxErWUrbgRqi9g50SRA))
- Davies, Victor "Transit of Venus," a 2007 opera about the life and work of 18<sup>th</sup> century astronomer Guillaume Le Gentil (excerpts from a Manitoba Opera production are at: <https://www.youtube.com/watch?v=Ip-hHdKhYi0>)
- Glass, Philip *Galileo Galilei: An Opera* (on 9mm CD recorded at the Portland Opera). A retrospective through Galileo's life and work, going from old age back to his youth. (See: [https://en.wikipedia.org/wiki/Galileo\\_Galilei\\_\(opera\)](https://en.wikipedia.org/wiki/Galileo_Galilei_(opera)) for information; for some glimpses of the Portland production, see: [https://www.youtube.com/watch?v=IhL\\_C3QqaY8](https://www.youtube.com/watch?v=IhL_C3QqaY8))
- Glass, Philip *Kepler: An Opera* (on 9mm Orff CD and DVD, recorded at the Upper Austrian State Theater). 2009 opera explores scientific and personal themes in Kepler's work. (For an excerpt with the Prologue, see: <https://www.youtube.com/watch?v=ctx46UA2hF8>)
- Gorecki, Henryk *Symphony 2 (Copernican)* (Polish National Radio Symphony Orchestra on Naxos). Commissioned to celebrate the 500<sup>th</sup> anniversary of Copernicus' birth; includes some text from his book *De Revolutionibus*. (Background information at: <http://unsungsymphonies.blogspot.com/2010/08/hey-copernicus-goreckis-second-symphony.html>; Music on YouTube at: [https://www.youtube.com/watch?v=JF\\_h9147RIw](https://www.youtube.com/watch?v=JF_h9147RIw))

Hindemith, Paul *The Harmony of the World* (Berlin Rundfunk Symphony on Wergo) An opera, first performed in 1957, about the life and musical ideas of Johannes Kepler, who thought there was an intimate connection between the harmony of planetary motions and the harmonies in music. (Sound recording at: <https://www.youtube.com/watch?v=q8MFI8-TiKI>; brief review: <https://www.gramophone.co.uk/review/hindemith-die-harmonie-der-welt>)

Koechlin, Charles *Vers la Voute Etoilee (Toward the Starry Vault)* (Stuttgart Radio Symphony Orchestra on Hanssler). An orchestral nocturne dedicated to the memory of French astronomer and astronomy popularizer Camille Flammarion, whose books originally led the composer to think about a career in astronomy, before he turned to music. He described the piece as "...a journey to very distant places, far away from the Earth..." (More information at: <https://www.allmusic.com/composition/vers-la-vo%C3%BBte-%C3%A9toil%C3%A9e-symphonic-poem-op-129-mc0002549810>; Music is on YouTube at: <https://www.youtube.com/watch?v=ctPTaigcRTE>)

McClure, Glenn *Starry Messenger*, an oratorio based on Dava Sobel's book *Galileo's Daughter*, and the letters Galileo and his daughter exchanged. Unfortunately, I can't find a recording of it, but the story of how it came about is discussed here: [https://www.rochestercitynewspaper.com/rochester/star-search/Content?oid=2132426`](https://www.rochestercitynewspaper.com/rochester/star-search/Content?oid=2132426)

Pennypacker, Carl *Falling Through a Hole in the Air: The Incredible Journey of Stephen Hawking* (a light opera written with science writer Judith Goldhaber). For more information, see: <https://www.sfgate.com/performance/article/A-Brief-History-of-Hawking-Musical-City-College-3006475.php> (For an excerpt, see: <https://www.youtube.com/watch?v=UXjwZlqJwos&t=62s>)

Smit, Leo "Copernicus: Narrative and Credo" on *American Masters: Leo Smit Collection* (on CRI). With text by astronomer Fred Hoyle. Written in honor of the 500<sup>th</sup> anniversary of Copernicus' birth; contains a moving declaration of cosmic belief from Hoyle. You can hear that "Credo" at: <https://www.youtube.com/watch?v=3J9583fiOws>

*See also the heading "Einstein"*

### Popular Music:

Grant, Amy "Galileo" on *Heart in Motion* (on A&M). Compares the singer's attraction to her lover to Galileo's attraction to starlight. (Recording at: [https://www.youtube.com/watch?v=hxIE\\_cnm8aA](https://www.youtube.com/watch?v=hxIE_cnm8aA))

Indigo Girls "Galileo" on *Rites of Passage* (on ). The singer is thinking about life and the possibility of reincarnation, and sees Galileo as the exemplar of how humanity can get life right. (<https://www.youtube.com/watch?v=WA0jsb2yhW4>)

Knopfler, Mark "Sailing to Philadelphia" on *Sailing to Philadelphia* (on Warner Brothers). About Mason and Dixon (known for the Mason-Dixon line in the U.S.) and their surveying expedition; refers to the fact that Mason was an astronomer. (Performed live at: <https://www.youtube.com/watch?v=OTvc-bEP35I>)

Rundgren, Todd "Hawking" on *Nearly Human* (on Warner Brothers). A moving meditation on Hawking's work and disability. (Performed live at: <https://www.youtube.com/watch?v=59zckD8rNDA>)

*See also "Einstein".*

## **Astronomy in General**

### Classical:

Barrett, Richard *Dark Matter* (on NMC). This very modern and complex piece is inspired by new and old ideas in astronomy and physics, and includes text or ideas from Lucretius, Eratosthenes, Hesiod and other ancient and medieval thinkers. For the composer's thinking, see:

- <https://richardbarrettmusic.com/DARKMATTERinterview.html>. To listen:  
<https://www.youtube.com/watch?v=rWTkns14kX4>
- Eotvos, Peter “Cosmos” on *IMA* (on Budapest Music Center). Piece for two pianos, inspired by Yuri Gagarin’s first space flight; the composer says he was thinking of a mixture of astronomical ideas, including the Big Bang, comets, asteroids, meteorites; the piece ends “a quarter of a second before the next big bang.” (<https://www.youtube.com/watch?v=IF6I5IfxnGA>) The same composer has a more recent piece called “Multiversum”: <https://www.youtube.com/watch?v=P5zZMIhAMy0&t=39s>)
- Granados, Enrique *The Song of the Stars* (on Naxos). A 1911 piece, recently rediscovered, with a triple chorus singing poems that take a mystical view of the starry sky.  
[https://www.youtube.com/watch?v=wV\\_trrowy7U](https://www.youtube.com/watch?v=wV_trrowy7U))
- Ives, Charles *Universe Symphony* (on Pitch.) American composer Ives left only sketches for this ambitious symphony celebrating the evolution of life on Earth and our planet being part of the cosmos. It was assembled and completed by Johnny Reinhard; see: <https://stereosociety.com/of-pitch-and-time/> Section titles include: “Pulse of the Cosmos” and “Earth is of the Heavens.”  
<https://www.youtube.com/watch?v=OT2E13p3sLw>)
- Ivey, Jean Eichelberger *Three Songs of the Night* (on Folkways). One of the songs is a setting for Walt Whitman’s poem “When I Heard the Learned Astronomer.” On other recordings, she also has pieces entitled *Aldebaran* and *Solstice*. ([https://www.youtube.com/watch?v=vnpP2dC\\_sWE](https://www.youtube.com/watch?v=vnpP2dC_sWE))
- Lehar, Franz *The Stargazer (Der Sterngucker)* (on CPO). A comic operetta whose title character is an absent-minded “head in the stars” astronomer, who learns the ways of love through the machinations of his sister and her friends.  
[https://www.youtube.com/watch?v=8bPzrN8t0FM&list=PLKS1Ght1Kif5JC46LkyCmwK3\\_y4XDV9NL](https://www.youtube.com/watch?v=8bPzrN8t0FM&list=PLKS1Ght1Kif5JC46LkyCmwK3_y4XDV9NL))
- Messiaen, Olivier *From the Canyons to the Stars* (on several recordings). Complex, modern orchestral piece, with sections called “What is Written in the Stars,” “Interstellar Call,” and “The Resurrected and the Song of the Star Aldebaran.” (<https://www.youtube.com/watch?v=5DjgpPL7RhA>)
- O’Regan, Tarik *A Celestial Map of the Sky* (on NCM). A piece for orchestra and chorus inspired by astronomical charts, and philosophical views of the sky and our relationship to it.  
[https://www.youtube.com/watch?v=YMnQ3\\_cUheE](https://www.youtube.com/watch?v=YMnQ3_cUheE))
- Penderecki, Krzysztof *Kosmogonia* (on Naxos and other labels). This modern, often dissonant 1970 oratorio includes quotations from Copernicus, John Glenn, and others.  
<https://www.youtube.com/watch?v=JyC7WBuyQYo>)
- Pickard, John *A Starlit Dome* (Raymond Clarke, piano, on Diversions). A 1965 “astronomical nocturne”, which the composer says was inspired by his being a “keen amateur astronomer.” The piece reflects his feelings about watching celestial sights such as the Orion Nebula, through his telescope.  
<https://www.youtube.com/watch?v=NpSRMBK8cLE>)
- Prado, Almeida *Cartas Celestes (Celestial Charts)* (part one is a piano piece available in several recordings and in performance on YouTube). Jose Antonio Rezende de Almeida Prado was a Brazilian composer who wrote a series of pieces entitled Celestial Charts, the first of which -- for piano -- was commissioned for the planetarium in Sao Paolo. The pieces take their names and draw inspiration from a wide range of astronomical objects. In the first one, the globular cluster M13 has a recurring turn. (<https://www.youtube.com/watch?v=KrJyUvclaKk>)
- Renzo, Giovanni *Atlas Coelestis: The Music and the Stars* (Book and DVD available in Italian). In this piece for piano, computer and video, astronomical images accompany a contemplation of things astronomical, from the discovery of the moons of Jupiter by Galileo, to Cygnus X-1, to modern ideas of a multiverse. Produced with assistance from Gianluca Masi of the Planetarium of Rome.  
<https://www.youtube.com/watch?v=ATMYCKi3a1w>)
- Ruders, Poul *Serenade on the Shores of the Cosmic Ocean* (a piece for accordion and string quartet; with Mikko Louma on Bridge). Inspired by Carl Sagan’s book/TV series *Cosmos*, this piece by a living Danish composer explores with music some ideas about space and our thinking about cosmic perspective on Earth. (For an excerpt, see: <https://www.youtube.com/watch?v=1lpUZfVniHs>)

Simpson, Robert *String Quartet No. 7* (Delme String Quartet on Hyperion). Written for the 100<sup>th</sup> anniversary of the birth of astronomer James Jeans, by a composer who was himself an avid amateur astronomer (and a Fellow of the Royal Astronomical Society), this piece shows a universe “quiet and mysterious, yet pulsating with energy.” ([https://www.hyperion-records.co.uk/dc.asp?dc=D\\_CDA66117](https://www.hyperion-records.co.uk/dc.asp?dc=D_CDA66117))

Talbot, Joby *Worlds, Stars, Systems, Infinity* (see the DVD of Holst’s *The Planets* by conductor Essa-Pekka Salonen on Signum Vision). Continues the Holst journey through the solar system outward, but without the reference to astrology. The composer discusses his thinking about the piece at: <https://www.youtube.com/watch?v=f4dgtbXALVw>

Weir, Judith *Moon and Star* on *The Welcome Arrival of Rain* (on NMC). Orchestral setting of the Emily Dickinson poem “Ah, Moon and Star” about the great distances between astronomical objects and people. (<https://www.youtube.com/watch?v=4Vw8ht8aIGE>)

Zaimont, Judith Lang *Solar Traveller* (concerto for piano and wind orchestra.) Section titles are: “Outward Bound,” “Nocturne (Lunar),” and “Ad astra per aspera”. (First movement is at: <https://vimeo.com/7476114>)

### Popular Music:

Armor for Sleep “Slip Like Space” on *Dream to Make Believe* (on Equal Vision Records.) Dissatisfied with life on Earth, the singer dreams of traveling through space, past the Moon, into the Milky Way, through a wormhole. (<https://www.youtube.com/watch?v=ZcYpAvuf8ts>)

Blur “Far Out (the Beagle 2 Version)” on the *No Distance Left to Run DVD*. Lyrics mention a lot of astronomy, including names of Jupiter’s moons and well-known star names, plus the universe being 10 billion lightyears wide. The song was part of what was sent aboard the ill-fated Beagle 2 mission to Mars. (<https://www.youtube.com/watch?v=fu1DCI9P7M0>)

Bock, Jerry and Harnick, Sheldon “Perspective” in *She Loves Me* (on Decca/Polydor) A song in this old-fashioned 1963 musical takes a cosmic view of human goings-on and has a nice series of astronomy images. (<https://www.youtube.com/watch?v=jiG4V6-SThQ>)

Echo Movement *Love and the Human Outreach* (on Jersey Shore Island Beat). On this 2012 album, the reggae-rock-space-music band uses actually transit data from two candidate star systems in the Kepler mission catalog (processed by the Georgia Tech Sonification Lab) as rhythm elements and includes some audio from the Voyager golden record. ([https://www.youtube.com/watch?v=RJ2AmqU5XFg&list=PLYvRZhIOZAwbTrsTAo7H0g\\_Lbnsf05Pko](https://www.youtube.com/watch?v=RJ2AmqU5XFg&list=PLYvRZhIOZAwbTrsTAo7H0g_Lbnsf05Pko); Lyrics: <https://genius.com/albums/Echo-movement/Love-and-the-human-outreach>)

Echosmith “Bright” on *Talking Dreams* (on Warner Brothers). A song that uses images from astronomy (shooting stars, Jupiter, shining bright) to express the feeling of having just fallen in love. (The official video is all about going on a star party camping trip with your friends and enjoying meteors in the night sky: <https://www.youtube.com/watch?v=kMAzstG5O7E>)

Emerald Rose “Urania Sings” on *Archive of Ages to Come* (on Emerald Rose.) This 2005 song by a Celtic folk rock group is about the effect of the muse of astronomy on astronomers (and the singer). It’s full of images of the night and uncovering the secrets of the universe.

(<https://www.youtube.com/watch?v=osFpxEXuX1A>) We also like their song about evolution, “We Come from Monkeys,” on the same album. (<https://www.youtube.com/watch?v=WS4LrbHGLL4>)

Grateful Dead “Throwing Stones” on *In the Dark* (on Arista.) The song takes the perspective of seeing planet Earth and humanity from space. ([https://www.youtube.com/watch?v=rbiqeqYk\\_V4](https://www.youtube.com/watch?v=rbiqeqYk_V4))

Jethro Tull “Astronomy” on *Under Wraps* (on Chrysalis). Stuck in a traffic jam, the singer fantasizes about doing astronomy and seducing “Miss Galileo,” mentions telescopes, black holes, quasars and the Big Bang. (<https://www.youtube.com/watch?v=M2MNq1XMX50>)

Monty Python “Galaxy Song” on *Monty Python Sings* (on Virgin). This comic song about our insignificance in the scheme of the Universe includes an array of astronomical facts.

(<https://www.youtube.com/watch?v=hkkjzmuEBbo>)

- Moody Blues “The Best Way to Travel” on *In Search of the Lost Chord* (on Deram). Including several astronomical references, this “spacey” song emphasizes (as does every astronomy course) that “thinking is the best way to travel” over interstellar distances.  
(<https://www.youtube.com/watch?v=YqOiZjwQKaU>)
- Oldfield, Mike “Saved by a Bell” on *Discovery* (on Blue Plate Caroline). Lyrics are about an observing session, looking at Sagittarius, Aquarius, the Milky Way and planets.  
(<https://www.youtube.com/watch?v=gVzG9siO704>)
- Reeves, Natty “Orbit” on *Soul Drive* (on Deep Matter). Astronomical images are used to describe the singer’s lover, including “shooting stars light across the sky” and “your stare tighter than Orion’s belt.” (<https://www.youtube.com/watch?v=gFiRtMNxGYY>)
- Rush “Entre Nous” on *Permanent Waves* and *Snakes & Arrows Live* (on Anthem). Uses the planets’ orbits in space as a metaphor for human loneliness.  
(<https://www.youtube.com/watch?v=sodthxK1z44>)
- Sleeping at Last “Venus” on *Atlas: Year One* (on Independent). A love song to the singer’s wife, using a lot of astronomical images, particularly of a telescope seeming to bring them closer.  
(<https://www.youtube.com/watch?v=EFTs2K8rOTs>)
- Sparro, Sam “Black and Gold” on *Sam Sparro* (on Island Records). Singer looks out into the universe, ponders evolution, and questions the existence of God.  
(<https://www.youtube.com/watch?v=8fc2CfBQD70>)
- Tunstall, KT “Universe & U” on *Eye to the Telescope* (on Relentless). Song about a feeling of belonging to the universe and a relationship, by a singer whose father was a physics lecturer at St. Andrews University. (<https://www.youtube.com/watch?v=Vw9ytWOJCa4>)
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## **Black Holes**

### Classical:

- Gandolfi, Michael *The Garden of Cosmic Speculation* (Robert Spano and the Atlanta Symphony on Telarc). The “Black Hole Terrace” section of this suite of music (inspired by a Scottish garden that embodies ideas in modern physics): [https://en.wikipedia.org/wiki/Garden\\_of\\_Cosmic\\_Speculation](https://en.wikipedia.org/wiki/Garden_of_Cosmic_Speculation)) features such sections as “The Distant Grasp of the Black Hole,” “Crossing the Event Horizon,” “The Energy Jet,” and “Beyond the Black Hole.” (<https://www.youtube.com/watch?v=BsTJ08fVwYw>)
- Wiltgen, Roland *Wormholes*. Chamber music inspired by the notion that a black hole might open up into a pathway to other spaces or times, called a “wormhole.” Listen at: <https://soundcloud.com/roland-wiltgen/wormholes>

### Popular Music:

- Aqualung “Black Hole” on *Memory Man* (on Sony). Compares the hopelessness of a relationship to the hopelessness of getting out of a black hole. Uses words from astronomy: singularity, supernova, lines versus circles, etc. (<https://www.youtube.com/watch?v=-LI63AIQVvI>)
- Ayreon “To the Quasar” on *Universal Migration Part II* (on InsideOut). Part of a “rock-opera” or storyline album by a Dutch group, this song tells of travel by the neutron star in the Crab Nebula and on to the supermassive black hole in 3C273. Their other albums also have a significant amount of science, often mixed with science fiction. (<https://www.youtube.com/watch?v=MwkLyw7VKrE>)
- Ayreon “Into the Black Hole” on *Universal Migration Part II* (on InsideOut). Part of the concept album described above, the lyrics are evocative of conditions near/in a black hole.  
(<https://www.youtube.com/watch?v=bUhfBMC5MNw>)

Black, Frank “Places Named After Numbers” on *Frank Black* (on Electra). A love song to a black hole, with lyrics such as “And though it seems from here, That she was never there, Light beams disappear, Into her blackened hair.” (<https://www.youtube.com/watch?v=YW1nbALCBlk>)

Gamma Ray “Beyond the Black Hole” on *Somewhere Out in Space* (on Noise). Heavy metal song about falling into a black hole -- with an emphasis on the idea that you don’t come back. (<https://www.youtube.com/watch?v=WRzdv34SGZY>)

Labelle “Black Holes in the Sky” (on the album *Phoenix*, now available on CD as part of *Nightbirds/Phoenix/Chameleon* on 101 Distribution). Offers the death of stars and black holes as metaphor for the careers of rock stars. (<https://www.youtube.com/watch?v=yrPaoUpbkn4>)

Lear, Amanda “Black Holes” on *Never Trust a Pretty Face* (1979 album, now out of print; the song is available on greatest hits CD’s, such as Sony’s *The Sphinx*). Compares an all-consuming love to a black hole; lyrics include; “Like a black hole in the sky, You crush me from your universe, What you want you just erase without a trace, Like a fantastic goodbye.” (<https://www.youtube.com/watch?v=Iv9TPqt2ITo>)

Rush “Cygnus X-1” on *Farewell to Kings* (on Mercury/Universal). Portrays ideas around the discovery of the first stellar-mass black hole. Lyrics include: “Headlong into mystery, The x-ray is her siren song, My ship cannot resist her long, Nearer to my deadly goal, Until the Black Hole -- Gains Control...” (<https://www.youtube.com/watch?v=ZeQLVxBczBY>) (The British Marvel comics version is at: <http://www.cygnus-x1.net/links/rush/comicbook-cygnus-x1-b1.php>)

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## Calendar, Time, Seasons

### Classical:

Bayer, Josef *Sonne und Erde* (Slovak Radio Philharmonic on Naxos). A ballet based on the relationship between Sun and Earth during the four seasons. (No YouTube video available.)

Harrison, Lou *Solstice*, a ballet (California Symphony on Phoenix). Depicts mythological and physical aspects of the solstices, and the fear that “is everything going to get hotter and will we all burn up” contrasted with “is everything going to get darker and we will head into oblivion?” (<https://www.youtube.com/watch?v=A8XK-EcAgZw> includes a brief talk before the music explaining the piece)

Kraggerud, Henning *Equinox* (on Simax). Four concertos, each containing six pieces, making 24 parts, each corresponding to a time zone on Earth, which tour both the world and the circle of fifths in the music. (For a short excerpt, see: <https://www.youtube.com/watch?v=XFi7aeEkU8k>)

Vivaldi, Antonio *The Four Seasons* (hundreds of recordings are available). Early program music that depicts characteristics of the four seasons in the northern hemisphere, such as a summer thunderstorm. (See, for example, <https://www.youtube.com/watch?v=ygpf6mxTUeY>)

### Popular Music:

Pink Floyd “Time” on *Dark Side of the Moon* (Harvest/Capitol). Uses the image of the Sun racing to rise and set to illustrate the inexorable passing of time in human lives. (<https://www.youtube.com/watch?v=rL3AgkwbYgo>)

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## Comets

### Classical:

Finzi, Gerald “The Comet at Yell’ham” part of the collection of songs, *A Young Man’s Exhortation* (on Naxos). This is a setting for voice and piano of a short poem by Thomas Hardy about Donati’s Comet of 1858. (<https://www.youtube.com/watch?v=s1VX03mgmWg>)

Holmen, Jaxper *Oort Cloud* (on DeCapo). This 1-hour-long piece of modern ambient classical music is meant to surround the listener, much as the Oort Cloud surrounds the solar system.

(<https://www.youtube.com/watch?v=3D2pqV98IuU>)

Waterhouse, Graham “Hale-Bopp” on *Portrait 2* (English Chamber Orchestra on Meridian). This 1997 piece celebrates a bright comet with scoring that the composer says “evokes an other-worldly atmosphere.” It ends with 16<sup>th</sup> century chorale tune “How Brightly Shines the Morning Star.”

(<https://www.youtube.com/watch?v=p7-cbHLZBK4>)

Also see Glenn McClure’s *Rosetta under Space Travel*.

### Popular Music:

Blue Rodeo “Comet” on *Palace of Gold* (on Warner). Country-and-western meditation on how a comet goes on and on along its orbit unconcerned with human emotions. (Lyrics at: <https://genius.com/Blue-rodeo-comet-lyrics>)

Mary-Chapin Carpenter “Halley Came to Jackson” on *Shooting Straight in the Dark* (on Columbia).

Country music song about the pass of Halley’s Comet in 1910, as observed by the singer’s parents.

(<https://www.youtube.com/watch?v=Om3j8VP1oCI>)

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### Constellations

#### Classical:

Boyadjian, Hayg *Cassiopeia* and *Perseus* (by various performers on the album *Vientos* on Albany). The composer, an active amateur astronomer, writes “I have taken the shapes of the stars that form the constellations and plotted them on the music staff... in *Cassiopeia*, a five-note cell traces the letter W on the staff...” (<https://www.youtube.com/watch?v=ji-n0uMJUIg>)

Boyadjian, Hayg *Scorpius Rising* (Polish Radio National Symphony Orchestra on Opus One). A tone poem in which the composer also uses the shape of the constellation to make a principal motif, but also portrays the rising of the constellation in the spring evening sky and contrasts peaceful scenes of the stars with the violence of supernovae. (No YouTube video available.)

Cage, John *Atlas Eclipticalis* (S.E.M. Ensemble Orchestra on Asphodel). Cage, the notorious “bad boy” of modern music, put musical note paper on the pages of a star atlas and let the arrangement of the stars determine the pattern of the notes. The project continues with another piece, *Etudes Australes*, for piano, whose score is based on southern hemisphere star maps. (Performance with an introductory lecture by Leonard Bernstein: <https://www.youtube.com/watch?v=nky14InylDM>)

Crumb, George *Makrokosmos*, vol. I and II (a number of performances are available). Each volume of this cycle of piano pieces has its 12 parts named after the constellations of the zodiac (or perhaps the signs), but a number of the individual pieces are named after astronomical phenomena, such as “The Abyss of Time,” “Spiral Galaxy,” “Twin Suns,” and “Voices from the Corona Borealis.” The fourth, eighth, and 12<sup>th</sup> piece in each volume has a score in the shape of something, like a spiral galaxy. (Vol I: <https://www.youtube.com/watch?v=3YTix06IwT4>; Vol. II: [https://www.youtube.com/watch?v=L\\_sKMxjmCRE](https://www.youtube.com/watch?v=L_sKMxjmCRE))

Edwards, Ross *Symphony 4: Star Chant* (on ABC Classics Australia). With text by astronomer Fred Watson, this piece traverses the northern and southern constellations, using both European and aboriginal names for stars, clusters, and constellations. For more details, see:

<http://www.rossedwards.com/symphony-no-4-star-chant-2001/>

(<https://www.youtube.com/watch?v=e5iWN-rhzJM>)



Glass, Philip *Orion* (on Orange Mountain Music). Commissioned for the 2004 Olympics in Athens, this multi-cultural piece (played on instruments -- and performed by players -- from around the world) draws its inspiration from the different myths based on the constellation of Orion. (Information at: <http://philipglass.com/compositions/orion/>; a recording at: <https://www.youtube.com/watch?v=DHJ163ZWDC4&list=PLGxaqBTVsgeOJLAbKIFJ5fpBdSrlInF3T>)

Saariaho, Kaija *Orion* (on Ondine). A 2002 orchestral piece inspired by both the mythology of Orion and its role as a constellation. Sections include “Winter Sky” and “Hunter.” ([https://www.youtube.com/watch?v=-7n36U\\_2kJY](https://www.youtube.com/watch?v=-7n36U_2kJY))

Takemitsu, Toru *Orion and Pleiades* (on *A Flock Descends* on BIS) Piece for piano and cello, part of his “constellations” series, which also includes *Gemini* and *Cassiopeia*. Information at: <https://www.allmusic.com/composition/orion-pleiades-for-cello-orchestra-mc0002473881>; recording at: <https://www.youtube.com/watch?v=RxCsbcaL3Zk>)

Tanaka, Karen *The Zoo in the Sky* (on RCA/BMG). Subtitled “piano pieces for children with small hands,” many are named after constellation pictures (though not necessarily Western ones), while four are entitled “Star Song.” (Individual pieces can be found on YouTube played by children in recital, such as: <https://www.youtube.com/watch?v=QijRw4aeNF0>)

Vaughan Williams, Ralph *The Sons of Light* (e.g. David Lloyd-Jones conducting on Naxos). Part of this rather mystical cantata, written by Ursula Wood, soon to be the composer’s wife, concern the signs (constellations) of the zodiac and their annual march across the sky. (<https://www.youtube.com/watch?v=R-jQ0-ZdH54>)

Vivier, Claude *Orion* (on Naxos). Orchestral music made up of seven motifs, one for each of the bright stars in the constellation of Orion. (<https://www.youtube.com/watch?v=UOYOZfDL2As>)

#### Popular Music:

Jethro Tull “Orion” on *Stormwatch* (on Chrysalis). Uses images of Orion and Canis Major to contrast the majesty of the skies with the misery down on Earth. (<https://www.youtube.com/watch?v=frGRu1pbgl>)

Johnson, Jack “Constellations” on *In Between Dreams* (on Brushfire.) This simple folk-rock song takes its central idea from watching the constellations and hearing the singer’s father tell the stories behind them. (<https://www.youtube.com/watch?v=eTXmseLoJh4>)

McKeown, Susan “Bold Orion” on *Through the Bitter Frost and Snow* (on Prime). Nice images of the constellation of Orion the hunter in the winter skies, contrasted with the impermanence of earthly things. (<https://www.youtube.com/watch?v=ny9TpH2oGLO>)

They Might Be Giants “See the Constellation” on *Apollo 18* (on Elektra). Singer compares the emptiness of his life after his “lady” leaves to the emptiness of a constellation figure -- “just a guy made of dots and lines.” (Also refers to light pollution making star patterns difficult to see from cities.) (<https://www.youtube.com/watch?v=sAlusliGvCc>)

## **Cosmology**

### Classical:

Bedford, David *Star’s End* (on Virgin). Piece for orchestra concerned with entropy and “the heat death of the universe;” that phrase was Bedford’s preferred title for the piece, but the publisher did not want the word “death” in the title. (<https://www.youtube.com/watch?v=PefTjeTNH5A>)

Borenstein, Nimrod *The Big Bang and the Creation of the Universe* (on Chandos). We list this piece because of its title; the composer indicates that it was inspired more by the beginning of the book of Genesis than by science. (See the 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> pieces at:

<https://www.youtube.com/watch?v=9o7bmBDOnV4&list=PLRa76X13WaMbB9SDGQspMFY8wbPeIPtIO>

Coates, Gloria *Holographic Universe* on *At Midnight* (on Tzadik). Piece for violin and orchestra whose three sections are: Dark Energy, Mirror Manifolds, and Holographic Universe. Interestingly, the piece is said to be from 1975, before “Dark Energy” had its current cosmological meaning.

(<https://www.youtube.com/watch?v=YXusTwp7w>)

Hart, Mickey *Rhythms of the Universe*. Grateful Dead drummer Mickey Hart and Nobel laureate and cosmologist George Smoot have cooperated on a film that explores interactions between music and science: <https://www.mickeyhart.net/news/mickey-hart-and-george-smoot-talk-rhythms-universe-4956>. They discuss and show the film at: <http://www.ustream.tv/recorded/39395730>

Kubian, Darryl *3-2-1 Violin Concerto*. The movements are called “Big Bang,” “Zeno’s Paradox,” and “Distant Suns” (where the universe has expanded so much it’s hard to see other parts of it). The composer was inspired by a cosmology article he read in *Scientific American* magazine in 1999. (<https://www.youtube.com/watch?v=ukS-AeuVyPc>) (For a documentary about Kubian and the concerto, see: <https://www.youtube.com/watch?v=wd0mTKNmeVw&t=3s>; the discussion of the concerto starts 5 minutes in.)

Parmegiani, Bernard *La Creation du Monde* (on INA). Electronic music portraying the beginning of the universe and emergence of life, inspired by the composer’s reading of popular science works by Hubert Reeves, Carl Sagan, Steven Weinberg, and others. (A review is at: <http://www.iac.lu.se/events/bernard-parmegiani-la-creation-du-monde-acousmatic-lab-concert/> and an excerpt at: <https://www.youtube.com/watch?v=nLkBbbCZMx0>)

Payne, Anthony *Time’s Arrow* (Andrew Davis, conductor, on NMC). Portrays a Big Bang, an expanding universe, and a universal contraction. The composer intends the piece to be a meditation on the nature of time and its perception. Unfortunately, the composer decided to begin the piece with a section called “The Void” -- “expectant emptiness waiting to be filled” -- which could reinforce the mistaken notion that the big bang was an explosion IN space, rather than OF space.

([https://www.youtube.com/watch?v=Sju5fVYJ34A&list=OLAK5uy\\_kRqNPZXOtAHSYYhzPH15YNJJ87rRzHb0](https://www.youtube.com/watch?v=Sju5fVYJ34A&list=OLAK5uy_kRqNPZXOtAHSYYhzPH15YNJJ87rRzHb0))

Say, Fazil *Universe (Symphony 3)* includes a movement entitled “Expansion of the Universe,” which the composer tries to portray in the music. The symphony has a Wikipedia entry at at: <https://www.youtube.com/watch?v=gm9evI4-D6c>

Sisler, Hampson *The Big Bang* (on *Classics, Eclectic: Geophysics and Bach* conducted by Arkady Leytush on MSR Classics). We include this with some hesitation, since it starts with a void, then has a Bang, then portrays the formation of the Earth, and only then “the remainder of our solar system forms.” Thus, this is more a biblical than an astronomical sequence, but the composer, an organist and ophthalmologist in New York, clearly has an interest in science, with such other pieces as *Thermals*, *Rising* and *Tsunami*. (The album can be heard here, after two Bach pieces:

[https://www.youtube.com/watch?v=IK134i8V9vI&list=OLAK5uy\\_IV7FUJvXwt81unn70PRzC6NFjMOR9FzQ0](https://www.youtube.com/watch?v=IK134i8V9vI&list=OLAK5uy_IV7FUJvXwt81unn70PRzC6NFjMOR9FzQ0))

Stockhausen, Karlheinz *YLEM* (London Sinfonietta on Stockhausen Verlag). Takes its title from the ancient Greek term for primeval material revived by George Gamow; tries to portray the oscillating universe in musical terms. Players actually expand through the concert hall, just as the universe does, and then return and expand again. (<http://www.stockhausen.org/ylem.html>)

### Popular Music:

Bad Religion “Big Bang” on *No Control* (on Epitaph). The chorus of this anti-religion song begins “Big Bang, Big Crunch, you know there’s no free lunch” and the song vaguely contrasts human ideas of the end of things with cosmological ones. (<https://www.youtube.com/watch?v=GBs20XMdeMI>)

Barenaked Ladies “The Big Bang Theory Theme” on *Hits from Yesterday and the Day Before* (on Rhino). The song from the TV comedy includes many scientific terms and ideas. Correctly says that the Big

Bang was about 14 billion years ago, but then says the universe will collapse one day, which is not what current data indicate. ([https://www.youtube.com/watch?v=CMSYv\\_Z4SI8](https://www.youtube.com/watch?v=CMSYv_Z4SI8))

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## Earth

De Meij, Johan *Planet Earth (Symphony 3)* (on Naxos or Cryston). A complex piece with electronic effects inspired by our planet as a body in space. The composer discusses the piece at: [http://johandemeij.com/cd\\_profile\\_main.php?id=14&cat=9](http://johandemeij.com/cd_profile_main.php?id=14&cat=9) (Listen at: <https://www.youtube.com/watch?v=v1okVbpT2eM>)

Zaimont, Judith *Chroma: Northern Lights* (on Naxos). Conveys the colorful and varying phenomena of the aurora in musical terms. (<https://www.youtube.com/watch?v=wtlYvWv1uLk>) See also her pieces “Sky Curtains” on the album *Neon Rhythm*.

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## Eclipses

### Classical:

Handel, George F. “Total Eclipse:” an aria from the oratorio *Samson*. (many recordings). Poignant song, comparing Samson going blind with an eclipse of the Sun. (See, for example: <https://www.youtube.com/watch?v=8bWE1vZ9OKw>)

Hovhanness, Alan *Sonata on the Long Eclipse of the Moon July 6, 1982* (Nicola Giosmin on Taukay). Portrays some of the physical and personal aspects of watching the full Moon turn dark and then coming back into the light; by a prolific 20<sup>th</sup> century Armenian-American composer who plays with astronomy in a number of his pieces. (<https://www.youtube.com/watch?v=FJ3RbNINJ-s&list=PLCFE80FAA9C1305F8>)

Saariaho, Kaija *Notes on Light* (Orchestre De Paris on Ondine). In this modern piece for cello and orchestra, the composer tries to portray properties of light and phenomena with light through musical textures. The fourth movement is called “Eclipse”. ([https://www.youtube.com/watch?v=hQSV5qFv\\_T0&list=OLAK5uy\\_kX8BGQgfO-gRlj3BQkeTk5Z6DiTIOiybo](https://www.youtube.com/watch?v=hQSV5qFv_T0&list=OLAK5uy_kX8BGQgfO-gRlj3BQkeTk5Z6DiTIOiybo))

Tsontakis, George *Eclipse* (piece for clarinet, violin, cello, and piano; Broyhill Chamber Ensemble on Koch). Written after the composer observed a lunar eclipse in 1995, the music reminds him of “the eclipsing shadow... as it softly invaded the hazy luminescent circle, and later, the shadow leaving the sphere just as quietly as it had first entered.” (<https://www.youtube.com/playlist?list=PLGxaqBTVsgeOaa0KkHu-pJKzmMUTbxFpf>)

### Popular Music:

Tyler, Bonnie “Total Eclipse of the Heart” on *Faster than the Speed of Night* (on Sony). 1983 song by a Welsh singer using eclipse images -- shadows, being in the dark, “no one in the universe as magical as you” -- to describe a love affair going wrong. (<https://www.youtube.com/watch?v=lcOxhH8N3Bo>)

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## Einstein

Dessau, Paul *Einstein* (Otmar Suitner, conductor on Edel). Eastern European opera from early 1970’s; focus on Einstein’s “decisions and their social consequences”. Perpetuates myth that Einstein was one of the “fathers of the atomic bomb”; quite a bit of political propaganda. Galileo and Giordano Bruno also appear. (Start at: <https://www.youtube.com/watch?v=OBobq7pERkg>)

Glass, Philip *Einstein on the Beach* (on Elektra Nonesuch; and other labels). A minimalist opera in which Einstein the man and Einstein's work serve as "mantras" for meditating on current events, mental illness, space and time. (For a documentary about it, see:

<http://www.youtube.com/watch?v=Urp17NzYpc>; Hear it at:

<https://www.youtube.com/watch?v=xiMr1EvGmw&list=PL7lkY6oE82FwBYdmF5TWSBcDHlecGSGrn>)

McTee, Cindy *Einstein's Dream* on a recording with *Symphony 1* (on Naxos). A piece based on Alan Lightman's book of the same name, which examines many aspects of time. The composer's intentions are explained at: [http://www.cindymctee.com/einsteins\\_dreams.html](http://www.cindymctee.com/einsteins_dreams.html) (Listen at:

<https://www.youtube.com/watch?v=5BwypnzePD8>)

Wolpe, Stefan *Excerpts from Dr. Einstein's Address on Peace in the Atomic Era* (on Bridge). A setting for baritone and piano of parts of a speech Einstein gave in 1950, responding to the announcement that the U.S. would build a hydrogen bomb. (<https://www.youtube.com/watch?v=BInwmJHD4dQ>)

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## Exoplanets

Say, Fazil *Universe (Symphony 3)* includes a movement entitled, Gliese 581g, referring to a possible 5<sup>th</sup> planet in this system, which is still disputed, but is thought to be in a habitable zone. The symphony has a Wikipedia entry at: [https://en.wikipedia.org/wiki/Symphony\\_No.\\_3\\_%22Universe%22](https://en.wikipedia.org/wiki/Symphony_No._3_%22Universe%22) (Hear the music at: <https://www.youtube.com/watch?v=gm9evI4-D6c>)

Stockhausen, Karlheinz *Sirius* (on DGG.) A musical "mystery play," based on the idea that there are planets around Sirius, inhabited by advanced beings who use music for communication.

(<https://www.youtube.com/watch?v=PuP1CJtOsyg>)

*See the work of the group Echo Movement under Astronomy in General.*

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## Galaxies and Quasars

Classical:

Beppe, Flint Juventino *Remote Galaxy* on *Remote Galaxy* album (on 2L). Orchestral piece, more mythic than astronomical, featuring a Hubble image on the album cover.

(<https://www.youtube.com/watch?v=IQrEZMmsz80>)

Bloom, Jane Ira *The Most Distant Galaxy* on *Art and Aviation* (on Arabesque). This jazz piece was one of several commissioned by NASA, when saxophonist and jazz composer Bloom was part of the NASA Art Program. For a bit more about her NASA work, you can read: <https://www.axs.com/jane-ira-bloom-s-night-skywriting-trio-travels-through-space-for-speci-15714> (The piece is at:

<https://www.youtube.com/watch?v=K5Xj66xHyTM>)

Brodsgaard, Anders *Galaxy* (on Dacapo Open Space). Long orchestral piece that takes its structure from the spiral shape of galaxies. ([https://www.youtube.com/watch?v=F\\_q1Y3QhfJQ](https://www.youtube.com/watch?v=F_q1Y3QhfJQ))

Heyer, Mark *The Milky Way Blues*. In this three-minute "sonification," radio astronomy data about the velocities and intensities of the gas in our Galaxy are mapped to a pentatonic minor blues scale. See the article at: <https://www.sciencealert.com/milky-way-rotation-data-transcribed-as-jazz-music>, which includes links to other sonification projects. (<https://www.youtube.com/watch?v=njVmbTzk5IM>)

Hovhannes, Alan *Symphony 48: Vision of Andromeda* (on Naxos). The composer, who had a strong interest in things celestial, said that this piece was "inspired by the wonders and mysteries of astronomy" and specifically by our neighbor galaxy M31 in the constellation of Andromeda. (The 2nd movement is at: <https://www.youtube.com/watch?v=ra2UdWFTHrg>)

Lentz, Georges *Caeli Enarrant (The Heavens are Telling)* (Parts 3 and 4 on Naxos). Lentz is a modern Australian composer, engaged in composing a cycle of works inspired in part by his interest in

astronomy. He recounts staring at astronomical images as he was composing some parts of the cycle. Parts 3 and 4 include sections with such subtitles as: The Spiral Galaxy M33, Rho Ophiuchi, The Pleiades M45, and The Andromeda Galaxy M31. (Start with: <https://www.youtube.com/watch?v=jtWiQM8qy6E>)

Terenzi, Fiorella *Music from the Galaxies* (on Island). Electronic music based on a digitized data set from active galaxy UGC 6697. Selections include “Plasma Waves”, “Radio Core”, and “Galactic Beats”. Terenzi, a composer and performer, did work in astrophysics for her doctorate. (For a sample, see: <https://www.youtube.com/watch?v=RkCfXZN8KnY>)

Sisask, Urmas *The Milky Way* (a piano sonata performed by the Grieg Piano Duo on Siel): <https://www.youtube.com/watch?v=jiuzhodj91c> (Sisask is an Estonian composer with a “fondness for astronomy.”) See also his *Andromeda* at: <https://www.youtube.com/watch?v=r2xfr107RZE>

Sisask, Urmas *Spiral Symphony for Piano Four Hands* (Grieg Piano Duo on Siel). A 9-part cycle of piano pieces about spiral galaxies, with movements such as NGC 2276, M 51, etc. (For excerpts, see: <https://www.youtube.com/watch?v=UR-yAd1gadU&list=PLLEBHp4hdnZjszArEGlluULBaOvnOBbYk>) There are a number of other Sisask astronomy pieces, including a cycle where the short pieces are named after constellations; we suggest you search the web for what else is currently available.

### Popular Music:

Ayreon “To the Quasar” on *Universal Migration Part II* (on InsideOut). Part of a “rock-opera” or storyline album by a Dutch group, this song tells of travel by the neutron star in the Crab Nebula and on to the supermassive black hole/quasar in 3C273. Their other albums also have a significant amount of science, often mixed with science fiction. (<https://www.youtube.com/watch?v=MwkLw7VKrE>)

Crosby and Nash “Milky Way Tonight” on *Crosby & Nash* (on Sanctuary). Uses the distance and faintness of the Milky Way to symbolize the remoteness of our dreams.

(<https://www.youtube.com/watch?v=Lgd5fD56Xnc>)

See also the listing for “CTA 102” by the Byrds under SETI.

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## **History of Astronomy**

### Classical:

Birtwistle, Harrison *Harrison’s Clocks* (piano pieces, at least two recordings are available on CD).

Inspired by Dava Sobel’s book *Longitude*, which details the long history of developing clocks that could measure time and thus longitude at sea, these are a musical depiction of some aspects of John Harrison’s timepieces. (<https://www.youtube.com/watch?v=nyB8hnINcq4>)

Borresen, Hakon *At Uranienborg: Tycho Brahe’s Dream* (Aalborg Symphony on Dacapo). A 1924 ballet that takes place at Tycho’s observatory on the island of Hven. (See the second through thirteenth cuts at: [https://www.youtube.com/watch?v=o4Nce2n7T3U&list=PLekzG-jAEWOeibmuS8IP\\_sxQkTY\\_ovGv7](https://www.youtube.com/watch?v=o4Nce2n7T3U&list=PLekzG-jAEWOeibmuS8IP_sxQkTY_ovGv7))

Kornicki, Steve *Morning Star Rising* (on the album *Orchestral, Conceptual, and Ensemble Music* on the Fragmented View Music label). An orchestral piece inspired by Mayan notions of astronomy, as discussed in astronomer Anthony Aveni’s book *Conversing with the Planets*.

(<https://www.youtube.com/watch?v=j1reMIw5nuY>) (See the composer’s notes at:

<http://www.stevекornicki.com/morningstar.html#Notes>)

Simpson, Robert *Eppur Si Muove* for Organ (Ian Quinn on Hyperion). This piece takes its name from the phrase that Galileo was supposed to have muttered under his breath as he left sentencing by the Inquisition, translated as “it does move” (referring to the Earth.) Simpson was an active amateur

astronomer who frequently mentioned astronomy as his great interest. (Review at: <http://robertsimpson.info/works/discography/reviews/choir-organ-music-ma.html>)

See also under “Astronomers”

See the Ruff and Rogers piece under “Planets”

### Popular Music:

Haggard *Eppur Si Muove* (2004 German symphonic metal band on Drakkar). An album about Galileo (based on the Latin phrase mentioned under Simpson above. The song by that title is at: <https://www.youtube.com/watch?v=cE4YRnjrM1Q>)

O’Connell, Robbie “Galileo” on *Humorous Song* (on Celtic Media). A humorous song about the apology from the Church to Galileo. (<https://www.youtube.com/watch?v=AMwr32eimJM>)

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## **Jupiter**

### Classical:

Bain, Reginald *Jovian Images* (piece for soprano saxophone and electronics, performed by Susan Fancher on Innova) Inspired by photographs of the giant planets, these (very) modern improvisations were created by mapping the image data as electronic sounds.

([https://www.youtube.com/watch?v=35Xav\\_oBZx0](https://www.youtube.com/watch?v=35Xav_oBZx0))

Bergmann, Gunter *The Harmony of the World of Jupiter* (five organ pieces; was available on a CD of the composer’s collected works). Written in celebration of the 350<sup>th</sup> anniversary of Kepler’s birth, these pieces follow Kepler’s ideas of the harmony of the spheres by basing the music on the periods of Jupiter’s Galilean moons. (No YouTube video)

Raitio, Vaino *Moonlight on Jupiter*. This 1920 orchestral piece has only its vague title to connect it to astronomy. It is available on the web only in one place, where the person putting it up decided he didn’t like the title, renamed it and put a nebula image with it:

<https://www.youtube.com/watch?v=XSCOIBwoYQ4>

Riley, Terry *Sun Rings*. This piece, for string quartet and electronic sounds, accompanied by space and science images, was written for the Kronos quartet. It features Don Gurnett’s recordings from the plasma wave instruments aboard Voyager, Cassini, and other spacecraft that went by Jupiter, Saturn, and Venus, turned into sound. Among the names of the ten movements are: Venus upstream, Electron Cyclotron Frequency Parlor, and Earth/Jupiter Kiss. (For excerpts, see:

<https://www.youtube.com/watch?v=xLiUHPWFFOA>)

Saariaho, Kaija *Io*. This 1987 piece for “orchestra, tape, and live electronics,” by a Finnish woman composer who has written other astronomically titled pieces, is named for Jupiter’s inner Galilean moon. (<https://www.youtube.com/watch?v=d5vAMzuobo>)

Say, Fazil *Universe (Symphony 3)* includes a movement entitled “Storm in Jupiter,” in which the composer’s uses a wind machine and other instrumental effects to portray the “Red Spot.” Storm. The symphony has a Wikipedia entry at:

[https://en.wikipedia.org/wiki/Symphony\\_No.\\_3\\_%22Universe%22](https://en.wikipedia.org/wiki/Symphony_No._3_%22Universe%22) (Hear the music at:

<https://www.youtube.com/watch?v=gm9evI4-D6c>)

Wiltgen, Roland *Les Lunes de Jupiter* on *Anthologie de Musique Luxembourgeoise* Vol. 8 (on LGMN). Organ piece in 5 movements, named after groups of jovian moons, moving inward; so, for example, the third movement is Callisto and Europa. You can listen at: <https://soundcloud.com/roland-wiltgen/sets/les-lunes-de-jupiter>

Zaimont, Judith Lang *Jupiter’s Moons* (Joanne Polk on Albany). Impressionist piano pieces written in 2000, inspired by recent pictures and images of the jovian satellites and the mythological characters after whom they are named. (See items 5-10 at:

[https://www.youtube.com/watch?v=NSApcBqAD8Y&list=PL13tf7kfO7SscUTr\\_0TyD3vABR2gyUqhP](https://www.youtube.com/watch?v=NSApcBqAD8Y&list=PL13tf7kfO7SscUTr_0TyD3vABR2gyUqhP))

#### Popular Music:

Jewel “Jupiter” on *Spirit* (on Atlantic). This song is only vaguely astronomical, but the singer refers to the large unexplored area of her new lover’s body to the vast extent of the planet.

(<https://www.youtube.com/watch?v=fnWBv4cJxCw>)

Presidents of the USA “Jupiter” on *Freaked out and Small* (on MusicBiz). Many images and science ideas from Jupiter exploration, although one line talks about “walking on the slimy surface.”

(<https://www.youtube.com/watch?v=1VnMzH394pU>)

Train “Drops of Jupiter” on *Drops of Jupiter* (on Sony). A song that uses images of Jupiter, Venus, and the Milky Way to talk about a girlfriend who had taken either a physical or a spiritual journey and was “back in the atmosphere” now. (<https://www.youtube.com/watch?v=7Xf-Lesrkuc>)

Wheeler, Cheryl “Orbiting Jupiter” on *Driving Home* (on Philo/UMGD). Co-written with Janis Ian, this song explores loneliness using many astronomical images.

(<https://www.youtube.com/watch?v=i8TXcW8yOO0>)

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## **Mars**

#### Classical:

Applebaum, Mark *Martian Anthropology* (on Innova). Inspired by a game imagining that humanity completely destroys itself, and “martian” anthropologists have to consider the nature of our culture from three random artifacts they find.

([https://www.youtube.com/watch?v=52GCZ\\_jW0pY&list=PLoobyPqcan9lyzxwU89LDYOvGD4oet9DC](https://www.youtube.com/watch?v=52GCZ_jW0pY&list=PLoobyPqcan9lyzxwU89LDYOvGD4oet9DC))

Gosfield, Annie *War of the Worlds*, a new multi-site opera, based on Orson Welles’ adaptation, which was based on H.G. Wells’ novel, which was based on Percival Lowell’s ideas about a Mars inhabited by advanced, but thirsty martians. It was staged in 2017 by the Los Angeles Philharmonic and other arts organizations in the Disney Concert Hall and in other locations in the city. For more, see the *NY Times* article: <https://www.nytimes.com/2017/11/13/arts/music/review-war-worlds-los-angeles-philharmonic.html>; read the program booklet: [http://www.anniegosfield.com/WOTW\\_Program.pdf](http://www.anniegosfield.com/WOTW_Program.pdf); listen to some excerpts: [https://www.youtube.com/watch?v=d6ALe\\_96GYA](https://www.youtube.com/watch?v=d6ALe_96GYA)

McNabb, Michael “Mars Suite” on *Computer Music* (on Mobile Fidelity Sound Lab). Electronic music inspired by the Viking mission and used (in part) in a film of Viking images. The three movements are: 1. Orbital View, 2. Chryse Planitia (the site where Viking 1 landed), and 3. Olympus Mons Flanked by Clouds. (<https://www.youtube.com/watch?v=LQEIzfwmt70>)

Miller, Kelvin & Bach, J.S. *Winds of Mars and the Music of Johann Sebastian Bach* (Roderick Kettlewell, piano, on Music Crest). Wind data from weather station of Mars Pathfinder are converted into sounds and mixed with piano pieces by Bach. Comes with an informative booklet explaining the concept and the exploration of Mars. (Article:

<http://www.nytimes.com/1998/11/10/science/pathfinder-probe-transforms-red-planet-into-the-whistling-planet.html>; Music:

[https://www.youtube.com/watch?v=g0xg4rqtjino&list=OLAK5uy\\_mrHqwQSrmAGXzH-34zWSZ5Q5ZDjINefHY](https://www.youtube.com/watch?v=g0xg4rqtjino&list=OLAK5uy_mrHqwQSrmAGXzH-34zWSZ5Q5ZDjINefHY))

See also *Star Dawn by Hovhannes under “Space Travel.”*

#### Popular music:

Lancaster, Jack & Lumley, Robin *Marscape* (on Ozone/DEI). This rock and jazz fusion album from the 1970's was inspired by some of the discoveries of the Mariner 9 mission on Mars. Tracks include "Olympus Mons", "Dust-storm" and "Phobos and Deimos."

(<https://www.youtube.com/watch?v=nLqcLoX3iHw>)

Lyon, Steve "Deimos and Phobos" on *The Doctor: There's No Place Like Mars* (on Flying Fish.) The singer misses the martian sky with the two moons moving through it, and dismisses other solar system sights in comparison. (<https://www.youtube.com/watch?v=DOeA5DEz3uc>)

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## Meteors and Meteorites

### Classical:

Cerha, F. *Nacht (Night)* (on Kairos). An orchestral piece inspired in part by the night sky and the composer watching the Perseid meteor shower in August.

(<https://www.youtube.com/watch?v=ufMQnRAc19E>)

### Popular Music:

Bad Company "Shooting Star" on *Straight Shooter* or *Ten from Six* (on Swan Song/Atlantic). Compares the quick fame, and sudden death of a music star to the brief flaring up of a shooting star.

(<https://www.youtube.com/watch?v=0kEDa6bXnA8>)

Newsom, Joanna "Emily" on *Ys* (on Drag City). A complex song about the singer's sister Emily (who is presently a graduate student in astronomy) and the relationships in their family; the chorus uses meteors and meteorites as a metaphor. (<https://www.youtube.com/watch?v=vRnikXRJ6hY>)

Parish, Mitchell & Perkins, Frank "Stars Fell on Alabama" (1935 song recorded by many artists over the years). In 1934, a best-selling book by this title described the travels of a professor from New York who came to teach in Alabama and began collecting native lore. It takes its title from stories about the 1833 Leonid meteor shower (which was so rich, it was really a meteor storm.) The book inspired the later song, which compares the thrill of kissing your lover to being bathed in the light of falling stars. (Frank Sinatra version, with lyrics, at: <https://www.youtube.com/watch?v=fachmkjXcoA>)

They Might Be Giants "What is a Shooting Star?" on *Here Comes Science* (on Disney Sound). A children's song, by a nerd-rock group, explaining what shooting stars really are and why they are bright. (<https://www.youtube.com/watch?v=JqBChyNyLhU>)

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## The Moon

### Classical:

Brant, Henry "Litany of the Tides" on *Henry Brant Collection vol. 3* (on Innova). During this complex piece, four sopranos sing science facts about the tides. (On YouTube:

<https://www.youtube.com/watch?v=XSbNEjsxIjk>; composer's website: <http://www.henrybrant.com/> -- see spatial music)

Crumb, George *Night of the Four Moons*. Composed during the journey of Apollo 11, this piece for soprano and an instrumental ensemble takes its texts from writings about the Moon by Federico Garcia Lorca. (<https://www.youtube.com/watch?v=wqXPc8KG-jM>)

Eno, Brian (et al.) *Apollo: Atmospheres & Soundtracks* (E.G.; reissued on Astralwerks). This "ambient sound" album was used as the soundtrack for a documentary of Apollo moon missions footage and tries to capture the sense of being in space and on the Moon. Tracks include "Under Stars," "Weightless," and "Ascent." (For more information, see:



[https://en.wikipedia.org/wiki/Apollo:\\_Atmospheres\\_and\\_Soundtracks](https://en.wikipedia.org/wiki/Apollo:_Atmospheres_and_Soundtracks); to listen, see:  
[https://www.youtube.com/watch?v=a76E5Kc-d\\_w](https://www.youtube.com/watch?v=a76E5Kc-d_w)

Haydn, Franz *Il Mondo della Luna (The World in the Moon)* on *Haydn Operas vol. 2* (on Phillips). 1777 comic opera involving a telescope used to trick someone into believing he can see life on the Moon and an “elixir” used to pretend to transport him there.

([https://en.wikipedia.org/wiki/Il\\_mondo\\_della\\_luna](https://en.wikipedia.org/wiki/Il_mondo_della_luna) has more information; to listen to the opera, see:  
<https://www.youtube.com/watch?v=RoVDiFRN124>)

Jenkins, Karl *Imagined Oceans* (Karl Jenkins Ensemble on Sony). A musical interpretation of 13 regions on the Moon with Latin names of seas and lakes. The music is more about the meaning of the names (such as Mare Imbrius) than about real conditions on our satellite, but we include it for its value in considering the history of naming things on the Moon.

(<https://www.youtube.com/watch?v=qbudzvedZms&list=PLC3B64687321E6CCE>)

Kamen, Michael *The New Moon in the Old Moon's Arms* (Slatkin & the National Symphony on Decca). Symphonic poem inspired by the composer's visit to Anasazi ruins in Arizona. Title refers to smallest waning crescent moon. Mostly about the rituals and aspirations of the Anasazi, but the last section, entitled “Reaching for the Stars,” take listeners forward to the year 2000.

(<https://www.youtube.com/watch?v=qbudzvedZms&list=PLC3B64687321E6CCE>)

Norgard, Per *Luna (in 4 Phases) for Orchestra* (on Marco Polo/Dacapo). Modern classical piece based on aspects of the Moon. ([https://www.youtube.com/watch?v=bE1cJLskN0E&list=PL8DioZfUiqpuf-PaqdIh\\_UFbMqWN8RxM6](https://www.youtube.com/watch?v=bE1cJLskN0E&list=PL8DioZfUiqpuf-PaqdIh_UFbMqWN8RxM6))

Paterson, Robert *Moon Trio on Spheres* (on American Modern Recordings). A piano trio inspired by lunar phenomena; the sections are entitled: Moonbeams, Lunatic Asylum, Blue Moon, and Moon Trip. (<https://www.youtube.com/watch?v=mphpkbbHqwU&list=PLUOHtooUK6OiiLc154G6NLdfadKfLm8pF>)

#### Popular Music:

Cowboy Junkies “Crescent Moon” on *Pale Sun Crescent Moon* (on RCA). A bluesy rock song which uses images involving the phases of the Moon. (<https://www.youtube.com/watch?v=ajtnaiLaJNQ>)

Grateful Dead “Standing on the Moon” on *Built to Last* (on Rhino). From the Moon, the singer can take a wider perspective on the wars and injustices on Earth, as well as on his relationship.

(<https://www.youtube.com/watch?v=j0wCPXpRoWQ>)

Great Big Sea “Walk on the Moon” on *Fortune's Favour* (on Warner). Compares taking a major step in a relationship to the first step an astronaut took on the Moon.

(<https://www.youtube.com/watch?v=OXoalnqD7z4>)

Harrison, George “Here Comes the Moon” on *George Harrison* (on Dark Horse). Mentions that the Moon is dark, but reflects sunlight to Earth. (<https://www.youtube.com/watch?v=x0KcgXQ2fl8>)

Moody Blues “Higher and Higher” on *To Our Children's Children* (on Polygram). 1969 song celebrates the Apollo 11 mission to Moon; uses image of tranquility (the astronauts landed in Mare Tranquilitatis -- the “sea” of tranquility). (<https://www.youtube.com/watch?v=f5xtL5Y2yWY>)

Police “Walking on the Moon” (on the album *Regatta de Blanc* & found on several of their greatest hits compilations). Compares the feeling of walking in the low gravity of the Moon (“giant steps”) to being in love. Video of the song was filmed at NASA's Kennedy Space Center:

<https://www.youtube.com/watch?v=zPwMdZOIPo8>.

Rush “Earthshine” on *Vapor Trails* (on Atlantic). Correct description of Earthshine on the Moon; compares the Earth's reflected light to the plaint of a lover who feels as if he only exists to be in the loved one's reflected glory. (<https://www.youtube.com/watch?v=UB3EXW1NFng>)

Sting “Sister Moon” on *Nothing Like the Sun* (on A&M). Plays with the idea that the Moon is connected with lunacy in popular culture. (<https://www.youtube.com/watch?v=QZLvDhTtONU>)

Waterboys “The Whole of the Moon” on *This is the Sea* (on Capitol). Interesting use of the image of the crescent moon versus the full moon as a way of expressing that the singer only saw and felt little, but his lover saw the larger emotional picture. (<https://www.youtube.com/watch?v=pu7AR0-FRro>)

XTC “Another Satellite” on *Skylarking* (on Virgin/Geffen). The singer compares an unwanted romance to an extra moon, exclaiming “why on earth do you revolve around me” and “why in heaven’s name do you come on these trips, only to freeze in a total eclipse.” The conclusion: “Don’t need another satellite!” (<https://www.youtube.com/watch?v=YEO8hgUT5HM>)

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## Nebulae

Prestini, Paola *The Hubble Cantata*. This virtual-reality enhanced musical piece, put together with help from astronomer Mario Livio, takes participants into the Orion Nebula and compares the life of a person on Earth with the lives of the stars, using Hubble images and videos. Livio (who narrates in some of the performances) describes the piece’s genesis in this blog post from 2013: [https://www.huffingtonpost.com/mario-livio/the-hubble-cantata\\_b\\_3639350.html](https://www.huffingtonpost.com/mario-livio/the-hubble-cantata_b_3639350.html) For an introduction (with interviews), see: <https://www.youtube.com/watch?v=2PVGbVZYCR8> To hear the Cantata, go to: <https://www.youtube.com/watch?v=eJ6fkO9t6VM&list=PLEEGR5VqLlx9kuGqWhaNX-fkxs1Fq6OFq>

See the piece by Lentz under “Galaxies”

See the first piece by Bedford and the piece by Smith-Brindle under “Sky Phenomena”

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## Physics Related to Astronomy

### Classical:

Brant, Henry *Orbits* (on CRI American Masters). Written for 80 trombones arranged in a semi-circle (with organ and voice), this 1979 piece experiments with sound and space. (You can find a video report on a 2009 performance at the Guggenheim Museum:

<https://www.youtube.com/watch?v=W3jifFOcGUg>)

Cowie, Edward *Rutherford’s Lights* (Richard Casey on UHRecordings). 24 piano pieces, composed with the assistance of physicist Michael Berry, that are an effort to capture the many properties and relationships of light and color and the history of humanity’s discovery of these. The composer has a degree in physics. (See a YouTube introduction at:

<http://www.youtube.com/watch?v=xRTXTRL5rU> and order at

<http://www.uhrecordings.co.uk/shop/albums/UHR/Cowie.aspx>)

Glass, Philip *The Light* (Bournemouth Symphony on Naxos). Commissioned in 1987 by Case Western University to commemorate the 100<sup>th</sup> anniversary of the Michelson-Morley Experiment, which measured the constancy of the speed of light in different frames of reference. The composer said that he tried to mirror the “onset of modern scientific research.” (<https://vimeo.com/216168322>)

Kernis, Aaron *Symphony in Waves* (New York Chamber Symphony on Phoenix). This 1989 symphony, by an eclectic American composer, uses ideas and impressions from the physics and behavior of waves. (See cuts 3-7 at:

<https://www.youtube.com/watch?v=tKM8YP10tkg&list=PLCsIvrnAwRzb0teej3JjRrNQuu1x5HRO&index=1>)

Parra, Hector *Hypermusic Prologue* (on Kairos). A very modern, two-person opera, done with physicist and popular author Lisa Randall, on the switch from Newton’s physics to a more modern perspective on the nature of the universe. For an article about the genesis of the opera from *Seed* magazine, see: [http://seedmagazine.com/content/article/opera\\_in\\_the\\_fifth\\_dimension/](http://seedmagazine.com/content/article/opera_in_the_fifth_dimension/) (Hear the music and

interviews with Randall and Parra at: [https://www.youtube.com/watch?v=QMDthaov-hk&list=PLwd4KZfEGuJvk\\_-N4nSbx5UsMUSrXgyXx](https://www.youtube.com/watch?v=QMDthaov-hk&list=PLwd4KZfEGuJvk_-N4nSbx5UsMUSrXgyXx))

Ryan, Jeffrey *Quantum Mechanics* (on Centredisks.) This music for string quartet, by a composer with a long-term interest in astronomy and science, has sections entitled: “Fission,” “Absolute Zero,” and “Fusion.” The composer explains at: <https://jeffreyryan.com/works/chamber-3-6-players/quantum-mechanics/> ([https://www.youtube.com/watch?v=CScouvIsyFo&ab\\_channel=ScottSt.John-Topic](https://www.youtube.com/watch?v=CScouvIsyFo&ab_channel=ScottSt.John-Topic))

Varese, Edgard *Ionization* (on several CD’s, e.g. Boulez version on Sony). Iconoclastic 20<sup>th</sup> century composer Varese tried to expand the vocabulary of music by including new and different sounds and soundmakers in his pieces. This 1931 composition for 35 percussion instruments and 2 sirens tries to evoke the process by which atoms lose their outer electrons. (See, for example: <https://www.youtube.com/watch?v=wClwaBuFOJA>)

Wallfisch, Benjamin “Escape Velocity” and “Spectra (Piano Quintet)” on *Escape Velocity* (on Quartz Music.) Two pieces by a classical and film composer, each of which tries to portray a physical phenomenon in musical terms. Spectra is performed at: <https://www.youtube.com/watch?v=2GEoYmwh0Do>; Escape Velocity at: <https://www.youtube.com/watch?v=JKmH0BUba7Q>

### Popular Music:

Flanders and Swann “The First and Second Law (of Thermodynamics)” (a song from the musical review *At the Drop of Another Hat* on *The Best of Flanders and Swann* on EMI). A funny exploration of heat, work, and entropy, with a mention of the heat death of the universe. ([https://www.youtube.com/watch?v=VnbiVw\\_1FNs](https://www.youtube.com/watch?v=VnbiVw_1FNs))

Hawkwind “Quarks, Strangeness and Charm” on *Quarks, Strangeness and Charm* (on Atomhenge). We include this song with some hesitation: it plays with many science ideas, but not always correctly (it suggest Copernicus had a telescope, for example.) Still, it makes the properties of quarks sound sexy, which is not an easy thing to do. (<https://www.youtube.com/watch?v=MYVx178VIZ8>)

Klaatu “Little Neutrino” (on Bullseye Canada). Compares the flight of a neutrino out of the Sun, barely interacting, with the singer’s lover, who does not really know who he is. (<https://www.youtube.com/watch?v=yk0Is8-gGSQ>)

Kraftwerk *Radio-activity* (on EMI/Capitol). This 1975 concept album includes cuts about both radio activity (related to radio transmission) and radioactivity (including songs called “Geiger Counter” and “Uranium.”) See: <https://en.wikipedia.org/wiki/Radio-Activity> (<https://www.youtube.com/watch?v=4kEti-BB4Pw>)

Lehrer, Tom “The Elements Song” (on several collections of his songs) A recitation of the known elements set to a Gilbert & Sullivan song: <https://www.youtube.com/watch?v=AcS3NOQnsQM>

Muse “The 2<sup>nd</sup> Law: Unsustainable” on *The 2<sup>nd</sup> Law* (on Warner Brothers.) A musical piece in which a woman newscaster quickly gives several different formulations of the second law of thermodynamics over the music, part of an album with ecological themes. ([https://www.youtube.com/watch?v=EF\\_xdvn52As](https://www.youtube.com/watch?v=EF_xdvn52As))

They Might Be Giants “Meet the Elements” on *Here Comes Science* (on Idlewild/Disney Sound). This song for children by a popular indie-rock band contains a lot of good science, including the idea that stars are made mostly of hydrogen and helium. (<https://www.youtube.com/watch?v=Uy0m7jnyv6U>) They also have a song called “Roy G. Biv” about the colors: <https://www.youtube.com/watch?v=Gf33ueRXMzQ>

See also the box on *Scientists Who Write Songs*

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### **Planets (in General)** [also see the name of each specific planet]

#### Classical:

Arend, David: *Voyager: 3 Sheets to the Wind on Astral Travels* (on Navona). Orchestral piece inspired by the Voyager mission to the outer planets. Sections include: Escape Velocity, Jupiter, Saturn, Uranus, Neptune, and Interstellar Space. (See the 4<sup>th</sup> – 10<sup>th</sup> selections at: [https://www.youtube.com/watch?v=7qwDtD8pwZk&list=OLAK5uy\\_1dlcXUztgChdRQ\\_DaManh7o3j34aZM9qs](https://www.youtube.com/watch?v=7qwDtD8pwZk&list=OLAK5uy_1dlcXUztgChdRQ_DaManh7o3j34aZM9qs))

Carlos, Wendy *Digital Moonscapes* (on East Side Digital). A digital synthesizer suite from the early 1980's, depicting post-Voyager impressions of our Moon, the two moons of Mars, three moons of Jupiter and four moons of Saturn. (<http://www.wendycarlos.com/+dmci.html>)

Ewers, Peter *The Planets* (on Solstice). 17 improvisations for organ, inspired by the worlds in our solar system. (<https://peterewers.bandcamp.com/album/die-planeten-the-planets>)

Ruff, Willie & Rodgers, John *The Harmony of the World* (on Kepler CD). Computer-synthesizer realization of Kepler's music of the spheres, with the notes for each planet determined by its relative velocity in orbit. (Available through: <http://www.willieruff.com/harmony-of-the-world.html>, where you can also find liner notes.)

### Popular Music:

Lavin, Christine "Planet X" on *Shine My Flashlight on the Moon* (on Shanachie). Song about Pluto, its discovery, and its uncertain status. See her updated lyrics at: [http://christinelavin.com/index.php?page=songs&category=I\\_DON-amp--num-039-scol-T\\_MAKE\\_THIS\\_STUFF\\_UP-elipsis- I JUST MAKE IT RHYME&display=701](http://christinelavin.com/index.php?page=songs&category=I_DON-amp--num-039-scol-T_MAKE_THIS_STUFF_UP-elipsis- I JUST MAKE IT RHYME&display=701)

Manfred Mann's Earth Band "In the Beginning, Darkness" on *Solar Fire* (on Creature Music). Part of an album that features rock adaptations of Holst's *The Planets*, this song is a nice evocation of the events that led to the formation of the Earth and the evolution of life. (<https://www.youtube.com/watch?v=hUzKRq5GtGE>)

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## **Pluto**

Matthews, Colin *Pluto the Renewer* (on several recordings). This "add-on" to Holst's *The Planets* rejects Holst's astrological approach and tries to portray the solar wind and other phenomena at Pluto; see composer's note at: <http://www.fabermusic.com/repertoire/pluto-the-renewer-3427>. ([https://www.youtube.com/watch?v=T5BM\\_BE8iQ](https://www.youtube.com/watch?v=T5BM_BE8iQ))

Mendak, Jeff & Wals, Sergio "Pluto's Not a Planet Anymore" on *Michael Closed the Bathroom Door*. A children's song, written by a professor of political science at the U. of Illinois, bemoaning Pluto's "demotion." (<https://www.youtube.com/watch?v=Ni2w6ov5zs8>)

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## **Saturn**

### Classical:

Hovhannes, Alan "Saturn" on *Magnificat* (on Crystal). This piece, by a prolific Armenian-American composer, for soprano, clarinet, and piano, celebrates both the astronomical and mystical Saturn, with words by the composer, who had a strong interest in astronomy. One section is entitled "Titan, Moon of Saturn." (Composer's website at: <http://www.hovhaness.com/>; Excerpts of *Saturn* can be heard at: <https://www.youtube.com/watch?v=Na01ldNQUwc>)

Roxburgh, Edwin *Saturn* (on NMC). Modern tone poem based on the Voyager images and data from the Saturn system, with sections named after a number of the best-known satellites of the ringed planet. The composer's liner notes are a combination of science and mythology, and the cover of the CD

shows radio emissions from Saturn.

([https://www.youtube.com/playlist?list=PL0QpdIcOBaFELKqp9MuZpfH\\_Z7ND4d1kG](https://www.youtube.com/playlist?list=PL0QpdIcOBaFELKqp9MuZpfH_Z7ND4d1kG))

Ryan, Jeffrey *Saturn*. This piano piece is inspired by the composer's long interest in astronomy and by a translation of the ring segment names (C, B, A, F...) into notes. The composer explains at:

<https://jeffreyyryan.com/works/chamber-1-2-players/saturn-study-in-white/>

(<https://www.youtube.com/watch?v=SAQ9nWKy6bo&t=104s>)

Santaguida, Andrew, et al. *Play Saturn's Rings Like a Harp* (web only). This modest app allows you to turn brightness differences in Saturn's complex ring system into pleasant musical sounds that resemble a harp. See: <http://www.system-sounds.com/saturn-harp/> Other Saturn "sonifications" by the same group are at: <http://www.system-sounds.com/more-saturn-sounds/>

See also: *Terry Riley under Jupiter*

### Popular Music:

Electrocute "Saturn Rings" on *Double Diamond* (on Bounce). Electro-pop love song in which the singer wants to go around her lover like Saturn's rings go around Saturn; and talks about her "metallic hydrogen fantasy." (<https://www.youtube.com/watch?v=5I8JW743fHs>)

HammerFall "Titan" on *Threshold* (on Nuclear Blast). This song by a Swedish heavy metal band is about the remains of humanity, shattered by war, moving to Saturn's moon Titan.

([https://www.youtube.com/watch?v=V0-C6\\_o2vh0](https://www.youtube.com/watch?v=V0-C6_o2vh0))

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### SETI

Byrds "CTA 102" on *Younger than Yesterday* (on Sony). In 1960's, there was a brief flurry of public attention to quasar CTA 102: its radio signals were incorrectly claimed to include coded information from an advanced civilization. The song is a brief ode to our willingness to hear from other civilizations out there. (<https://www.youtube.com/watch?v=OONsT-z1hc8>)

Punishment of Luxury "Message" on *Laughing Academy* (on Lemon). A song by a British punk-rock band which tells the story of the receipt of a message from another civilization at a radio observatory on the Moon. Has some science errors, but an interesting attempt.

(<https://www.youtube.com/watch?v=YcnOj0XmzFM>)

Zebra "Who's Behind the Door?" on *Zebra* (on Atlantic). Interesting song about the hypothesis that the Earth is a zoo being kept by an extra-terrestrial civilization.

(<https://www.youtube.com/watch?v=Ofz0iJQd-xU>)

There is a band named S.E.T.I., which takes its inspiration from the science of SETI, and features SETI-related speeches and documents on its albums: [https://en.wikipedia.org/wiki/SETI\\_\(band\)](https://en.wikipedia.org/wiki/SETI_(band))

See the *Echo Movement* album under *Astronomy in General*

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### Sky Phenomena

#### Classical:

Bedford, David *Star Clusters, Nebulae, and Places in Devon* (on Resurgence). A piece inspired by the idea that the same sky would have been visible to the Bronze Age people living in England as we see today. (No recording available on YouTube.)

Bedford, David *Some Bright Stars for Queen's College* (on the album *Nurses' Songs with Elephants*). A modern piece sung by 80 young girls and with 30 "whirlies" sound pipes; the girls sing the names of stars from star catalogs. (No recording available on YouTube)

Boyadjian, Hayg *Pleiades* (on *Vientos* on Albany). Uses motifs with 5 and 7 notes, portraying in music the five bright stars and seven stars in total that make up the old pattern of the seven sisters (the composer is an amateur astronomer). ([https://www.youtube.com/watch?v=91Jqv\\_J67vs](https://www.youtube.com/watch?v=91Jqv_J67vs))

Del Tredici, David *Syzygy* (on Deutsche Grammophone). Music partially inspired by the astronomical meaning of the term -- the alignment of celestial bodies. (<https://www.youtube.com/watch?v=QQd-zxr7EGQ>)

Howe, Mary “Stars” on *American Treasures* (The Virginia Symphony on Hampton Roads Classics). Brief, romantic symphonic poem that “evokes the gradually overwhelming effect of a starry, crystal clear night.” (<https://www.youtube.com/watch?v=rBrryJ4yd4g>)

Koechlin, Charles *Le Docteur Fabricius* (Stuttgart Radio Symphony Orchestra on Hanssler). A long section of this symphonic poem is called “The Starry Sky” and portrays a “vision” of the night sky. Koechlin had originally wanted to be an astronomer. A brief review is at: <https://www.gramophone.co.uk/review/koechlin-le-docteur-fabricius-vers-la-vo%C3%BBte-%C3%A9toil%C3%A9> and you can hear the music at: <https://www.youtube.com/playlist?list=PLWi4vvC8TDfH1SfldnyVkajAOV0VtO3Ti>)

Langgaard, Rued “Music of the Spheres” on *Music of the Spheres, etc.* (Danish National Radio Symphony on Chandos) Based on a line from a Danish poem that goes “The stars seem to twinkle kindly at us, yet the writing of the stars is cold and merciless,” this complex piece for large orchestra includes episodes that portray sky phenomena such as: “twinkling stars at sunset” and “the refraction of sunbeams in waves.” (<https://www.youtube.com/watch?v=-GixaHxgwYc>)

Lazarus, Bruce *A Musical Exploration of Messier’s Catalog of Star Clusters and Nebulae* (on Composer’s Concordance) Piano pieces about various objects in the catalog. ([https://www.youtube.com/watch?v=AsJQ26vor7w&list=OLAK5uy\\_nWAnBu1-TXFDXZidG7KK2pxAq-QcKXOMI](https://www.youtube.com/watch?v=AsJQ26vor7w&list=OLAK5uy_nWAnBu1-TXFDXZidG7KK2pxAq-QcKXOMI))

Smith Brindle, Reginald *Andromeda* (1966 for solo flute), *Orion M42* and *Auriga* (1967 for percussion). Pieces by a British composer with an interest in science and science fiction. Orion can be seen at: <https://www.youtube.com/watch?v=8lxt8vurWBg>.

### Popular Music:

Church “Under the Milky Way Tonight” on the 1988 album *Starfish* (on Arista). Uses the Milky Way as a symbol of being lost and disoriented. (See: <https://www.youtube.com/watch?v=mA54NBtPKdI>)

Crosby and Nash “Milky Way Tonight” on *Crosby & Nash* (on Sanctuary). Uses the distance and faintness of the Milky Way to symbolize the remoteness of our dreams. (<https://www.youtube.com/watch?v=Lgd5fD56Xnc>)

Muse “Starlight” on *Black Holes and Revelations* (on Warner Brothers). The song focuses on a ship that has taken the narrator far away from the people who love him, chasing starlight (and it mentions black holes). (<https://www.youtube.com/watch?v=3J1YBu0gpJY>)

Pink Floyd “Time” on *Dark Side of the Moon* (on Harvest/Capitol). Uses the image of the Sun racing to rise and set to illustrate the inexorable passing of time in human lives. (<https://www.youtube.com/watch?v=rL3AqkwbYgo>)

Sondheim, Stephen “The Sun Won’t Set” in *Little Night Music* (on Columbia). The musical about Scandinavia, adapted from an Ingmar Bergman film, includes this song about the long summer days and short nights at high latitudes. (<https://www.youtube.com/watch?v=MDHM5zCfo4A>)

See also XTC’s “Another Satellite” under Moon

## Space Travel

### Classical:

Berge, Hakon *Gagarin* (on Hemera). A 1991 Norwegian opera written for television, based on the life and work of the Soviet cosmonaut Yuri Gagarin: ([https://www.youtube.com/watch?v=G\\_rxk0XXyUk](https://www.youtube.com/watch?v=G_rxk0XXyUk))

Clarke, Nigel *Gagarin on Road to the Stars* (Matthew George, conductor on Innova). A suite for symphonic wind ensemble, inspired by Yury Gagarin's first space flight. The three sections are: "Road to the Stars" (which is also the name of Gagarin's book), "Orbit," and "Homecoming." (Start at: [https://www.youtube.com/watch?v=jS05zmP\\_H3k](https://www.youtube.com/watch?v=jS05zmP_H3k))

Dean, Brett *Komarov's Fall* (with *The Planets* by Holst, conducted by Simon Rattle, on EMI Classics CD). Honoring the astronaut, who was the first person to die in space, aboard Soyuz 1. (<https://www.youtube.com/watch?v=9ePOpm6xGVI>)

Downey, John *The Edge of Space* (on Chandos). A fantasy for bassoon and orchestra which tries to portray entering space in a musical way. (<https://www.youtube.com/watch?v=WwJKnMhAH8M>)

Hovhannes, Alan *Star Dawn* (Ohio State Concert Band on Delos). About this piece, the composer wrote: "My life-long interest in astronomy has suggested the thought and hope that we may colonize Mars... the [title] phrase from Dante suggested traveling in space." (<https://www.youtube.com/watch?v=1iRzUDsFppM>)

Hovhannes, Alan *Journey to Arcturus: Piano Sonata* –see under Stars

McClure, Glenn *Rosetta: Variations on a Day in Space*. This 2015 piece, commissioned for the 25<sup>th</sup> anniversary of the European Space Operations Centre Chorus (!), is based on speed measurement data from a day in the operations of the mission to Comet 67P/Churyumov-Gerasimenko. See: <https://rosetta-art-tribute.tumblr.com/post/149408792622/glenn-mcclure-with-esoc-chorus-james-schar>

#### Popular Music:

After the Fire "Starflight" on *Der Komissar* (on Collectables). Compares being in love to traveling through the universe. ([https://www.youtube.com/watch?v=4FdV0Q\\_xj-M](https://www.youtube.com/watch?v=4FdV0Q_xj-M))

Armor for Sleep "Slip Like Space" on *Dream to Make Believe* (on Equal Vision Records.) Dissatisfied with life on Earth, the singer dreams of traveling through space, past the Moon, into the Milky Way, through a wormhole. (<https://www.youtube.com/watch?v=GzTIZBP47sM>)

Berardelli, Chiara "Deep Space Hibernation" on *Seamonsters*. A song inspired by the fact that the Rosetta spacecraft underwent a period of "hibernation" on its way to the comet it explored; written during the period when the singer found out she couldn't have children and wanted to get away from it all. (<https://rosetta-art-tribute.tumblr.com/search/chiara>)

John, Elton "Rocket Man" on *Honky Chateau* (on Uni). Song sung by an astronaut in orbit, bemoaning his loneliness and that Mars is not inhabitable. (<https://www.youtube.com/watch?v=DtVBCG6ThDk>)

Moody Blues "Floating" on *To Our Children's Children* on Threshold. An exploration of what it is like to be in the weightless environment of space and walking on the Moon. ([https://www.youtube.com/watch?v=J9S7BA\\_Orj4](https://www.youtube.com/watch?v=J9S7BA_Orj4))

Queen "'39" on *Night at the Opera* (on Hollywood). Song about an interstellar expedition traveling at relativistic speeds and the loneliness the crew feels: they realize that everyone they knew on Earth will be dead when they return. Brian May, a member of the group, trained as an astronomer in England. (<https://www.youtube.com/watch?v=kE8kGMfXaFU>)

OMD (Orchestral Manoeuvres in the Dark) "Our System" on *English Electric* (BMG/100%). Uses sonified jovian magnetosphere data from Voyager as the beginning; meditation on the perfection of what we find in space versus the imperfection of humans on Earth.

Phobium *Oort Cloud* (on Omintropic). We list this piece hesitantly, since we don't generally concern ourselves with "ambient space music. However, the sections of this piece describe a journey beginning in the solar system, crossing the heliopause, into the interstellar medium and to Proxima Centauri, so the Norwegian producer Henning H. Ottesen, who goes under the stage name of *Phobium*, gets points for astronomical knowledge. ([https://www.youtube.com/watch?v=NqT\\_eNx5WY](https://www.youtube.com/watch?v=NqT_eNx5WY))

Rush “Countdown” on *Signals* (Mercury/Universal). Nice description of what it is like to witness a rocket launch at Cape Kennedy. (<https://www.youtube.com/watch?v=v5vPrnb6tw>)

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## Star Clusters

Bedford, David *Star Clusters, Nebulae, and Places in Devon* (on Resurgence). A piece inspired by the idea that the same sky would have been visible to the Bronze Age people living in England as are to us. (No recording available on YouTube.)

Boyadjian, Hayg *The Pleiades* (by various performers on the album *Vientos* on Albany). The composer is an active amateur astronomer (See: <https://www.youtube.com/watch?v=ji-n0uMJUIg>)

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## Stars and Stellar Evolution

### Classical:

Ades, Thomas *Polaris* (on *Asyla, Tevot, Polaris* on LSO Live). The piece is named after the north star, and is interpreted to be about large spaces, although described by some as more oceanic than astronomical. (<https://www.youtube.com/watch?v=xYw5hfzH1KM>)

Connesson, Guillaume “Supernova” (part II of *Cosmic Trilogy*, on Chandos). Musical depiction of the explosion of a massive star, with a second section entitled “pulsating star.” The composer writes that the piece was influenced by the reading of Stephen Hawking’s *A Brief History of Time*. (<https://www.youtube.com/watch?v=9RG7RVX6hew>)

Crumb, George *Celestial Mechanics: Volume IV of Makrokosmos* (“cosmic dances” for amplified piano; available on several recordings). In the four volumes of his Makrokosmos pieces, Crumb explores new ways to get sounds out of a piano. Many of the sections are named after astronomical phenomena. The four parts of this volume are called: Alpha Centauri, Beta Cygni, Gamma Draconis, and Delta Orionis. ([https://www.youtube.com/watch?v=Xx\\_Wl2m0jMI](https://www.youtube.com/watch?v=Xx_Wl2m0jMI))

Duparc, Henri *To the Stars (Nocturnal Poem)*. 1911 piano piece that is prefaced by lines from a poem by Graty: “The night-time starlight – who can know the secrets of this humble light from the immensity...” (<https://www.youtube.com/watch?v=G511rl2I-BM>)

Grisey, Gerard *The Black of the Star* (on Accord). In 1985, astronomer Joseph Silk played an audio recording of some pulsar “beats” for the composer and he later decided to write a piece for six groups of percussion instruments arranged to surround the audience, based on the “rhythm” of two pulsars. The piece begins with a brief discussion of pulsars, in French, written by the French astronomer Jean-Pierre Luminet. (<https://www.youtube.com/watch?v=5cT8GQdUFBg>)

Hovhannes, Alan *Journey to Arcturus Piano Sonata*. The Armenian-American composer had a special interest in astronomy. (<https://www.youtube.com/watch?v=UVDnb4L3Y5g&list=PLA894F46A236364BF>)

Olsen, Poul *Au Fond de la Nuit (In the Depths of Night)* (on DeCapo). This orchestral piece features sections called “Betelgeuse” and “Dead Star”. (Part of [https://www.youtube.com/watch?v=cfStb5umsmY&index=6&list=OLAK5uy\\_kyJRzaA8f7y-CuwzpXYOnnhogM3MiDBKY](https://www.youtube.com/watch?v=cfStb5umsmY&index=6&list=OLAK5uy_kyJRzaA8f7y-CuwzpXYOnnhogM3MiDBKY))

Parker, Alex & Melissa Graham: “Supernova Sonata” (a piano piece by two astronomers, where the music is based on the characteristics of 241 Type Ia supernova explosions): [http://www.astro.uvic.ca/~alexhp/new/supernova\\_sonata.html](http://www.astro.uvic.ca/~alexhp/new/supernova_sonata.html)

Say, Fazil *Universe (Symphony 3)* includes a movement entitled Supernova, portrayed just as the star is about to explode. There is also a movement called “Dark Matter.” The symphony has a Wikipedia entry at: [https://en.wikipedia.org/wiki/Symphony\\_No.\\_3\\_%22Universe%22](https://en.wikipedia.org/wiki/Symphony_No._3_%22Universe%22) (Hear the music at: <https://www.youtube.com/watch?v=gm9evI4-D6c>)



Studtucker, Volkmar *Star Songs* (available on the web only). Data from the cataclysmic binary star EX Hydrae is turned into jazz-like music. It began with a sonification of the data to help a blind graduate student to do her research. See: [https://www.cfa.harvard.edu/sed/projects/star\\_songs/](https://www.cfa.harvard.edu/sed/projects/star_songs/)

### Popular Music:

Ayreon “To the Quasar” on *Universal Migration Part II* (on InsideOut). Part of a “rock-opera” or storyline album by a Dutch group, this song tells of travel by the neutron star in the Crab Nebula. Their other albums also have a significant amount of science, often mixed with science fiction. (<https://www.youtube.com/watch?v=MwkLyu7VKrE>)

Epidemic “Factor Red” on *Decameron* (on Metal Blade). About the Sun becoming a red giant star in the future; begins: “Retinas burn, as my eyes raise towards the dying star, Half devoured sky bleeds red, the death of a star begun...” (<https://www.youtube.com/watch?v=7g2mHjerjww>)

Legend, John “Under the Stars” (available on the Web). The beginning and end of this rather tepid holiday song features the sonification of the oscillations of variable stars by Hungarian astronomer Zoltan Kollath. For more on his work with stellar music, see: <http://www.stellarsound.org/smusic2.html> (Hear the song at: [https://www.youtube.com/watch?v=7Y\\_DrRikRyQ](https://www.youtube.com/watch?v=7Y_DrRikRyQ))

Pink Floyd “Shine on You Crazy Diamond” on *Wish You Were Here* (on Capitol). Compares the self-destructive behavior of group member Syd Barrett to the death of low-mass stars in the form of white dwarfs. (<https://www.youtube.com/watch?v=cWGE9Gi0bB0>)

Slash (with Myles Kennedy) “Starlight” on *Slash* (on EMI). Evocation of the distances and long time-scales of stars, compared to the short-term drama of human life on Earth. (<https://www.youtube.com/watch?v=-BTad4tTdrE>)

See also *They Might be Giants (under The Sun)*

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## **The Sun**

### Classical:

Dodge, Charles *Earth’s Magnetic Field* (on the album *Columbia-Princeton Electronic Music Center 1961-1973* on New World). Electronic music based on variations of our planet’s magnetic field (more precisely on what scientists call the Kp Index, which is based on how the Sun’s wind and activity affect terrestrial magnetism). (<https://www.youtube.com/watch?v=j5MHsnc67yw>)

Estacio, John *Solaris* on *Frenergy* (on CBC). Written to be a prelude to Holst’s *The Planets*, this piece depicts the surface activity of the Sun, the Sun in the vacuum of space, and the Sun as the source of Earth’s energy, (<https://www.youtube.com/watch?v=NhzBggqtB0pc>)

Lipkin, Malcolm *Symphony 3 (The Sun)* (on Lyrita). Inspired by a 17<sup>th</sup> century poem about the rising and setting of the Sun. (<https://www.youtube.com/watch?v=sGJZhItGg3E>)

Nielsen, Carl *Helios Overture* (many recordings exist). Portrays the course of the Sun during a day, from sunrise to sunset. (See for example: <https://www.youtube.com/watch?v=7YlpCCNh4jk>)

Paterson, Robert *Sun Trio* on *Spheres* (on American Modern Recordings). A piano trio inspired by solar phenomena; the sections are entitled: Sun Day, Sunset, Absence of Sun, Sunrise, and Sun Dance. (Start with: <https://www.youtube.com/watch?v=vIfmhR4RDIU>)

Ruders, Poul *Solar Trilogy* (on Dacapo/Marco Polo). A modern symphonic triptych inspired by the composer reading about the Sun; includes sections entitled “GONG,” “Zenith,” and “Corona.” (The GONG (helioseismology experiment) section can be heard at: <https://www.youtube.com/watch?v=3ik-UltGCYA>; you can download the music (not free) at: <https://www.dacapo-records.dk/en/recordings/ruders-solar-trilogy>)

## Popular Music:

They Might Be Giants “Why Does the Sun Shine? (The Sun is a Mass of Incandescent Gas)” and “Why Does the Sun Really Shine?” on *Here Comes Science* (on Idlewild/Disney Sound). The first is modern re-recording of a 1959 educational song from an album called “Space Songs,” explaining what the Sun is and why it shines (nuclear fusion). The second updates the song (emphasizing that the Sun is plasma). (See the first two pieces at:

<https://www.youtube.com/watch?v=sLkGSV9WDMA&list=RDsLkGSV9WDMA>)

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## **Telescopes and Observatories**

Bedford, David *Great Equatorial* (on Voicepoint). Electronic music commissioned for 1993 renovation at Royal Observatory in Greenwich. The composer “tried to imagine what it would be like to travel through the cosmos revealed by the first large telescopes”; and uses some of the harmonies envisioned by Kepler in thinking of the orbital speeds of the planets as the “music of the spheres.” For an obituary of the composer, see: <http://www.independent.co.uk/news/obituaries/david-bedford-composer-whose-work-encompassed-classical-music-the-avant-garde-pop-and-prog-rock-2368063.html>

(<https://www.youtube.com/watch?v=KyZVuQpPOCs&list=PLSkdJnxZZ1sClb38L5zemt8JfAhnC1kNh>)

Enstrom, Rolf “Music for an Observatory” on *Immeasurable Traces* (on Phono Suecia). Written to celebrate the 250<sup>th</sup> anniversary of the Stockholm Observatory in 2003, this is modern electronic music inspired by astronomy. Enstrom also has a series of pieces about the properties of quarks.

([www.youtube.com/watch?v=IkuuYysvJVI](http://www.youtube.com/watch?v=IkuuYysvJVI))

Gasser, Nolan *GLAST Prelude on State of the Art: The American Brass Quintet at 50* (on Summit). A brass piece written for the launch of the Gamma-ray Large Area Telescope (later renamed the Fermi Telescope.) ([https://www.youtube.com/watch?v=uHa5e\\_qkDhU](https://www.youtube.com/watch?v=uHa5e_qkDhU)) Note that this piece was later expanded into a symphony called “Cosmic Reflection.” You can hear more about it at:

<https://asd.gsfc.nasa.gov/blueshift/index.php/2009/11/30/podcast-the-music-of-science/>

See also Prestini’s *Hubble Cantata under Nebulae*

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## **Venus**

Deussen, Nancy Bloomer *The Transit of Venus* – piece inspired by the transit of 2012 that the composer saw at NASA) (<https://www.youtube.com/watch?v=mNQKdKE17kE>)

Say, Fazil *Universe (Symphony 3)* includes a movement entitled Venus, with some correct and some incorrect information in the composer’s thinking. The symphony has a Wikipedia entry at:

[https://en.wikipedia.org/wiki/Symphony\\_No.\\_3\\_%22Universe%22](https://en.wikipedia.org/wiki/Symphony_No._3_%22Universe%22) (Hear the music at:

<https://www.youtube.com/watch?v=gm9evI4-D6c>)

Sousa, John Philip *Transit of Venus March* (for example on the album *On Wings of Lightning* by the Razumovsky Orchestra on Naxos). Sousa was caught up in the public interest in the 1882 transit of Venus and wrote this piece at that time, dedicated to Joseph Henry, the great American physicist who had recently died. In 1920 Sousa wrote a short story called “The Transit of Venus” about a group of men who go to Africa to photograph the 1882 transit.

(<https://www.youtube.com/watch?v=tS867McD4tQ>)

See also the Victor Davies opera listed under “Astronomers” and Terry Riley under “Jupiter”

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## **Box: Scientists Who Write Songs**

Not included in our main listings are a host of far more scientifically specific songs by scientists who are musicians in their spare time. Many have issued their own privately produced CD's and have web sites where their music can also be found. Here is a sampling of some of our favorites:

The Chromatics: <http://www.astrocappella.com/> A group of scientists and educators, originally clustered around NASA Goddard Space Flight Center, the Chromatics offer their songs on the web and on a CD (*Astrocapella 2.0*). Look for “Wolf 359,” “Doppler Shifting,” and “Dance of the Planets.

Kevin Krisciunas’ Astronomy Songs: <http://faculty.physics.tamu.edu/krisciunas/> or <http://www.haverford.edu/physics/songs/Krisciunas/krisciunas.htm> Astronomer-author Krisciunas wrote/performed astronomy shows for colleagues and you can find a few of his songs on these two sites. Look for “Betelgeuse,” “Give me a Supernova,” and “The Constellation Song.”

Alan Marscher’s Songs: <http://www.bu.edu/blazars/songs/index.html> Astronomer Alan Marscher of Boston University has composed a variety of songs on astronomy and physics themes. Look for “Universal History,” “Another Planet,” “Relatively Weird,” and more.

Lynda Williams, The Physics Chanteuse: <http://lyndalovon.blogspot.com/2014/09/lynda-williams-brief-resume.html> Physics professor Williams performs sultry, informative cabaret songs about physics and astronomy. Look for “Love Boson,” “Big Bang,” and “Carbon is a Girl’s Best Friend.”

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### Reading List:

Davis, J. “The Real Music of the Spheres” in *Astronomy* magazine, Jan. 2018, p. 46.

Fraknoi, A. 2016, “Interdisciplinary Approaches to Astronomy: The Music of the Spheres” (in *Communicating Astronomy for the Public Journal*):

[https://www.researchgate.net/publication/306746125\\_Interdisciplinary\\_Approaches\\_to\\_Astronomy\\_The\\_Music\\_of\\_the\\_Spheres](https://www.researchgate.net/publication/306746125_Interdisciplinary_Approaches_to_Astronomy_The_Music_of_the_Spheres)

Fraknoi, A. 2006, “Music of the Spheres” in *Education: Using Astronomically Inspired Music* (in *Astronomy Education Review*): <http://dx.doi.org/10.3847/AER2006009>

Ronan, C. “Astronomy and Music” in *Sky & Telescope*, Sep. 1975, p. 145.

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