

Music Inspired by Astronomy

A Selected Listing for the International Year of Astronomy

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Part of the aim of the International Year of Astronomy is to show the connections between astronomy and other areas of human culture. Such connections are easily found in music, where astronomical ideas have found a wide range of expression. This is not a comprehensive listing, but a sampling of some of the pieces that are available on CD's, and that may be of particular interest to educators and astronomy enthusiasts.

To qualify for the list, a piece (or the composer's vision for it) has to include some real science and not just an astronomical term in the title or in a few lyrics. For example, we do not list *The Planets*, by Gustav Holst, since it treats the astrological view of the planets. And we regret that Philip Glass' opera *Galileo* is not available on CD and therefore cannot be listed. Nor do we include the thousands of popular songs that use the moon or the stars for an easy rhyme or a quick romantic image. And, while many jazz pieces have astronomy in the title, it is often hard to know just how the piece and the astronomy go together; so we've sadly omitted jazz too.

For those with old-fashioned ears, like the author, we note that no warranty is made that all these pieces are easy to listen to, but each takes some key idea from astronomy and makes music out of it. A more comprehensive discussion can be found in my article in *Astronomy Education Review*: <http://aer.noao.edu/cgi-bin/article.pl?id=193>

1. Classical Music Available on CD

Applebaum, Mark *Martian Anthropology* (Innova 617). An electronic piece in which we are to imagine that scholars from Mars try to piece together the essence of our destroyed Earth civilization from three objects they dig up.

Bedford, David *Great Equatorial*. (Voicepoint VP156CD). Electronic music commissioned for the 1993 renovation at the Royal Observatory in Greenwich. The composer writes that he "tried to imagine what it would be like to travel through the cosmos revealed by the first large telescopes"; and that he uses some of the harmonies envisioned by Kepler in thinking of the orbital speeds of the planets as the "music of the spheres."

Bedford, David *Star Clusters, Nebulae, and Places in Devon*. London Philharmonic players. (Resurgence 11). 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.

Bedford, David *Star's End*. (Virgin CDV 2020). A piece for orchestra and extra instruments concerned with entropy and the heat death of the universe. Bedford has written several other astronomical pieces, including one called "Sword of Orion", which he says is based on actual observations through his own telescope.

- Bentzon, Niels “Chronicle on Rene Descartes” on *Contemporary Danish Orchestra Music, vol. 1*. Danish National Radio Symphony Orch. (BIS 79). The first movement is inspired by Descartes’ ideas on “heavenly vortexes.”
- Brant, Henry *Orbits*. (CRI American Masters CD 827). Written for 80 trombones arranged in a semi-circle (with organ and voice), this piece experiments with sound and space. For more on Brant, who has written many other pieces with astronomical themes, see: <http://www.jaffe.com/brant.html>
- Brant, Henry “Litany of the Tides” on *Henry Brant Collection vol. 3* (Innova 410) During this complex piece, four sopranos sing science facts about the tides.
- Cage, John *Atlas Eclipticalis*. S.E.M. Ensemble Orchestra (Asphodel 2000). Cage put note paper on the pages of a star atlas and let the arrangement of the stars determine the pattern of the notes. (We just report it, folks, we don’t endorse the music that results!)
- Crumb, George *Makrokosmos I, II, III, IV* (many recordings exist). Modern piano music that extends the kinds of sounds that can be drawn from a piano and uses many astronomical (and astrological) references. On I, for example, the last piece is called “Spiral Galaxy” and the score is in the shape of a spiral. II has references to Stonehenge and Corona Borealis. IV is called “Celestial Mechanics.” Crumb has done other pieces with astronomical references, including *Otherworldly Resonances, Night of the Four Moons, Star Child*.
- Del Tredici, David *Syzygy* (Deutsche Grammophone 000141502). Partially inspired by the astronomical meaning of the term, the alignment of celestial bodies.
- Dessau, Paul *Einstein*. Otmar Suitner, conductor. (Edel 0091092BC) An Eastern European opera from the early 1970’s, focusing on Einstein’s “decisions and their social consequences”. The plot perpetuates the myth that Einstein was one of the “fathers of the atomic bomb” and has quite a bit of anti-capitalist propaganda. Galileo and Giordano Bruno also make an appearance.
- Eotvos, Peter “Cosmos” on *IMA* (Budapest Music Center 085). This piece for two pianos includes a Big Bang, comets, asteroid, meteorites, with the piece ending “a quarter of a second before the next big bang.”
- Glass, Philip *Einstein on the Beach*. Philip Glass Ensemble, Michael Riesman, Conductor (Elektra Nonesuch 79323-2) 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.
- Glass, Philip *The Light*. Bournemouth Symphony. (Naxos 8.559325) Commissioned in 1987 by Case Western to commemorate the 100th anniversary of the Michelson-Morley Experiment.
- Glass, Philip *Orion* (Orange Mountain Music 21). Commissioned for the 2004 Olympics in Athens, this complex 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.
- Gorecki, Henryk *Symphony 2 (Copernican)*. Polish National Radio Symphony Orchestra. (Naxos 8.555375.) Commissioned to celebrate the 500th anniversary of Copernicus’ birth; includes some text from his book *De Revolutionibus*.
- 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.
- Haydn, Franz *Il Mondo della Luna* on *Haydn Operas vol. 2* (Phillips 473851). 1777 comic opera involving an amateur astronomer who is tricked into believing he is on the Moon.
- Hindemith, Paul *The Harmony of the World*. Berlin Rundfunk Symphony, Janowski (Wergo CD) 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. (A symphonic suite has been drawn from the opera and is available separately.) (See: <http://www.hindemith.org/E/summary.htm>)
- Hovhannes, Alan “Saturn” on *Magnificat* (Crystal 808). Hovhannes was a prolific Armenian-American composer with hundreds of pieces to his credit. This piece for soprano, clarinet, and piano, celebrates both the astronomical and mystical Saturn, with words by the composer. One section is entitled “Titan, Moon of Saturn.”
- Hovhannes, Alan *Star Dawn*. Ohio State Concert Band, Keith Brion. (Delos DE 3158) 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.”
- Howe, Mary “Stars” on *American Treasures*. The Virginia Symphony (Hampton Roads Classics HRC 001.) A symphonic poem that “evokes the gradually overwhelming effect of a starry, crystal clear night.”
- Kamen, Michael *The New Moon in the Old Moon’s Arms*. Slatkin & the National Symphony. (Decca 289 467 631-2). Written for the Millennium, this symphonic poem was inspired by the composer’s visit to Anasazi ruins in Arizona. The title refers to the smallest waning crescent moon. Most of the piece concerns the rituals and aspirations of the Anasazi, but the last section, entitled “Reaching for the Stars,” takes the listener forward to the year 2000.
- Kornicki, Steve *Morning Star Rising* (available on at least 2 different CD’s). An orchestral piece inspired by Mayan notions of astronomy, as discussed in astronomer Anthony Aveni’s book *Conversing with the Planets*.
- Langgaard, Rued “Music of the Spheres” on *Music of the Spheres, etc.* Danish National Radio Symphony, Rozhdestvensky. (Chandos 9517) 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.”
- Lehar, Franz *Der Sterngucker (The Stargazer)*. German Chamber Academy of Neuss, Goritzki. (CPO 999 872-2) A 1916 operetta in which one character is an astronomer, but the term “stargazer” also denotes someone not in touch with reality.
- Messiaen, Olivier *Visions de l’Amen* (several CD versions are available). Piece for two pianos, combining astronomical and religious images. The first two views of the word “Amen” are the Amen of Creation and the Amen of the Stars and the Ringed Planet.
- Messiaen, Olivier *Illuminations of the Beyond* (several CD versions available). This mixture of religion and mysticism just barely makes our list, but the patterns in the section “Constellation of Sagittarius” breaks the orchestra into small groups representing the pattern of Sagittarius and there is a motif the composer calls “a nebula image”. Those who have seen the score report that it has a frontispiece of galaxy and nebula photographs.
- Miller, Kelvin & Bach, J.S. *Winds of Mars and the Music of Johann Sebastian Bach*. Roderick Kettlewell, piano. (Music Crest MCPcd 0898). Wind data from the weather station of the Mars Pathfinder are converted into sounds and mixed with piano pieces by Bach. Comes with an informative CD explaining the concept and the exploration of Mars. (See: <http://www.windsofmars.com/>)
- Norgard, Per *Luna (in 4 Phases) for Orchestra*. (Marco Polo Dacapo 8.224041) Based on aspects of the Moon, this piece is by a composer with a strong interest (like Kepler) in the relationship between astronomy and mathematics.
- Parmegiani, Bernard *La Creation du Monde (The Creation of the World)* (INA GRM C1002) Electronically created (electroacoustic) music which draws its inspiration from ideas of the

- Big Bang and the development of matter and structure from a chaos of “black light” or energy. The album covers play with images of Centaurus A. (See: <http://www.scaruffi.com/avant/parmegia.html>)
- Penderecki, Krzysztof *Kosmogonia* (no current CD, but part of it was used in the soundtrack for David Lynch’s 1990 film *Wild at Heart*). 1970 piece commissioned to mark the 25th anniversary of the U.N., has two sections (Beginning and Infinity) and uses quotes from Copernicus, John Glenn, the Bible, etc.
- Rands, Bernard *Canti Trilogy* (Arsis 156). Accompanied vocal pieces, using texts from several languages. *Canti del Sol* deals with a day from sunrise to sunset, *Canti Lunatici* is about the Moon as seen at night, and *Canti del L’Eclisse* treats both the astronomical and philosophical concepts of eclipse. (The first *Canti* won the Pulitzer Prize in 1984).
- Ruff, Willie & Rodgers, John *The Harmony of the World* (Kepler CD). A 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/>, where you can also find liner notes.)
- Smit, Leo “Copernicus: Narrative and Credo” on *American Masters Leo Smit Collection* (CRI CD 826). With text by astronomer Fred Hoyle. Written in honor of the 500th anniversary of Copernicus’ birth; contains a moving declaration of cosmic belief from Hoyle. This collaboration is also featured in Hoyle’s novel about a physicist and a composer in the future, called *October the First is Too Late*.
- Stockhausen, Karlheinz *YLEM*. London Sinfonietta. (Stockhausen Verlag CD ST121-2). A piece that takes its title from the ancient Greek term for primeaval material revived by George Gamow and that 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. (See: <http://www.stockhausen.org/ylem.html>)
- Tanaka, Karen *The Zoo in the Sky* (RCA/BMG BVCC-1094). Subtitled “piano pieces for children with small hands, many of these bear the title of a well-known constellation, while four are entitled “Star Song.”
- Terenzi, Fiorella *Music from the Galaxies*. (Island 422-848 768-2) Electronic music based on a digitized visible-light and radio data set from active galaxy UGC 6697. Selections include “Plasma Waves”, “Radio Core”, and “Galactic Beats”. Terenzi, a composer and performer, has done work in astrophysics for her doctorate.
- Van de Vate, Nancy *Distant Worlds; Dark Nebulae* (Vienna Modern Masters 3008). The composer says that these two pieces were influenced by looking at astronomical and space imagery, among other things.
- Varese, Edgard *Ionization* (found on several CD’s, including the Pierre Boulez version on Sony 45844). Iconoclastic 20th century French-American composer Edgar 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. (Varese also wrote an opera on ideas by Jules Verne and a piece called “The Astronomer”, but these have not been recorded.)
- Waterhouse, Graham “Hale-Bopp” on *Portrait 2*. English Chamber Orchestra (Meridian CDE 84510). This 1997 piece celebrates the bright comet with scoring that the composer says “evokes an other-worldly atmosphere.” It ends with the 16th century chorale tune “How Brightly Shines the Morning Star.”

Wuorinen, Charles *Genesis* (Albany 678). A modern cantata which meditates on creation, and includes a section called “Cosmology” with a Big Bang.

2. Popular Music Available on CD

Black, Frank “Places Named After Numbers” on *Frank Black* (Electra WEA 61467). This is 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.”

Byrds “CTA 102” on *Younger than Yesterday* (Sony 64848). Back in the 1960’s, there was a brief flurry of public attention to quasar CTA 102, whose radio signals were claimed to include coded information from an advanced civilization. There was nothing there, but the Byrds wrote a song about it. Radio astronomer Eugene Epstein then included the names of the Byrds in a reference in a paper on CTA 102 in the *Astrophysical Journal* (vol. 151, p. L31, second paragraph) referring to the song as “private communication.”

Clannad “Sirius” on *Sirius* (RC 6846). Enigmatic lyrics appear to be about fleeing the Earth as the Sun becomes a red giant and trying to reach Sirius.

Cowboy Junkies “Crescent Moon” on *Pale Sun Crescent Moon* (RCA 66344). A bluesy rock song which uses images with the phases of the Moon.

Epidemic “Factor Red” on *Decameron* (Metal Blade CD). Song about a red giant star, which begins: “Retinas burn, as my eyes raise towards the dying star, Half devoured sky bleeds red, the death of a star has begun...”

Gamma Ray “Beyond the Black Hole” on *Somewhere Out in Space* (Noise 283). Interesting lyrics about a survivor of a civilization whose star has died diving into a black hole.

Grateful Dead “Dark Star” on *What a Long Strange Trip It’s Been* (Warner Brothers 3091) [and other CD’s]. The song begins “Dark star crashes, pouring its light, into ashes..” and has a memorable line about going through “the transitive nightfall of diamonds”. Its sometimes surrealistic words definitely conjure up a number of images of stardeath.

Hawkwind “Quarks, Strangeness, and Charm” on *Quarks, Strangeness, and Charm* (Griffin 132). Humorous song using lots of science ideas (relativity, antimatter, quarks, etc.). Makes the mistake of saying Copernicus used a telescope, but the rest is fun.

Iron Maiden “When Two Worlds Collide” on *Virtual IX* (Sony). Heavy metal song about cosmic impacts; lyrics include mentions of telescopes, declination, orbit calculations.

Knopfler, Mark “Sailing to Philadelphia” on *Sailing to Philadelphia* (Warner Brothers 47753). A song about Mason and Dixon and their surveying expedition; refers to the fact that Mason was an astronomer.

Lear, Amanda “Black Holes” on *Never Trust a Pretty Face* (1979; song also available on some imported greatest hits CD’s). 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.”

Melua, Katie “Nine Billion Bicycles” on *Piece by Piece* (2005 CD released in England, single available by import). As part of a series of large numbers used to describe her love, she mentions the size of the universe. Physicist and popular author Simon Singh then took her publicly to task about using 12 billion instead of 13 billion lightyears as the radius of the observable universe and she eventually did a TV retaping with improved numbers.

Moody Blues “Higher and Higher” on *To Our Children’s Children* (Polygram CD 844770) This 1969 song celebrates the Apollo 11 mission to the Moon, and uses the image of tranquility (the mission landed in Mare Tranquilitatis).

O’Connell, Robbie “Galileo” on *Humorous Song* (Celtic Media CMCD 2000). An apology from the Church to Galileo.

Petty, Tom & the Heartbreakers “In the Dark of the Sun” on *Into the Great Wide Open* (MCA 1037). This song, presumably about an eclipse, includes mentions of constellations and Orion’s sword. The album notes have constellation diagrams with them and the CD itself shows circumstellar constellations with the center of the turning CD being the North Celestial Pole.

Pink Floyd “Shine on You Crazy Diamond” on *Wish You Were Here* (Capitol 29750). Compares the self-destructive fading away of Syd Barret, the former leader of Pink Floyd, with the fading away of a low-mass star like the Sun into a white dwarf.

Queen “39” on *Night at the Opera* (Hollywood 61065). Song about an interstellar expedition traveling at relativistic speeds and the loneliness the crew feels because they know that everyone they knew on Earth will be dead when they return. Brian May, a member of this group, trained as an astronomer in England.

Police “Walking on the Moon” (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.

Rush “Countdown” on *Signals* (Mercury/Universal 534633). Nice description of what it is like to witness a rocket launch at Cape Kennedy.

Rush “Cygnus X-1” on *Farewell to Kings* (Mercury/Universal 534628). An interesting attempt to portray the ideas around the discovery of the first stellar-mass black hole in poetic and musical terms. 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...”

Rush “Natural Science” on *Permanent Waves* (Mercury/Universal 534630) Images from astronomy and the evolution of life are entwined with injunctions about morality.

They Might Be Giants “The Sun is a Mass of Incandescent Gas” on *Why Does a Star Shine?* (Elektra 66272-2). A re-recording of a 1959 educational song from an album called “Space Songs” (lyrics by Hy Zaret, who also wrote “Unchained Melody.”)

Train “Drops of Jupiter” on *Drops of Jupiter* (Sony 69888). Uses image of Jupiter, Venus, and the Milky Way to talk about a girl friend who had taken either a physical or a spiritual journey and was “back in the atmosphere” now.

Tyler, Bonnie “Total Eclipse of the Heart” on *Faster than the Speed of Night* (Sony 38710). 1983 hit song by a Welsh singer which uses eclipse images -- shadows, being in the dark, “no one in the universe as magical as you” -- to describe a love affair going wrong.

Waterboys “The Whole of the Moon” on *This is the Sea* (Capitol 21543). 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.

3. Broadway Musicals, etc.

At the Drop of Another Hat -- This review of comedy songs by Flanders and Swann (a British duo) included “The First and Second Law (of Thermodynamics)”. A shortened version is available on *The Best of Flanders and Swann* (EMI 7243 8 29399 2 4).

Good News (CDJay 1291) Revised version of 1927 musical in which the plot revolves around the football hero failing his astronomy exam and being kept out of the big game.

Monty Python's Meaning of Life (Virgin 1398605) Includes the "Galaxy Song" about our insignificance in the scheme of the Universe.

She Loves Me (Polydor 831 968-2) The song "Perspective" in this old fashioned 1963 musical takes a cosmic view of human goings-on and has a nice series of astronomy images.

4. Self-published Science Songs Available on CD

Artichoke *26 Scientists, vol. 1* (see the web site: <http://artichoketheband.com/>). Eclectic, not always pleasant, songs about scientists, including Galileo, Einstein, Heisenberg.

The Big Bang Band *Traveling Star Show* (see the web site: <http://www.bigbangband.biz>). Three amateur astronomers offer songs mostly for school children. They recently won the ASP's Las Cumbres Outreach award for their educational work with schools. Some of their songs are written by others, some by members of the group.

The Chromatics *AstroCapella 2.0* (see the web site: <http://www.astrocappella.com/>). This seven-member singing group from NASA Goddard offers a CD of such original songs as HST-Bop, Doppler Shifting, Wolf 359, Habitable Zone, etc. On their web site they have developed some lesson plans for teachers to use with the songs.

William, Lynda (The Physics Chanteuse) *Cosmic Cabaret* and *Parody Violation* (see the web site: <http://www.scientainment.com/index.html>). Williams, now a physics instructor at Santa Rosa Junior College, entertains as a cabaret singer, with such songs as: Love Boson, Annie Jump Cannon, Big Bang, Gravity Wave Vibe, and Solid State of Mind.

5. Books and Articles on Astronomy Music

Fraknoi, Andrew "Music of the Spheres: Astronomical Sources of Musical Inspiration" in *Mercury* (the magazine of the Astronomical Society of the Pacific), vol. 6, no. 3, pp. 15-22.(May/June 1977).

Fraknoi, Andrew "More Music of the Spheres" in *Mercury*, vol. 7, no. 6, pp. 128-132 (Nov/Dec. 1979).

Rodgers, J. & Ruff, W. "Kepler's Harmony of the World: A Realization for the Ear" in *American Scientist*, May/Jun 1979, p. 286.

Ronan, C. "Astronomy and Music" in *Sky & Telescope*, Sep. 1975, p. 145-149.

Ronan, C. "William Herschel and His Music" in *Sky & Telescope*, Mar. 1981, p. 195.

Ronan, Colin "Music of the Spheres" in *Interdisciplinary Science Reviews*, vol. 1, no. 2, pp. 149-159 (1976).

Ronan, Colin "Other Astronomical Pieces" in *Mercury*, vol. 7, no. 6, p. 131 (Nov/Dec. 1979).

Sagan, C., et al. *Murmurs of Earth: The Voyager Interstellar Record*. 1978, Random House. The record carried by the Voyager spacecraft includes a wide-ranging selection of Earth's music. [The record itself was available as a CD entitled *Murmurs of Earth* from Warner New Media.]

Stephenson, B. *Music of the Heavens: Kepler's Harmonic Astronomy*. 1993, Princeton U. Press. Scholarly account of Kepler's metaphysical views.

"A Physics Songbag" in *Physics Today*, July 2005, pp. 56 - 61. Includes physics songs spanning about a century of amateur contributions. Authors include George Gamow and Tom Lehrer

6. Useful Web Sites (not Cited in the Recordings List)

Hyperbolic Orbit: <http://www.haverford.edu/physics-astro/songs/hyperbolic.htm> -- Benjamin Newman's song compares a comet on a hyperbolic orbit around the Sun (comes in and goes out) with an enticing woman who will not stay after a brief encounter.

Jane Ira Bloom: First Musician in NASA's Art Program:

<http://www.janeirabloom.com/retrospectivespace.html> -- Jazz saxophone player and composer Bloom has written a number of pieces about space and astronomy

Jon Bell's Astronomers' Songbooks:

http://www.ircc.edu/portal/layout_web1.aspx?PortalPageID=182 -- Planetarium Director Bell has two large collections of astronomy lyrics which you can download in PDF format at the bottom of the Hallstrom Planetarium page.

Kevin Krisciunas' Astronomy Songs: <http://www.astro.washington.edu/kevin/songs.html>

Astronomer-author-historian Krisciunas has written and performed several astronomy shows for his colleagues and collects a few songs here.

Alan Marscher's Songs: <http://www.bu.edu/blazars/songs/index.html> Astronomer Alan Marscher has composed a variety of songs on astronomical themes.

Music to Titan: <http://music2titan.com/> -- Four pieces of music were included aboard the Huygens lander which touched down on Titan.

Physics and Astronomy Song Web Site: <http://www.haverford.edu/physics-astro/songs/> --

Professor Walter F. Smith of Haverford College keeps a marvelous web site of recorded and unrecorded songs related to physical science.

Science Songwriters' Association Resource Guide:

<http://www.science-groove.org/SSA/resource.html> Here you can find CD's and web sites from several self-published songwriters (including some of the above) who have formed a professional organization.

Voyager Spacecraft Audio-Video Record Site:

<http://voyager.jpl.nasa.gov/spacecraft/goldenrec.html> The record that is aboard Voyager 1 and 2 includes some music you might call "The Greatest Hits of Earth." (See *Murmurs of Earth* book listed in section 1.)

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