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Galileo Project: Music of the Spheres

In late 16th-century Florence, the house of the lutenist and composer Vincenzo Galilei was a fertile breeding ground for important innovations in the realms of music and of science. Vincenzo's experiments with the expressive power of accompanied solo song influenced the creation of opera as a musical form, and the style of music that we now describe as "baroque."

He also conducted repeated trials under controlled conditions with lute strings to find the mathematical formulas that express the relationships among length, tension and musical pitch. He is thought to have been assisted in these experiments by his oldest son, Galileo Galilei, a brilliant young teacher of mathematics who went on to apply his expertise to world-changing discoveries about the universe. Galileo inherited his spirit of scientific inquiry and a love of playing the lute from his father, and it is fitting that a musical tribute should honour an astronomer whose intellectual and artistic vitality stemmed from a place where music and science intersected.

The Galileo Project: Music of the Spheres is Tafelmusik's contribution to the International Year of Astronomy, marking 2009 as the 400th anniversary of Galileo's development and use of the astronomical telescope. In response to an invitation from esteemed astronomer and longtime Tafelmusik subscriber Professor John Percy, we have created an event which uses music, words and images to explore the artistic, cultural and scientific world in which 17th- and 18th-century astronomers lived and did their work.

Ancient civilizations depended on an awareness of the natural world for their livelihood and survival, and enjoyed an intimate relationship with the daily, monthly and yearly patterns of the night sky. The Greeks and Romans identified characters in their mythological stories with planets and stars, and gave them names that we still use today. In Ovid's story of Phaeton, the impetuous son of the sun god Apollo, the minutes, hours, days and seasons are personified as denizens of the palace of the sun.

At Versailles, the French 'Sun King,' Louis XIV, created his own palace of the sun, a building that strongly reflected the cosmology of the ancient world in its statuary and decoration. Jean-Baptiste Lully, the resident composer at Versailles, wrote some of his most magnificent music for his opera *Phaeton*. We include excerpts from the opera in our concert as an example of the cultural inheritance that the world of baroque music received from the observations of ancient stargazers. The first important opera, Claudio Monteverdi's *Orfeo*, was composed in 1607 and published in Venice in 1609, the year that Galileo travelled from Padua to Venice to offer his newly created telescope as a gift to the Venetian Doge. Monteverdi and Galileo were exact contemporaries and near the end of their lives Galileo arranged for Monteverdi to procure a beautiful Cremonese violin (probably built by Nicolo Amati) for his nephew Alberto Galilei, the son of Galileo's brother Michelangelo who composed the lute solo in the first half of our programme. Monteverdi, Tarquinio Merula and Biagio Marini were the most important composers in Galileo's world and we present some of their most beautiful works as a backdrop to his own account of his discovery of the moons of Jupiter and the events that followed.

In spite of the efforts of the Inquisition to suppress his discoveries and writings, Galileo's influence was soon felt throughout Europe and the telescope was adopted as a tool for astronomical research. In 1667, Louis XIV commissioned a Royal Observatory to be built in Paris and the early activities of this institution were recorded by Bernard le Bovier de Fontenelle, the 'perpetual secretary' of the French Academy of



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Sciences who died in 1757, a month short of his 100th birthday. Fontenelle, who attributed his longevity to the regular eating of strawberries, was one of France's most celebrated personalities. His most famous work was *Entretiens sur la pluralité des mondes* (*Conversations on the Plurality of Worlds*), a popularizing book on astronomy written in 1686 in the form of a dialogue between himself and a clever and beautiful noblewoman during evening walks to view the stars. Fontenelle refers charmingly to Lully's opera *Phaeton* as part of his explanation to the 'Marquise de M.' of the workings of the solar system.

The work became a bestseller in England when it was translated by the Restoration playwright, Mrs. Aphra Behn; an English newspaper from 1713 describes a mother and her daughters making jam while they read to each other from the book! Aphra Behn was also the author of *Abdelazer, or The Moor's Revenge*, for which Henry Purcell composed the *Rondeau* that we play in the second half of our programme, and that became famous after being used by Benjamin Britten as the theme for *The Young Person's Guide to the Orchestra*.

England's most important astronomer was Sir Isaac Newton. He was born within a year of Galileo's death in 1642 and was buried in 1727 in Westminster Abbey near the tombs of Aphra Behn and Henry Purcell. This period saw the establishment of a Royal Observatory in Greenwich, Newton's creation of the reflecting telescope, his discoveries about the properties of refracted light, and his development of the principles of universal gravitation.

Newton used the musical analogy of a seven-note scale in explaining the seven colours of the rainbow, but unlike Galileo, he does not appear to have been a music lover. After having been to hear Handel play a concert, he complained that there was nothing to admire except the elasticity of his fingers.

George Frideric Handel made more of a sensation when he travelled from his adopted country of England to his homeland of Germany in order to play at a glittering royal wedding celebration in Dresden in September of 1719. It was a month-long 'Festival of the Planets' with numerous operas, balls, outdoor events and special concerts in honour of each of the known planets: Mercury, Venus, Earth, Mars, Jupiter and Saturn. (Uranus was discovered in 1781 by oboist, organist, composer and amateur astronomer, Sir William Herschel who, like Handel, had moved to England from Hanover. Herschel also built the largest and finest telescopes of his day, catalogued nebulae and discovered infrared radiation with the help of his musician sister Caroline, the discoverer of several comets).

There are detailed archives of the musical events at the 1719 Festival of the Planets, and we know that not only Handel but also Georg Philipp Telemann, who was living in Frankfurt at the time, joined the renowned musicians employed by Augustus the Strong in Dresden. These included double-bass player Jan Dismas Zelenka and Silvius Leopold Weiss, Europe's most famous lutenist. We present excerpts from works by these four composers, and we are grateful to Lucas Harris for his reconstruction of Weiss's *Lute Concerto in C Major*. All that survives of the original is the solo lute part, but the title page confirms that the lute was accompanied by two violins, viola and violoncello. Lucas has composed the missing parts. Our programme begins and ends with reflections on the ancient concept of the 'Music of the Spheres,' thought to have been created by a heavenly ensemble of planets and stars making music together as they move through space. The concert's opening speech from *The Merchant of Venice* contains Lorenzo's beautiful expression of this idea: "There's not the smallest orb which thou behold'st but in his motion like an angel sings, still quiring to the young-eyed cherubins."



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The subject was treated extensively in *Harmonices Mundi* (*The Harmony of the Worlds*, 1619) by Johannes Kepler, who used the formulas from his laws of planetary motion to derive musical intervals and short melodies associated with each planet. We perform these short tunes on their own, and then weave them into the chorale tune *Wie Schön Leuchtet die Morgenstern*, (*How Brightly Shines the Morning Star*).

This is followed by music adapted from opening sinfonia of Johann Sebastian Bach's cantata of the same name, BWV 1, and from the opening sinfonia of Bach's Cantata BWV 29. We have chosen these works by Bach to end our concert because they speak profoundly and eloquently of what lies at the heart of the International Year of Astronomy — a celebration of the wonders of the cosmos and the achievements of the human spirit.

—Alison Mackay

Any explorer of the world and work of Galileo Galilei must acknowledge a special debt to the work of the late Stillman Drake (left), professor in the University of Toronto's Institute for the History and Philosophy of Science and Technology, and a giant of Galileo scholarship. Professor Drake assembled a formidable collection of rare texts in the history of science, including virtually all of Galileo's works, and these books became the core of the science collection in the Thomas Fisher Rare Book Library at the University of Toronto. He published over 130 books and articles on Galileo, and his translation of The Dialogue Concerning the Two Chief World Systems and his best-selling Discoveries and Opinions of Galileo have introduced Galileo's thought to a multitude of modern readers. He was a lover of renaissance and baroque music and wrote extensively on the connections between music and science in Galileo's time.