



January 26-28 • 8 PM | January 29 • 2:30 PM

Audience Guide

Cast & Characters
Exploration of the opera
What To Listen For
Galileo & Glass
Want to Know More?

CAST & CHARACTERS (IN ORDER OF APPEARANCE)



Older Galileo: William Joyner, tenor

The famed Italian astronomer discovered that Earth revolved around the Sun, only to suffer the persecution of his peers and the Inquisition. Galileo was a brilliant man of science and a pious Roman Catholic who often struggled to bridge his work and his faith.



Pope/Cardinal Barberini/Simplicio/Father of Merope: Dean Peterson, bass-baritone
Cardinal Barberini, who would become Pope Urban VIII, was a great admirer of Galileo; ultimately, politics forced him to make a difficult choice.

Simplicio argues for geocentrism in Galileo's *Dialogue Concerning the Two Chief Systems of the World*.



1st Cardinal/1st Inquisitor/1st Oracle: Alex Edgemon, countertenor

Cardinals are responsible for the election of a new Pope, and thus are powerful voices within the Catholic Church.

Inquisitors were officially sanctioned members of the Church who participated in investigations and trials of suspected heretics.



2nd Cardinal/2nd Inquisitor/Servant/2nd Oracle: Darik Knutsen, baritone

Cardinals are responsible for the election of a new Pope, and thus are powerful voices within the Church.

Inquisitors were officially sanctioned members of the Church who participated in investigations and trials of suspected heretics.



3rd Cardinal/Priest: Errik Hood, baritone

Priests were authorized to perform rites, and often were leaders of small communities. A priest was less vulnerable to the politics of the Church, and could participate more freely in non-theological scholarship. The Catholic Church has a long history of cleric-scientists; Georges Lemaître, the originator of the Big Bang Theory, was a priest.



Maria Celeste/Marie de Medici/Eos: Jamie-Rose Guarrine, soprano

Maria Celeste (born Virginia Galilei) was Galileo's eldest child and most beloved daughter. She was his muse and confidante.

Marie de Medici was the Queen of France and a member of the powerful Italian Medici family. She was one of Galileo's patrons.



Scribe/Maria Maddalena: Allisanne Apple, mezzo-soprano

Scribes were responsible for recording the official events of their day. Much of our historical knowledge is the result of records kept by Scribes.

Maria Maddalena was Cosimo II's wife, daughter-in-law to Grand Duchess Christina, and second cousin by marriage to Marie de Medici.



Young Galileo/Salviati: John Arnold, bass-baritone

In Galileo's book *Dialogue Concerning the Two Chief Systems of the World*, Salviati is the champion of Copernicus's heliocentric theory. He is based on Galileo's friend and fellow astronomer Filippo Salviati.



Sagredo/Duchess Christina: Saira Frank, soprano

Sagredo is the layman's voice in Galileo's *Dialogue*, a neutral character observing the conversation and asking questions.

Duchess Christina was a member by marriage of the powerful Medici family and a patron to Galileo.



Young Maria Celeste: Jennifer DeMain, mezzo-soprano

In her youth, before joining a convent, Maria Celeste would have been known as Virginia Galilei. She was as inquisitive and intelligent as her father, and they discussed many of his theories and ideas via letter throughout her short life.

Exploration of the opera

Galileo Galilei is told backward from the end of Galileo's life to the beginning.

Scene 1 • "Opening" – *Galileo's Portico, Florence*

Galileo Galilei, well into old-age and blinded, stands in the middle of an ever-expanding universe. He sings to the memory of his deceased daughter, Maria Celeste, of whom he had a dream the previous evening. He questions the actions of his life, recounting his dreams, doubting his beliefs, still trying to scrutinize the stars with his now blind eyes. The planets encircle him, shifting closer and then sliding away. Galileo recalls his recantation to the Church of years ago and the sky seems to melt around him. As he confronts his memories, he hears Maria Celeste calling to him from the shores of death.

Scene 2 • "Recantation" – *The Church of Santa Maria sopra Minerva, Rome*

Galileo, aged seventy, stands before Pope Urban VIII and three Cardinals. The men of the Church have called Galileo to the Cathedral to recant his heretical views on the movements of celestial bodies. Sunlight attempts to pervade the Cathedral window's glass, but is transformed into color, dimmed and diffused from its intended brilliance. Heavy tension pervades the air. The Cardinals pronounce a sentence of solitary confinement. They order Galileo's works banned and forbid him to ever again teach, research, or publish. The Pope remembers a happier time he shared with Galileo in his garden, and the scene fades away, receding into memory.

Scene 3 • "Pears" – *Outside the Convent of San Matteo, Arcetri*

Galileo rereads a letter from his daughter, Maria Celeste, writing him from the confines of her cloistered cell where she has lived for ten years. She speaks of the harshness of the religious life she and her sister live in the convent, and complains of the cold and lack of privacy. He imagines her delivering him a package in which there are candies and pears and a rose. It begins to snow. Softly at first, and then gaining in momentum. Wordlessly, Maria Celeste sings out against the storm. She drifts away, disappears into the mists, leaving the old man alone and in darkness.

Publish and perish

The book that led to Galileo's trial was called the *Dialogue Concerning the Two Chief Systems of the World* (sometimes called *Dialogue on the Two Great World Systems*). Galileo had been ordered by the Church not to present Copernicus' theory of a heliocentric universe as fact, and so he wrote the book as a conversation between two people. However, it was evident that Copernicus' theories were the winner of the discussion.

Seven months after the book's publication, Galileo was ordered to travel to Rome to stand trial before the Inquisition.

Fact vs. Fiction

Galileo did not go blind from staring at the sun. We know from his published methods that he projected an image of the sun through his telescope onto a screen. Galileo used the projected image to study the sun and make tracings of sun-spots. Galileo's blindness was most likely the result of cataracts and old age.

Scene 4 • "Trial" – *The Holy Offices at the Vatican*

A Scribe recounts the records of the Inquisition. Two Inquisitors enter and take their positions, referencing their documents as they interrogate Galileo. They question him about his latest published work, decrying the book as a work of heresy. Galileo answers their string of questions in his own defense. With the continual ringing of chimes, time shifts and days pass. Under threat of torture, Galileo determines to make a confession. The Inquisitors leave him. He holds tight his seminal book and addresses an imagined audience, presenting his work, which comes to vivid life.

Scene 5 • "Dialogue Concerning the Two Chief Systems of the World" – *Venice*

Sagredo, an intelligent layman, listens to Salviati and Simplicio debate the movement of Earth. Simplicio defends the geocentric view of the universe, while Salviati champions the heliocentric theory. The scene is a wide-open sky with an occasional cloud. It is an imaginary Venice. As the men discuss their conjectures about life and its meaning, fantastical images appear in the sky above them, elucidating their thoughts. They argue physical theories and the intertwined glories of man and God, but still leave together remaining companions on a journey of discovery. The sky becomes a brilliant white.

Scene 6 • “Incline Plane” – *The Piazza della Signora, Florence*

A younger Galileo speaks to himself, working out his ideas of scientific and physical principals to describe the acceleration of objects in motion. He sits on the floor, books and papers surrounding him in the bright clear space that is his mind. He formulates, thinks, crosses out, redraws. His sketching appears on the floor and then floats up into the air above him. He determines that he will write a book. He exits as his inner world fades into reality.

Scene 7 • “A Walk in the Garden” – *Cardinal Barberini’s Garden Villa, Rome*

The scene awakens on a lush garden overlooking Rome as Cardinal Barberini walks with Galileo, a young Maria Celeste in tow. Cardinal Barberini, who will one day become Pope Urban VIII, is warm and congenial with the burgeoning scientist. He pledges to protect Galileo from his enemies, promising kindness and protection. Still, he warns Galileo to steer clear of the geocentric vs. heliocentric argument. Barberini reads a poem on the purpose of the stars. Nature is praised. Hope abounds. The men exit together as a cover is placed on the natural world, dimming its light and censoring the freshness of its air.

Scene 8 • “Lamps” – *The Cathedral at Pisa*

A musty sense pervades as a Priest processes followed by monks and nuns. Maria Celesta, a young girl, and Galileo are attending Mass. Galileo translates the Liturgy for his daughter who is inquisitive of its meaning. The lamp above them begins to sway. Maria Celeste asks her father—whose gaze has gone upward—if he is praying. Galileo explains to his daughter how a pendulum functions and shows her how to use her pulse to time the arc of the lamp. Great discoveries are attributed to God’s perfection. Maria Celeste leaves her father, who intently watches the lamp above.

“Dangerous Adulation”

Barberini was a fan of Galileo’s as early as 1611, when he sent the astronomer a letter extoling Galileo as a virtuous and pious man, whose brilliance could only lead to the improvement of other lives. In his 1620 poem *Dangerous Adulation*, Barberini praises Galileo for his celestial explorations and uses sunspots—discovered by Galileo— as a metaphor for the dark fears in God’s heart.

Barberini signed the letter accompanying a copy of the poem to Galilei, “as your brother.”

Fact vs. Fiction

Galileo did not invent the telescope. He improved on a design that originated in 1608 with Dutch lensmaker Hans Lippershey. Both men are commonly credited with “inventing” the telescope—Galileo erroneously, and Lippershey only because there is no hard proof to the contrary.

Galileo never saw Lippershey’s telescope. The astronomer built his based on a rough description of the Dutch design.

Scene 9 • “Presentation of the Telescope” – *The Medici Court, Tuscany*

The room is transformed to a courtly space as a Herald appears to announce three highly titled women. Archduchess Maria Maddalena, Marie de’ Medici, and the Grand Duchess of Tuscany Christina are excited about meeting Galileo and seeing his latest creation: the Galileo telescope. He unveils his telescope and explains its development and usage to them. The women are agog. The Duchess reminds him that the two of them had met before. Galileo retreats into the memory of that moment years ago at his own father’s opera.

Scene 10 • “Opera Within the Opera” – *The Theatre at the Medici Court*

Singers and dancers arrive and the story of Orion plays out on the stage. The Greek hero falls in love but is tricked. His eyes are plucked out. He sails to the edge of the Earth and finds Eos, who heals him. The company praises the mythic hunter as they scan the sky for his constellation’s image. An old, blind Galileo emerges from the crowd as the company exits, unaware of his presence. Galileo raises his empty eyes heavenward and reaches up towards the stars.

What to Listen For

The musical character of *Galileo Galilei*

The Minimalists

Although a number of artists have experimented with minimalist music over the past five decades, the most prominent composers in the genre are:

John Adams
Louis Andriessen
Philip Glass
Michael Nyman
Steve Reich
Terry Riley
La Monte Young

Philip Glass is regarded not only as one of the most influential composers of the late 20th century, but as one of the composers associated with the advent of *minimalism*— an experimental style of music that began in the mid-twentieth century. Although minimalistic elements are not uncommon in European classical music, minimalism is regarded as a distinctly American genre and originated in the New York Downtown scene of the 1960s.

Minimalism itself is a sensibility that swept through many artistic forms during the 1960s, including music, literature, and the visual and performing arts. Minimalist composers strive to use the barest musical ideas necessary, focusing primarily on constant harmony, melody, and rhythm. Qualities most often associated with minimalist compositions

are steady pulses, patterns, repetitions, brevity, and rhythmic silence.

Glass has never particularly liked the term *minimalism* and prefers to call his compositions “music with repetitive structure.” Nevertheless, the term has stuck with Glass throughout his career. In *Galileo Galilei*, Glass uses rhythm as his primary thematic element and repeats many of the same rhythmic elements throughout the opera. The most evident rhythmic element is a tied eighth-note ostinato, which can be found in every scene of the score. Not only does this create a strong thematic element, but it also generates a consistent, steady pulse. The repetition of melody, harmony, and rhythm is hypnotic, and can lead the listener into a trance state. Glass once recalled during an interview with NPR that a Bronx concert attendee used the words ‘Buddha rock’ to describe the meditative compositional elements of minimalism.

It can be difficult to discern whether minimalist music is strictly a compositional technique or if it has a clear connection to the text. The tied eighth-note figure could be merely a rhythmic device which Glass chose to repeat, or it could be interpreted as representative of a specific character or event in the story— underscoring a heartbeat, mimicking a revolving motion (much like the Earth around the Sun), a current, or as a signal of impending doom. One of the goals of minimalism is to express a sense of identity, place, and importance by employing the fewest musical elements and reducing the musical landscape to the most essential textures. In this sense, the eighth-note ostinato is incredibly important in *Galileo Galilei*, despite its apparent simplicity.

The Bare Minimum

There is no official ‘school’ of minimalism, but there are major traits that are employed in minimalist works:

- Repetition
- Drone (the use of one note or chord)
- Pulse
- Simplicity
- Hypnotic

In many operas of the Classical and Romantic eras, character identities can be expressed by musical key relationships. For example, in Mozart’s *Don Giovanni*, much of the Don’s music lies in the key of D major (or in a key closely related to D Major). In *Galileo Galilei*, however, there is no formal key structure. Instead, Glass weaves in and out of harmonies and uses accidentals as the only clue to the tonal structure, many of which are repeated throughout the opera.

A common misconception of Glass’s music, and minimalist music in general, is that it is atonal, or lacking a key center. On the contrary, consonance (or harmony) is an important compositional device to Glass; G minor and C minor are commonly used keys throughout the opera. *Galileo Galilei* may be an example of minimalism, but it is far from simple.

Galileo Galilei

The astronomer



Galileo Galilei (February 15, 1564—January 8, 1642) was an Italian astronomer, physicist, mathematician, and philosopher. Called the Father of Modern Science, Galileo's work deeply influenced the scientific revolution of the 16th and 17th centuries. A man of both scientific inquisitiveness and religious conviction, Galileo's legacy spans the fields of cosmology and spirituality.

Galileo was born in Pisa, the firstborn in what would become a large family. Galileo's mother, Giulia degli Ammannati, gave birth to six children over the next thirteen years. Two of Galileo's siblings died in childhood. The Galileo family were of respected Italian nobility but were not wealthy. By Galileo's own accounts, his was a happy home filled with love and music.

A Childhood of Learning

Galileo's father, Vincenzo Galilei, was a musician, and one of the originators of Italy's most famous art: opera. In addition to being a successful lute player, vocalist, and teacher, Vincenzo had a keen interest in acoustics and studied the way in which strings produce sound. He taught his son to play the lute, and Galileo may have developed his interest in science by assisting with his father's musical experiments.

Although Pisa had been one of Italy's wealthiest and most powerful cities, the mid-16th century brought an economic decline that resulted in the population falling by more than half. When Galileo was eight, Vincenzo moved his family to Florence in the hopes of better employment prospects. Galileo remained in the home of an aunt in Pisa while his family settled in; he was ten-years-old before he rejoined his family in Florence. In the prosperous new city, Vincenzo and his group of colleagues studied Greek music and drama; their arguments, debates, writings, and works are the foundation on which opera was built.

In Florence, Galileo received private tutoring. When he reached thirteen, his family sent him to the Camaldolese Monastery at Vallombrosa in Tuscany. Galileo enjoyed the strict routine of prayer, worship, and study, and decided that he wanted to become a monk. Vincenzo disapproved of this, as the family would be depending on Galileo's future salary to survive and monks did not have an income. Vincenzo told the monks that Galileo had to return to Florence for medical treatment of an eye problem. Once home, Galileo was sent to a different monastery school, where he was firmly encouraged to forget about the priesthood.

Student and Teacher

In 1581, Galileo entered the University of Pisa to pursue a medical degree. The University of Pisa had a prestigious international reputation, and Galileo argued about science and religion with young men from all over Europe. In addition to his primary studies, Galileo took fine art classes and attended lectures on poetry and music. Although Galileo studied medicine to please his father, he questioned the prevailing theories about the human body and diseases, which were not based on scientific inquiry. Galileo was a bright and inquisitive student but medicine simply did not interest him. In his second year at university, Galileo attended a geometry lecture given by Ostilio Ricci, chief mathematician to the Grand Duke of Tuscany. Galileo's following discussions with Ricci paved the way for Galileo's life-long friendship with

the patriarchs of the powerful House of Medici, who ruled the Duchy of Tuscany until 1737. Ricci visited the Galilei home in Florence in 1583 and attempted to convince Vincenzo to let his promising son specialize in mathematics. Vincenzo insisted that Galileo continue studying medicine, but when Galileo left university in 1585, he did so without his medical degree.

After university, Galileo returned home to Florence, where he helped his father with the mathematics of his musical experiments. In order to make money, Galileo tutored pupils in Florence and Siena, published his first book, and gave public lectures. One of his most famous lectures from this time occurred at Accademia Fiorentina (Florentine Academy), in which Galileo used geometric principles to give the shape, location, and dimensions of hell as described in Dante's *Inferno*.

In 1588, Galileo applied but was turned down for jobs at the universities of Pisa, Siena, Padua, and Bologna. He managed to obtain a position at Florence's Accademia delle Arti del Disegno, teaching perspective and chiaroscuro. He continued to lecture and make friends with some of Italy's leading scientific and political figures. In 1589, the University of Pisa offered him a lectureship in mathematics. It was an underpaid position, compounded by the pay-cut Galileo suffered after being unable to give his first series of lectures: the River Arno had flooded the city and trapped most of Pisa's inhabitants, including Galileo, on one side of the city or the other. In addition, Galileo upset university leaders by refusing to wear the standard academic regalia, dismissing the black robe as pretentious and cumbersome. He was repeatedly fined for this transgression, further reducing his salary.

Despite his financial difficulties, Galileo enjoyed the company and conversation of his colleagues at the university. While teaching at Pisa, Galileo formulated his early theories on motion. He wrote, but did not publish, the book *De motu* ("On motion"). The book has survived the centuries and helped scientists and scholars to understand the evolution of Galileo's theories, which he refined over the next twenty years and which paved the way for luminaries such as Isaac Newton to advance science beyond Aristotelian theories.

Family Man

Vincenzo passed away in 1591, making Galileo the sole provider for a family that included his mother; Virginia, a married sister who owed regular dowry payments to her husband's family; Michaelangelo, his brother; and his unmarried sister, Livia. In 1592, Galileo was forced by academic politics to take a better paying position as Chair of Mathematics at the University of Padua in Venice. His teaching duties included lecturing in geometry, astronomy, medical astrology, military engineering, and fortification.

Although the working conditions and salary were more agreeable at Padua, Galileo's financial responsibilities increased. He had to fund two job-hunting trips to Poland and throughout Florence for his brother, Michaelangelo. Under threat of lawsuit and debtor's prison, Galileo borrowed money to make payments on Virginia's dowry debt. Livia, who had been sent to a convent to relieve Galileo of some debt burden, received two marriage offers, one of which Galileo was forced to turn down due to the expense of providing a dowry. Michaelangelo, who had secured a position in the Polish royal court, agreed to provide a portion of the dowry if Galileo accepted the second offer; however, Michaelangelo was unable and ultimately unwilling to fulfill his end of the bargain, and Galileo was forced to borrow a great sum of money from a patron in addition to securing an advance on his salary from the university.

In addition to his family's debt, Galileo incurred regular medical expenses for real and imagined illnesses. While Galileo did suffer from common maladies—seasonal colds, allergies, and headaches—he was also a hypochondriac who summoned physicians every time he sneezed, coughed, or felt a pain. Galileo borrowed money or traded favors to secure his pills and poultices and to pay the physicians' bills; he complained bitterly of feeling ill throughout his long life.

In order to augment his income—the lion’s share of which was going to pay debts incurred by his family—Galileo rented rooms in his home and cast horoscopes. Astrology was of great importance in the 17th century, influencing everything from political affairs and medical decisions to marital unions and career goals. People of the time believed astrology to be a dependable science, and were particularly interested in receiving readings from astronomers and mathematicians. Galileo’s clients included not only his students and boarders, but cardinals of the Church, European princes, and patricians from Italy’s wealthiest and most influential families. Some 25 of Galileo’s astrological charts survive today, as well as a handful of his written analyses.

Giovanni Francesco Sagredo, a very wealthy man and friend of Galileo’s, applied his influence to pressure the University of Padua into giving Galileo a raise on his salary. The sum was less than Sagredo had hoped to secure, in large part because Galileo had made a number of enemies at the university, one of whom even called for Galileo to resign if his salary displeased him. Sagredo warned Galileo he would never receive another raise and that his appointment at Padua was tenuous. The only reason Galileo was not fired from Padua was the patronage of Ferdinand I de’Medici, the Grand Duke of Tuscany and one of the most powerful men in Italy. In 1601, Ferdinand appointed Galileo the official tutor to his son and heir, Cosimo II. Though Cosimo II was only 11-years-old at the time and his tutor nearly 40, they were mutually impressed with one another and formed a friendship that lasted until Cosimo II’s death in 1621.



Cosimo II de' Medici, Grand Duke of Tuscany from 1609-1621

Galileo travelled regularly between Padua and Venice for professional and leisure purposes. In 1599, Galileo met an attractive young woman 14 years his junior, Marina di Andrea Gamba. Social conventions prevented them from marrying, as they were of two different classes, but Marina and Galileo lived together in Padua and had a happy relationship. Marina gave birth to Galileo’s first child, a daughter, in 1600. She was named Virginia after Galileo’s sister, and would become Galileo’s scientific muse and moral support as his professional life unraveled. Marina and Galileo had two more children, daughter Livia and son Vincenzo, before their union ended in 1610 with Galileo’s relocation to Florence. All of the children were illegitimate under the law, and Galileo was not listed on their birth records.

In July of 1610, Galileo was appointed Chief Mathematician of the University of Pisa and Philosopher and Mathematician to the new Grand Duke of Tuscany, Cosimo II. It was a life-long appointment that no longer required Galileo to teach. He moved to Florence in September to take his position at the Medici Court, bringing Livia with him but leaving his son Vincenzo in Marina’s care and sending money for the boy’s upkeep. Virginia, who had been living with Galileo’s mother in Florence for the last year, moved into her father’s home. Vincenzo joined his father and sisters in Florence in 1612, following Marina’s death and a short stay with a family friend.

The illegitimacy of Galileo’s children, coupled with his high-status position at the Medici Court, forced Galileo to make difficult decisions about their futures. In 1619, Cosimo II legitimized Vincenzo at Galileo’s request, permitting the boy to eventually study law at the University of Pisa and go on to a bright career. However, there was nothing Galileo could do for his daughters. His position at the Medici court necessitated his daughters marry men of high rank, but Galileo could never have afforded the

dowries for men of such status. The only option was to put the girls in a convent, the common solution for dealing with unmarried female relations.

Social convention decreed that girls had to choose to enter the convent, though in reality their personal desires were irrelevant. In keeping with the pretense of choice, the Church instituted a minimum age requirement at which girls could be thought old enough to decide to enter a convent. Galileo's daughters were both too young, but he secured a special dispensation from Cardinal Maffeo Barberini, the future Pope Urban VIII. In 1613, both girls were sent to the convent of San Matteo at Arcetri, about an hour from Galileo's home in Florence. Virginia became a nun in 1616, taking the name Maria Celeste; Livia took her vows the following year and became Sister Arcangela. Galileo's daughters were confined to the walls of the convent for the remainder of their lives.

Galileo and His Eldest Daughter

Galileo once wrote of his eldest daughter: "[She is] a woman of exquisite mind, singular goodness, and most tenderly attached to me." Over a hundred of Maria Celeste's letters to her father survive, though it is believed the sisters at San Matteo, likely under orders from the Church, destroyed all of Galileo's correspondence to his daughter following her death in 1634.

Maria Celeste's life in the convent was a difficult one. Her order, known as the Poor Clares after their founder Clare of Assisi, lived in abject poverty and isolation, subsisting on alms from the community, funds borrowed from relatives, and revenue earned from their sales of bakery goods and needlepoint art. Unlike most of the wealthier convents, the Clares did not require a dowry from the girls entering their convent, making it an attractive option for Italy's middle-classes. It was a convent unbefitting the daughters of a man of Galileo's status, but Galileo's financial troubles followed him all of his life and it might have been the only affordable option. Despite its poverty, San Matteo's nuns were of a good pedigree, with many of the women being sisters and daughters of servants and lower members of the Medici court. Galileo spent a good deal of money and time helping the sisters—he paid to repair their windows, replaced their moldy bread and sour wine whenever he could, and personally ensured the convent's clock remained in perfect repair.



Maria Celeste (1600-1634)

Maria Celeste's letters reveal that she worried constantly about her father's generosity, and whether he would continue providing support for herself and her ailing sister. Maria Celeste remembered well the uncertain years of her youth, when her father seemed always one bill away from being unable to support his family. As the years passed, her letters show that her father gained not only her admiration but also her trust. Having no money or resources of her own, Maria Celeste nevertheless devised many ways to show her affection: she bleached her father's collars, sent him herbal remedies for his complaints, and baked confections of the lemons and citrons he sent her from his garden. Her devotion became Galileo's source of strength when faced with the machinations of his enemies, the opposition of his peers, or even doubts about his own abilities. She remained his most trusted confidante throughout his life.

If not for the restrictions placed on women of the era, Maria Celeste might well have become her father's assistant and perhaps one of the few female scientists of her day. She proved to be as brilliant as her father. She was the convent's most literate resident, having been taught to read and write by Galileo during a time when even wealthy women were denied an education. Maria Celeste was San

Matteo's apothecary, accountant, and drama director, staging several plays to help alleviate the tedium of a poor nun's life. She also led a campaign against moral corruption in the priesthood.

Her correspondence with her father shows that in addition to private affairs and politics, they often discussed his theories and inventions in detail. There is evidence that Maria Celeste prepared the manuscripts for many of Galileo's books. She also provided spiritual guidance during her father's trials with the Inquisition and his own crises of faith.

In 1631, Galileo bought the villa Il Gaiello in Arcetri near the convent. He could see San Matteo from his windows and hear its bells through his walls. When the Church passed down Galileo's sentence in 1633, he was placed under house arrest. He lived the remainder of his years at the villa. As part of his sentence, Galileo was ordered to recite the seven penitential Psalms once a week for three years. Sister Maria Celeste chose to perform this penance for her father, but died only four months after Galileo's return to Arcetri.

Her death devastated Galileo. He wrote to a friend that he felt "immense sadness and melancholy". He lost his appetite and became bed-ridden, and for several months he believed he heard his daughter's voice calling to him. Galileo lived another eight years after Maria Celeste's death, but he stipulated that they be buried together. They rest together in Galileo's tomb in the Basilica of Santa Croce, Florence.

Heretic

Galileo spent nearly two decades at Padua, teaching geometry, mechanics, and astronomy, as well as giving private lessons in cosmography, art, and other subjects. It was also during this time that Galileo formulated several scientific theories and made many of his most significant discoveries and contributions. He quickly won acclaim and favor from Europe's scientific elite and wealthy aristocracy. Deftly, Galileo increased their esteem by dedicating his works to powerful individuals and families. His popularity within these circles, coupled with his bold and opinionated personality, earned him many enemies.

Galileo's theories were often in direct conflict with prevailing scientific and religious beliefs of his day. This led to members of both the scientific community and the Church to oppose, threaten, and scheme against Galileo. For many years, Galileo escaped the worst danger through the influence of his friends and patrons, particularly the Medici family. Though Galileo worked in mathematics, physics, and engineering, it was his career as an astronomer that would lead to his downfall.

In 1610, Galileo published *Starry Messenger*, recounting the observations he had made with his new and improved telescope. The book raised objections to prevailing theories about the known universe and proposed new ones based on Copernicus' heliocentric theory. The prevailing idea—supported by leading scientists and backed by the Church's scripture—was that Earth was the center of the universe, and all heavenly bodies rotated around it. Galileo championed the theory of Copernicus: that Earth was but one body rotating around the Sun. Science had long been dominated by theology, and Galileo's theories were not merely a challenge to prevailing scientific theory but a direct attack on religious principles.

Galileo's Mind

Galileo created and improved designs for many important inventions. He is credited with inventing the proportional compass—which also doubled as a 'pocket calculator'—the hydrostatic balance scale, an early thermometer, and a design for the pendulum clock.

Galileo is erroneously credited as the inventor of the telescope. While he did not invent the device, he made improvements on its design that let him explore more of the universe than any of his predecessors or contemporaries.

Galileo, who was a very spiritual man and a pious Roman Catholic, wrote a letter to his friend and former pupil Benedetto Castelli, a Benedictine abbot. In the letter, Galileo wrote what he felt were valid

Galileo's Mistake

Although Galileo and his contemporaries were correct about the planets of the Milky Way (our galaxy) rotating around the Sun, they incorrectly believed that our Sun was the center of the Universe.

We now know that the Sun itself rotates around the Galactic Center of the Milky Way. Prevailing astronomical theories support the notion that while galaxies have centers, the Universe itself does not.

responses and solutions to the problem of scientific truth and scripture. This letter would later be expanded into an essay entitled *Letter to The Grand Duchess Christina* [de Medici], but it was the initial writing to Castelli that would return to condemn Galileo.

In late 1614, Tommaso Caccini, a Dominican friar, preached a sermon in Florence in which he denounced Galileo, his associates, and all astronomers and mathematicians (the latter he considered guilty by association). This was the first official shot in the war between Galileo and his supporters and his opponents in academia and the Church. Niccolò Lorini, another Dominican friar, acquired a copy of the Castelli letter in February 1615 and sent it to the Inquisition in Rome. Caccini followed the letter a month later, appearing in person at the Inquisition's offices to denounce Galileo.

Galileo traveled to Rome to defend himself against Castelli and Lorini, and to hopefully persuade the Church not to suppress the truth of heliocentrism. The outcome went poorly. Galileo was cleared of all accusations of heresy, but the Church's commission ruled that heliocentrism could not be held as truth for lack of suitable evidence. Thus, to believe it, teach it, or research it became heretical. Astronomers all over Europe withdrew their support for heliocentrism, publicly or quietly, in order to save themselves and their families from the Inquisition.

Galileo survived his first serious brush with the Inquisition relatively unscathed, but his troubles with the Church were far from over.

Galileo's Trial

Galileo's old friend, Maffeo Barberini, became Pope Urban VIII in 1623. He viewed Galileo in a far more favorable light than his predecessors, and in fact had been a vocal supporter of Galileo during conflicts with the Church or religious representatives. However, the political and social realities of the Papedom caused Urban VIII to fear for his position and his life. When the Spanish cardinal accused the new Pope of being weak in defense of the Church, Galileo knew he would eventually lose his friend.

Despite the bans against heliocentrism, Galileo managed, with Urban VIII's cautious support, to publish *Dialogue Concerning the Two Chief World Systems*. He presented the book as a conversation between two individuals, and a third moderating the conversation. Although Galileo offered arguments for and against both sides, even including the Pope's own ideas, it was clear that the book championed the Copernican theory. Galileo had placed the Pope's arguments into the mouth of the geocentric supporter in his book, and his enemies used that to convince the Pope that the character—a foolish and inarticulate simpleton—was meant to represent him. This was not Galileo's intention, as he valued the Pope's friendship and would never have acted in such malice against a friend, but Urban VIII's paranoia won. He banned Galileo's books and assembled a commission to investigate Galileo for heresy.

Galileo stood trial on suspicion of heresy in 1633. He was found guilty, and sentenced to house arrest; his books were banned and he was forbidden to publish any future work. Galileo was also forced to "abjure, curse, and detest" his own opinions. Though it must have been extremely painful for Galileo to

denounce his life's achievements, it was the most prudent choice. Galileo could have been executed had he refused, and his family and friends made to suffer for his crimes.

Galileo spent the remaining years of his life under house arrest. Although he was meant to languish in isolation, Galileo had many visitors and a few pupils. He continued his work in mathematics, even publishing some of his works in Holland. His health continued to fail him, and by 1638 Galileo was blind, afflicted with a hernia, severe and often immobilizing pain, and bouts of insomnia. The Church permitted him to seek treatment in Florence under the command that he speak to no one and not go out into the city, and that he return to Arcetri as quickly as possible. His son, Vincenzo, nursed his father through the rest of his days, and with his father's assistant Viviani helped Galileo to continue his work.

On January 8, 1642, Galileo succumbed to a two-month long bout of fever compounded by heart ailments. He died in his bed, surrounded by his friends, family, and supporters.

The Age of Enlightenment

In 1741, the Church issued an Imprimatur that authorized publication of all of Galileo's work except *Dialogues*. In 1759, the Church lifted the ban on books advocating heliocentrism and removed several works from its Index of Forbidden Books. However, its judgment of Galileo and the censorship of Galileo's *Dialogue* and other pro-Copernican books remained in place. The censorship of these books muddled the theory, making it almost incomprehensible due to the large passages changed or completely removed. Supporters worked hard to fill in the missing gaps, producing new scientific works to support the Copernican view of the universe. The Church did not officially sanction these groups, and science leapt forward into the Age of Enlightenment.

Not until 1820, when a Catholic canon challenged the Chief Censor's refusal to publish his book on heliocentrism, was the Church forced to make an official pronouncement. In 1822, the Church overturned the Censor's ruling and permitted the uncensored printing of heliocentric books. The 1616 prohibition of the heliocentric theory was officially lifted. In 1992, Pope John Paul II issued a formal apology declaring that the Church had erroneously convicted Galileo and that geocentrism was factually incorrect.

Leading Western thinkers, including Albert Einstein and Stephen Hawking, hail Galileo as the father of modern science. Galileo's work has influenced many fields, including engineering and mathematics, though his star shine's brightest in astronomical sciences. His life and work have been recounted in theatre, film, and literature—it is in these finer arts that the modern world has the opportunity explore Galileo as not merely an inquisitive juggernaut of science, but as a flawed human being of profound spiritual faith.

Philip Glass

The composer



Through his operas, his symphonies, his compositions for his own ensemble, and his wide-ranging collaborations with artists ranging from Twyla Tharp to Allen Ginsberg, Woody Allen to David Bowie, Philip Glass has had an extraordinary and unprecedented impact upon the musical and intellectual life of his times.

The operas – “Einstein on the Beach,” “Satyagraha,” “Akhnaten,” and “The Voyage,” among many others – play throughout the world’s leading houses, and rarely to an empty seat. Glass has written music for experimental theater and for Academy Award-winning motion pictures such as “The Hours” and Martin Scorsese’s “Kundun,” while “Koyaanisqatsi,” his initial filmic landscape with Godfrey Reggio and the Philip Glass Ensemble, may be the most radical and influential mating of

sound and vision since “Fantasia.” His associations, personal and professional, with leading rock, pop and world music artists date back to the 1960s, including the beginning of his collaborative relationship with artist Robert Wilson. Indeed, Glass is the first composer to win a wide, multi-generational audience in the opera house, the concert hall, the dance world, in film and in popular music -- simultaneously.

He was born in 1937 and grew up in Baltimore. He studied at the University of Chicago, the Juilliard School and in Aspen with Darius Milhaud. Finding himself dissatisfied with much of what then passed for modern music, he moved to Europe, where he studied with the legendary pedagogue Nadia Boulanger (who also taught Aaron Copland, Virgil Thomson and Quincy Jones) and worked closely with the sitar virtuoso and composer Ravi Shankar. He returned to New York in 1967 and formed the Philip Glass Ensemble – seven musicians playing keyboards and a variety of woodwinds, amplified and fed through a mixer.

The new musical style that Glass was evolving was eventually dubbed “minimalism.” Glass himself never liked the term and preferred to speak of himself as a composer of “music with repetitive structures.” Much of his early work was based on the extended reiteration of brief, elegant melodic fragments that wove in and out of an aural tapestry. Or, to put it another way, it immersed a listener in a sort of sonic weather that twists, turns, surrounds, develops.

There has been nothing “minimalist” about his output. In the past 25 years, Glass has composed more than twenty operas, large and small; eight symphonies (with others already on the way); two piano concertos and concertos for violin, piano, timpani, and saxophone quartet and orchestra; soundtracks to films ranging from new scores for the stylized classics of Jean Cocteau to Errol Morris’s documentary about former defense secretary Robert McNamara; string quartets; a growing body of work for solo piano and organ. He has collaborated with Paul Simon, Linda Ronstadt, Yo-Yo Ma, and Doris Lessing, among many others. He presents lectures, workshops, and solo keyboard performances around the world, and continues to appear regularly with the Philip Glass Ensemble.

Courtesy of Dunvagen Music Publishers

WANT TO KNOW MORE?

Opera Up Close: The *Galileo Galilei* Preview

January 22, 2012 | 1-3 p.m. | MMOCA | 227 State St. next to Overture Center
\$20 general admission; free to students with valid ID

Join Madison Opera for a behind-the-scenes exploration of *Galileo Galilei*, including a multimedia look at the works of iconic American composer Philip Glass, hosted by General Director Kathryn Smith with commentary from stage director A. Scott Parry, Maestro Kelly Kuo, and members of the cast. Special guest lecturer Michael Shank, History of Science and Integrated Liberal Studies professor at UW-Madison, will discuss the life of famed astronomer Galileo.

Tickets available online, at the door, or by calling (608) 238-8085

Pre-Opera Talks

One hour prior to curtain

Rotunda Studio at Overture, Free to ticket holders

Attend an introduction to *Galileo Galilei* one hour prior to curtain to learn about the story, cast and design of Madison Opera's production.

MadOpera Blog | <http://madisonopera.blogspot.com/>

Follow Madison Opera's blog over the weeks leading up to *Galileo Galilei* to learn more about the artists, production, opera, and special events surrounding *Galileo Galilei*!