

FIRENZE  
PALAZZO STROZZI

13 MARZO  
30 AGOSTO 2009

# GALILEO

IMMAGINI DELL'UNIVERSO  
DALL'ANTICHITÀ AL TELESCOPIO

SOTTO L'ALTO PATRONATO  
DEL PRESIDENTE DELLA  
REPUBBLICA ITALIANA

MINISTERO PER I BENI E  
LE ATTIVITÀ CULTURALI  
MINISTERO DEGLI AFFARI ESTERI

*This spectacular and fascinating exhibiton comprising some 250 masterpieces – paintings, drawings, ingenious instruments, ancient frescoes, sculpture, and cosmological models – recreates the history of astronomy from its earliest days, thousands of years ago and celebrates the 400<sup>th</sup> anniversary of Galileo's revolutionary discoveries.*

The exhibition entitled *Galileo. Images of the universe from antiquity to the telescope*, on view at Palazzo Strozzi, Florence, from **13 March to 30 August 2009**, [www.palazzostrozzi.org](http://www.palazzostrozzi.org), presents 250 masterpieces from some of the greatest museums in the world: paintings and drawings, scientific instruments of exceptional beauty and genius, maps of the heavens and celestial atlases, archaeological finds, frescoes from Pompei never exhibited before, statues, illuminated codices, and extraordinary working cosmological models specially crafted for the exhibition.

The occasion for this spectacular exhibition, with which Florence is paying tribute to one of its most brilliant sons, is the 400<sup>th</sup> anniversary of **Galileo Galilei's** astronomical discoveries. His findings on the real nature of the moon, sunspots, Jupiter's moons revolutionized man's view of the universe. To mark the anniversary, the UN has declared 2009 *International Astronomy Year* ([www.astronomy2009.it](http://www.astronomy2009.it)). The exhibition in Florence, where Galileo's only surviving instruments are held, is the most important of the many events planned in Italy for this year.

Devised and curated by Accademia dei Lincei member **Paolo Galluzzi**, the director of Florence's Istituto e Museo di Storia della Scienza, the exhibition comprises eight sections. The first explores the dawn of astronomy (Mesopotamia, Egypt and the biblical cosmos). The second section describes the spherical view of the cosmos developed in Classical Greece (**Plato** and **Aristotle**). The third examines Hellenistic Greece and the idea of the geocentric cosmos (**Ptolemy**). This is followed by three sections on Islam, the Christianisation of the cosmos, and the rebirth of astronomy (**Copernicus** with his heliocentric theory and **Tycho Brahe**). The seventh section is devoted to Galileo and his telescope while the final part of the exhibition focuses on Kepler and Newton (who was born in 1642, the year Galileo died) and marks the definitive triumph of modern science.

This intriguing journey in time and space, accompanied by a fully illustrated catalogue published by Giunti, 444 pages, €38, is further enriched by fabulous film material, multi-media applications, and explanations that make it easy for the visitor to understand the significance of the works of art and their astronomical references (**Botticelli**, **Rubens**, **Guercino**, **Dürer**), the instruments and the cosmological models. Highlights of exhibition include the Farnese Atlas, a painting by **Jan Brueghel the Elder** called the *Linder Gallery Interior*, on public display here for the very first time, and the monumental Toledo astronomical tapestry

The exhibition also takes a look at the universe of man's fears and hopes, exploring the relationship between astronomy and astrology, and between astrology and music, medicine and the formation of a person's character and inclinations. **Albrecht Dürer** was greatly influenced by cosmology, as were other architects and artists, particularly with the relationship considered to exist between melancholy and the planet Saturn.

#### UFFICI STAMPA

Catola & Partners  
tel. +39 055 5522867 – 892  
riccardo.catola@catola.it

Fondazione Palazzo Strozzi  
tel. +39 055 2776461  
l.rinaldi@fondazionepalazzostrozzi.it

Sue Bond Public Relations  
tel. +44 (0)1359 271085  
info@suebond.co.uk

#### PROMOZIONE

Susanna Holm – Sigma CSC  
tel. +39 055 2340742  
susannaholm@cscsigma.it

RESPONSABILITÀ SCIENTIFICA

Istituto  
e Museo di Storia  
della Scienza



Regione Toscana  
Della Salute, Innovazione, Sostenibilità



ENTE  
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DI FIRENZE

esa

18  
1839-2009



PALAZZO  
STROZZI

## Fact Sheet

*Exhibition under the Patronage of the President of the Italian Republic*

**Title:** *Galileo Images of the universe from antiquity to the telescope*

**Dates:** 13 March to 30 August 2009

**Location:** Palazzo Strozzi, piazza Strozzi, Florence 50123, Italy

**Sponsored by:** Ministero per i Beni e le Attività Culturali  
Ministero degli Affari Esteri  
ESA-European Space Agency

**Promoted and organised by:** Ente Cassa di Risparmio di Firenze  
Fondazione Palazzo Strozzi

**With the Support of:** Regione Toscana  
Comitato per le Celebrazioni Galileiane 2009-2010, under the  
Cultural Assets and Activities Ministry's Directorate General  
for Bibliographic Assets and Cultural Institutes

**FPS supported by:** Regione Toscana, Provincia di Firenze, Comune di  
Firenze, Camera di Commercio di Firenze,  
Associazione Partners di Palazzo Strozzi

**Presented by:  
in conjunction with:** Fondazione Palazzo Strozzi  
Istituto e Museo di Storia della Scienza

**Scientific Director:** Istituto e Museo di Storia della Scienza

**Devised and curated by:** Paolo Galluzzi, Director, Istituto e Museo di Storia della  
Scienza

**Scientific Committee:** Cristina Acidini, Jim Bennett, Maria Giovanna Biga,  
Fabrizio Bonoli, Filippo Camerota, Giovanni di Pasquale,  
Paolo Galluzzi, Pietro Giovanni Guzzo, Hermann Hunger,  
David King, Eugenio Lo Sardo, Marco Ramazzotti, Alessandro  
Roccati, Gloria Rosati, Giorgio Strano, Albert Van Helden

**Opening Hours:** Daily 09.00 to 20.00, Thursday 09.00 – 23.00  
Last admission one hour before exhibition closes.

**Information:** Tel +39 055 2645155, [www.palazzostrozzi.org](http://www.palazzostrozzi.org)

**Websites:** [www.palazzostrozzi.org](http://www.palazzostrozzi.org), [www.portaleragazzi.it](http://www.portaleragazzi.it)  
<http://brunelleschi.imss.fi.it/portalegalileo/index.html>

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| <b>Admission:</b>  | Adults: € 10.00; concessions: €8.50, €8.00, €7.50, €5.00<br>Schoolchildren: € 4.00  |
| <b>In Galileo's Footsteps:</b>                             | Concession €8.00 for holders of tickets to Museo Horne<br>Concession €8.50 for holders of tickets to Casa Buonarroti, Basilica of Santa Maria Novella, Basilica of San Lorenzo, <i>The Telescope and the Paintbrush</i> (Pisa).<br>Exhibition ticket-holders qualify for a discount on the price of admission to associated museums.  |
| <b>Special Family Ticket:</b>                              | €20.00 (2 adults + 2 children aged 6 to 18).<br>This ticket allows unlimited admission.   |
| <b>"Palazzo Strozzi" Ticket:</b>                           | €20.00. Annual ticket admits holder to all Palazzo Strozzi exhibitions  |
| <b>Reservations and Educational Activities:</b>            | Sigma CSC, Tel. +39 055 2469600, Fax. +39 055 44145<br><a href="mailto:prenotazioni@cscsigma.it">prenotazioni@cscsigma.it</a> , <b>No booking charge</b>  |
| <b>How to get there:</b>                                   | By plane: Firenze Airport <a href="http://www.aeroporto.firenze.it">www.aeroporto.firenze.it</a><br>Tel. +39 055 306 1700<br>By car: From north (Milan) A1 Bologna, Firenze, Firenze Nord exit, follow directions for city. From south (Rome) A1 Roma, Milano, Firenze Sud exit, follow directions for city<br>By train: Nearest stations are Stazione di Santa Maria Novella, Piazza del Duomo, Via Tornabuoni |
| <b>Access:</b>   | Lifts and wheelchair access to all areas  |
| <b>Multi-channel Ticket Office:</b>                        | Vivaticket by Charta  |
| <b>Audio-guides:</b>                                       | Antennaudio, <b>Included in price of admission</b>  |
| <b>Catalogue:</b><br>exhibition)                           | Giunti Arte Mostre Musei, 444 pages, €48.00 (€38.00 in exhibition)  |
| <b>Related Publications:</b>                               | <i>Come See Beyond (Mandragora)</i> , 96 pages, €12.00 (€10.00 in exhibition); <i>Linder Interior - The Linder Gallery (Mandragora)</i> 96 pages, €15.00 Italian and English edition; <i>Starry Messenger (Rizzoli ragazzi)</i> 40 pages, €16.00  |
| <b>Designed by:</b>  | Gris Co., Padova; Studio Cupellini, Firenze   |
| <b>Installed and built by:</b>                             | Opera Laboratori Fiorentini S.p.A.  |
| <b>Graphic design by:</b>                                  | RovaiWeber design   |
| <b>Working exhibits and models:</b>                        | Opera Laboratori Fiorentini S.p.A.<br>Stella Battaglia and Gianni Miglietta<br>Centro Studi per il Restauro degli Orologi Antichi, ITIS "L. da Vinci", Florence   |
| <b>Multimedial applications and films:</b>                 | Istituto e Museo di Storia della Scienza<br>Università IUAV, Venice<br>Massimo Mogi Vicentini   |
| <b>Communication and Promotion:</b>                        | Susanna Holm - Sigma CSC, Tel. +39 055 2340742<br><a href="mailto:susannaholm@cscsigma.it">susannaholm@cscsigma.it</a>  |
| <b>For further information and images, please contact:</b> |   |
| <b>Press Office:</b>                                       | Catola & Partners (in Italy)<br>Tel. + 39 055 22867/892, <a href="mailto:riccardo.catola@catola.it">riccardo.catola@catola.it</a>   |
|  | Fondazione Palazzo Strozzi – Lavinia Rinaldi<br>Tel. + 39 055 2776461 <a href="mailto:l.rinaldi@fondazionepalazzostrozzi.it">l.rinaldi@fondazionepalazzostrozzi.it</a>  |

**International Press Office:**

Sue Bond Public Relations

Tel. +44 (0)1359 271085, Fax. +44 (0)1359 271934

[info@suebond.co.uk](mailto:info@suebond.co.uk), [www.suebond.co.uk](http://www.suebond.co.uk)

The section devoted to Galileo probes the details of his discoveries and includes a relic (a finger of his right hand) and one of his first telescopes, only two of which have survived. The interactive exhibits on display help visitors to gain a deeper understanding of its structure and workings. The section also offers an exceptionally complete overview of the way in which the face of the moon gradually began to be more accurately defined, and it includes the very first drawings ever made on the basis of observations through a telescope.

A fantastic DVD provides evocative simulations of the main world systems and illustrates the more important scientific instruments on display, while schools, teachers and students (for whom a special interactive game on Galileo has been devised) can access more in-depth information and programmes on the [www.palazzostrozzi.org](http://www.palazzostrozzi.org) and [www.portaleragazzi.it](http://www.portaleragazzi.it) websites.

The Fondazione Strozzi will devote numerous collateral initiatives for schools, children and families. The special captions for younger visitors are accompanied by illustrations by the famous Czech children's writer **Peter Sís**, while the Fondazione has taken the opportunity to publish an Italian edition of his *The Starry Messenger*, a bestseller on Galileo which he wrote in 1997, and *Come See Beyond (Mandragora)*. Children will find a variety of documents and games in the *Starry Messenger's Postbag* both at the workshops and on the *Domeniche Viola* Sunday sessions organised in conjunction with the ACF Fiorentina football club. Along with competitions and film cycles, Palazzo Strozzi will also host a number of large video touch screens showing HD pictures of stars, planets and galaxies.

Enjoying the distinguished patronage of the President of the Republic, the exhibition is sponsored by the Ministero per I Beni e le Attività Culturali, by the Ministero degli Affari Esteri and by European Space Agency ESA. The exhibition is promoted and organised by the Ente Cassa di Risparmio di Firenze and the Fondazione Palazzo Strozzi, with the support of the Tuscany Regional Authority and of the National Committee for Galileo Celebrations 2009-2010 under the Cultural Assets and Activities Ministry's Directorate General for Bibliographic Assets and Cultural Institutes. The scientific director is the Istituto e Museo di Storia della Scienza. The Fondazione Palazzo Strozzi's supporting members include the Florence Provincial Authority, the Florence Municipal Authority, the Florence Chamber of Commerce and the Palazzo Strozzi Partners' Association. This exhibition marks the Ente Cassa's 180<sup>th</sup> year of involvement in cultural activities.

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Fondazione Palazzo Strozzi – Lavinia Rinaldi  
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## LIST OF THE WORKS

**Pictures are numbered in accordance with the catalogue and the order in which they are on display in the exhibition**

Legend:

- **First Roman numeral indicates catalogue section and exhibition section**
- **Second numeral indicates catalogue subsection and exhibition subsection**
- **Third numeral indicates order of succession of exhibits in catalogue and exhibition**

### SECTION I

#### THE DAWN OF ASTRONOMY: MESOPOTAMIA, EGYPT AND THE BIBLICAL COSMOS

- I.1.1** *Part of a Clay Tablet Enuma Elish*, sculpture: 7.3 x 9.84 cm. British Museum – Dep.of Middle East, London
- I.1.2** *Tablet I of the Series Mul-Apin*, sculpture: 8.2 x 6 cm. British Museum - Department of Middle East, London
- I.1.3** *Upper Part of a Clay Tablet with Astronomical Report*, sculpture: 9.2 x 17.14 cm, British Museum – Dep. of Middle East, London
- I.1.4** *Kudurru of Meli-Shipak from Sippar*, limestone, sculpture: 51 x 24 x 25 cm, British Museum - Department of Middle East, London
- I.1.5** *Cuneiform Tablet (Astronomical Diary for the Year 345 B.C.)*, clay, sculpture: 18.5 x 16.5 cm. British Museum – Dep.of Middle East, London
- I.1.6** *Part of a Clay Tablet, Astrological* sculpture: 5.08 x 6.98 cm. British Museum – Dep. of Middle East, London
- I.1.7** *Hepatoscopy Tablet* , clay, sculpture: 8.57 x 7.3 cm. British Museum – Dep. of Middle East, London
- I.1.8** *Sun God Tablet* , limestone, early 9th century B.C., sculpture: 29.21 x 17.78 cm. British Museum – Dep. of Middle East, London
- I.1.8b** *Cover for the Box of the Sun God Tablet*, early 9th century B.C. Dimensions: 29.2 x 17.8 cm. British Museum – Dep. of Middle East, London
- I.1.8c** *Cover for the Box of the Sun God Tablet*, early 9th century B.C. Dimensions: 13 x 17.8 cm. British Museum – Dep. of Middle East, London
- I.1.9** *Part of a Circular Clay Tablet with Depictions of Constellations*, clay, 800 B.C. Diameter: 14.1 cm British Museum – Dep.of Middle East, London
- I.1.10** *Part of a Clay Tablet, Neo-Assyrian*, clay, sculpture: 2.85 x 2.54 cm. British Museum – Dep.of Middle East, London

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tel. +39 055 2776461  
l.rinaldi@fondazionepalazzostrozzi.it

Sue Bond Public Relations  
tel. +44 (0)1359 271085  
info@suebond.co.uk

#### PROMOZIONE

Susanna Holm – Sigma CSC  
tel. +39 055 2340742  
susannaholm@csigma.it

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- I.1.11** *Tablet with Astronomical Reports to the King*, sculpture: 3.17 x 6.35 cm, British Museum – Dep. of Middle East, London
- I.1.12** *Model of the Babylonian Cosmos*, Opera Laboratori Fiorentini
- I.2.1** *Polychrome Lid with Figure of the Sky Swallowing and Giving Birth to the Sun wood*, plastered and painted circa 740- 700 B.C. sculpture: 178 x 44 cm. Soprintendenza per i Beni Archeologici del Piemonte, Turin
- I.2.2** *Papyrus with Omens*, circa 1300 - 1200 B.C., sheet: 70 x 35 cm. Soprintendenza per i Beni Archeologici del Piemonte, Turin
- I.2.3** *Papyrus with Cosmogony Scene*, circa 800 B.C., sheet: 97 x 25 cm. Soprintendenza per i Beni Archeologici del Piemonte, Turin
- I.2.4** *Funerary Stele with Astronomers and Merkheth (or Stele of Priest/Astronomer Penbu)*, engraving, paint, sculpture: 52 x 32 x 4.5 cm. Museo Archeologico Nazionale, Florence
- I.2.5** *Copy of Egyptian Merkheth*, sculpture: 48 x 56 x 21 cm. Science Museum, London
- I.2.6** *Model of Amenhotep's Cubit*, engraving, Roman era, dimensions: 44.2 x 4 cm. Museo Archeologico Nazionale, Florence
- I.2.7** *Fragment of Sundial*, granite, Ptolemaic era, sculpture: 6.6 x 10 x 3.5 cm. Musei Vaticani, Vatican City
- I.2.8** *Fragment of Gnomon (Sundial)*, black basalt, Late Period, XXV-XXXI dynasty (712-332 B.C.) sculpture: 6.3 x 3.2 x 3.7 cm. Museo Egizio, Turin
- I.2.9** *Fragment of Water-Powered Hourglass (formerly De Gruneisen collection)*, engraving, Early Ptolemaic era, dimensions: 12.2 x 14 cm. Museo Archeologico Nazionale, Florence
- I.2.10** Part of Basalt Merkheth, engraving, Roman era, Dimensions: 8.8 x 13.5 cm. Museo Archeologico Nazionale, Florence
- I.2.11** *Clepsydra*. Reign of Ptolemy II Philadelphus 285/82-246 B.C. Basalt, height: 36.4 cm. Museo Barracco, Rome
- I.2.12** *Coptic Ostrakon*. 10 march 601. Limestone, black ink; 11x9 cm. Museo Egizio, Turin
- I.2.13** *Display Model of the Denderah Zodiac*. Wood; 255x255 cm. Opera Laboratori Fiorentini
- I.3.1** *Model of the Universe According to the Jewish Tradition*. Steel, acrylic, resins, 100x200 cm. Opera Laboratori Fiorentini
- I.3.2** *The creation of the world according to Genesis images....* Nuremberg 1493

## SECTION II THE COSMOS BECOMES A SPHERE

- II.1.1** *Sarcophagus of Phaëton*. Early IV century. White marble: 100 x 247cm. Rome, Museo Pietro Canonica
- II.1.2** *Red-Figured crater with Helios on a chariot*. V century B.C. Clay, height: 33 cm. British Museum – Dep. of Greek and Roman Antiquities, London
- II.1.3** Anonymous. *Relief with Phanes*. II century A.D. Marble 74 x 48.7 cm. Museo Civico Archeologico, Modena
- II.1.4** Anonymous. *Relief with Mithras*. End III century A.D. Stone: 90 x 148 cm. Museo Nazionale Romano, Rome
- II.1.5** *Campanian amphora with Atlas, Heracles and the celestial sphere*. V century B.C. Clay; height 33 cm.

British Museum – Dep.of Greek and Roman Antiquities, London

- II.2.1** Anonymous. *Relief with Anaximander*. I century A.D. Pentelic marble; 17 x 18 cm. Museo Nazionale Romano, Rome
- II.2.2** Anonymous. *Herma of Pythagoras*. I century A.D. Greek marble; height: 49 cm. Musei Capitolini, Rome
- II.2.3** Anonymous. *Astrological globe*. II century B.C-II century A.D. Crystalline white marble; diameter: 30 cm Museo Civico Archeologico, Matelica (Macerata)
- II.2.4** S-Battaglia, G.Miglietta, F.Weing-Lynds. *Celestial medicine*. Fibreglass, wood, iron; diameter 150 cm.
- II.2.5** *The five regular bodies*. Wood and plexiglass; diameter 60 cm. R.Folicardi, Fermo.
- II.2.6** Dominicus Sanctes Sanctini. *Heraclide's system*. Circa 1675, height: 57 cm. Museum of the History of Science, Oxford
- II.2.7** Anonymous. *Bust of Aristotle*. II century A.D. Onyx, marble; height 73 cm. Galleria degli Uffizi, Florence
- II.2.8-9** Jan Brueghel the Younger, *Allegory of Air and Fire, Allegory of Earth and Water*. Panel painting; 57x94 cm. Galleria degli Uffizi, Florence
- II.2.10** *Exodus' homocentric sphere*. Alloy steel, light alloys, brass, bronze, polycarbonates; diameter 100 cm; height 130 cm. Centro Studi per il Restauro e la Valorizzazione degli Orologi Antichi e Strumentaria, Istituto Statale di Istruzione Superiore "L. da Vinci", Florence
- II.3.1** *The Precession of the Equinoxes*. Steel, wood; 270x120 cm. Opera Laboratori Fiorentini
- II.4.1** Aratus of Soli. *Phenomena*. IX century- Latin codex membranaceous; 32x28 cm. British Library, London
- II.4.2** Anonymous. *Celestial Globe* (known as "Kugel's Globe"). II century B.C – I century A.D. Silver gilt, height: 6 cm; diameter: 6.3 cm. Galerie J. Kugel, Paris
- II.4.3** *The Antikythera Mechanism*. Bronze, maple-wood 33.3 x 22.5 x 12.4 cm. M.T. Wright, London

### **SECTION III THE GEOMETRY OF THE COSMOS**

- III.1.1** *Cygnus*. I century A.D. Fresco 39 x 27,5 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.1.2** *Europe on the bull*. I century A.D. Fresco, 69 x 76 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.1.3** *Centaur*. I century A.D. Fresco; 23 x 26 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.1.4** *Capricorn*. I century A.D. Fresco; 53 x 104,5 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.1.5** *Pegasus*. fresco, dimensions with frame: 18.5 x 41 x 5.5 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.1.6** *Ceres as Dapifer*. First quarter of the IV century A.D. Fresco; 53 x 73cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.1.7** *Roman Celestial Globe* (copy). Plaster; diameter: 11 cm. Römisch-Germanisches Zentralmuseum, Mainz

- III.1.8a** Anonymous. *Farnese Atlas*. II century A. D- White marble; height 164 cm- Museo Archeologico , Naples
- III.1.8b** *Farnese Atlas's Globe*. Circa 1930. Alabstrine plaster; height: 75 cm; diameter: 65 cm. Museo della Civiltà Romana, Rome
- III.1.8c** Giovanni Francesco Barbieri known as Il Guercino. *Atlas*. 1646- Oil on canvas; 127 x 101 cm. Museo Bardini, Florence
- III.1.9** Hyginus. *Astronomical poetics*. Second half XV century. Membrane manuscript; 25,5 x 17,5 cm. Biblioteca Medicea-Laurenziana, Florence
- III.1.10** Anonymous. *Celestial sphere*. I century A.D. White marble; 71 x 65 cm. Musei Vaticani, Vatican City
- III.1.11** *Apollo-Helios with sphere*. Fresco; 81 x 58 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.2.1** Anonymous. *Bianchini Planisphere*. II century A.D. Marble; 78,5 x 78 cm. Museo del Louvre, Paris
- III.3.1** *Ptolemy's parallactic instrument*. Wood, steel; 150 x 150 x 150 cm. Opera Laboratori Fiorentini
- III.3.2** Claudius Ptolemy. *Almagest*. Early XIV century. Sheet: 41 x 29 cm. Biblioteca Medicea-Laurenziana, Florence
- III.3.3** Claudius Ptolemy. *Tetrabyblos*. XV century. Manuscript; 28,5 x 21 cm. Biblioteca Medicea-Laurenziana, Florence
- III.3.4** Piero del Massaio. *Ptolemei Cosmographie*. Circa 1455-62. Manuscript; 66 x 42 cm. Biblioteca Medicea-Laurenziana, Florence
- III.3.5** Niccolò Germano. *Geographia*. Second half of XV century. Manuscript; 43,5 x 39 cm. Biblioteca Medicea-Laurenziana, Florence
- III.3.6** *The epicyclic theory*. Alloy steel, light alloy, brass, bronze, polycarbonate. Diameter 100 cm; height 105 cm. Centro Studi per il Restauro e la Valorizzazione degli Orologi Antichi e Strumentaria. Istituto Statale di Istruzione Superiore "L.da Vinci", Florence
- III.4.1** *Cherub with sphere*. I century A.D. Fresco; 37 x 24 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.4.2** *Armillary Sphere*. I century B.C. Fresco; 197 x 210 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.4.3** *Sundial*. I century A.D. Marble; 34,5 x 19,5 cm. Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei
- III.4.4** *Slab with the Signs of the Zodiac and of the Planets*. Circa 1930. Alabaster plaster cast; 26 x 28.5 cm. Museo della Civiltà Romana, Rome
- III.4.5** *Portable sundial: vertical disc dial*. Circa 250 B.C. Bronze; diameter 6 cm. Museum of the History of Science, Oxford
- III.4.6** *Sundial*. Circa 1929. Alabaster plaster cast; height: 44 cm; diameter: 27 cm. Museo della Civiltà Romana, Rome
- III.4.7** *Rustic Calendar*. Circa 1930. Alabaster plaster cast; 65.5 x 41 cm. Museo della Civiltà Romana, Rome
- III.5.1** Martianus Capella. *De Nuptiis Philologiae et Mercurii*. XI century. Codex membranaceous; 27 x 18,5 cm. Biblioteca Medicea-Laurenziana, Florence
- III.5.2** Andreas Cellarius. *Atlas Coelestis, plate 9*. Amsterdam 1660. Biblioteca Nazionale Centrale, Florence

- III.5.3** Andreas Cellarius. *Atlas Coelestis, plate 2*. Amsterdam 1660. Biblioteca Nazionale Centrale, Florence
- III.5.4** Andreas Cellarius. *Atlas Coelestis, plate 15*. Amsterdam 1660. Biblioteca Nazionale Centrale, Florence
- III.5.5** Andreas Cellarius. *Atlas Coelestis seu Harmonia Microcosmica..* Amsterdam 1660. Biblioteca Nazionale Centrale, Florence
- III.5.6** Andreas Cellarius. *Atlas Coelestis, plate 20*. Amsterdam 1660. Biblioteca Nazionale Centrale, Florence
- III.5.7** S. Battaglia, G. Miglietta. *Plane projections of the celestial sphere*. Forex and plexiglass; 150 x 150 x 102 cm

#### **SECTION IV THE SKIES OF ISLAM**

- IV.1.1** S. Battaglia, G. Miglietta. *Model of strategic projection*. Forex and plexiglass; diameter 30 cm
- IV.2.1** Abd al-Rahām al-Sūfi. *Book of the constellation and of the fixed stars*. X century. Manuscript; 23,5 x 16,5 cm. Bibliothèque Nationale de France, Paris
- IV.2.2** Al-Quazwini. *The Wonders of Creation*. XVI century. Manuscript; 32,5 x 23,5 cm.. Biblioteca Medicea-Laurenziana, Florence
- IV.2.3a** Andreas Cellarius. *Atlas Coelestis, plate 16*. Amsterdam 1660. Biblioteca Nazionale Centrale, Florence
- IV.2.3b** S. Battaglia, G. Miglietta. *Planets and human temperaments*. Fireglass; diameter 150 cm.
- IV.3.1** Alam al-Din Qaysa. *Celestial Globe*. 1225-1226. Brass, diameter 22,1 cm. Museo Nazionale di Capodimonte, Naples
- IV.3.2** Mūsa. *Spherical astrolabe*. 1480 – 1481. Brass, silver; diameter: 9 cm. Museum of the History of Science, Oxford
- IV.3.3** Ibrahim ibn Sa'id. *Arab astrolabe*. Valencia 463 A.H. Gilded brass; 33 x 24 cm. Museo Astronomico e Copernicano di Monte Mario, Rome
- IV.3.4** Ahmed Ben Khalaf. *Astrolabe*. Baghdad IX-X century. Brass; 19 x 12.5 cm. Bibliothèque nationale de France, Paris
- IV.3.5** Anonymous. *Planispheric astrolabe*. XIV century. Gilded brass; diameter: 170 mm. Istituto e Museo di Storia della Scienza, Florence
- IV.3.6** Muhammad ibn Ab Bakr al Ibar, Isfahan. *Astrolabe with geared calendar*. 1221-22. Brass, damascened with silver, gold; height 27,5 cm; width 18,5 cm. Museum of the History of Science, Oxford
- IV.3.7** Muhammad 'Ibn Abi'l Qasim 'Ibn Bakran. *Planispheric astrolabe*. 1102-1103. Gilded brass; diameter: 12,2 cm. Istituto e Museo di Storia della Scienza, Florence
- IV.3.8** *Sundial and Qibla-Indicator*. XVIII century. Brass; 13.1 x 9,9cm. Museum of the History of Science, Oxford
- IV.3.9a** Albrāhim 'Ibn Sa'īd as Sahli. *Celestial Globe*. Valencia 1085. Gilded brass, wood; diameter: 13,5 cm; height 29,5 cm. Istituto e Museo di Storia della Scienza, Florence
- IV.3.9b** Ferdinando Meucci. *Gores of Ibrāhim Ibn Sa'id al-sahli's celestial globe*. Opera Laboratori Fiorentini

**SECTION V**  
**THE EVANGELISATION OF THE COSMOS**

- V.1.1a** Giovanni Dondi. *Astrarium*. XIV century. Manuscript; 35 x 24,2 cm. Biblioteca Capitolare, Padua
- V.1.1b** Giovanni Dondi. *Astrarium*. Working model. Brass; 100 x 90 cm. Observatoire de Paris, Paris
- V.1.2** Cosmas Indicopleustes. *Christian Topography*. IX century. Manuscript; 25,5 x 19 cm. Biblioteca Medicea Laurenziana, Florence
- V.1.3** Matfre Ermengau de Bézier. *Le breviaries d'amor*. Manuscript; 35 x 25,5 cm. British Library, London
- V.1.4** Hildegard of Bingen. *Liber Divinorum Operum*. XIII century. Manuscript; 40 x 26 cm. Biblioteca Statale, Lucca
- V.1.5** Giovanni Sacrobosco. *Tractato de la sphaera*. Manuscript; 39 x 27 cm. Biblioteca Riccardiana, Florence
- V.1.6** Michael Scot. *Introductorium maius in astronomiam*. XV century. Manuscript; 29 x 20,3 cm, Biblioteca Nazionale Centrale, Florence
- V.1.7** Andreas Cellarius. *Atlas Coelestis seu Harmonia Macrocosmica*. Amsterdam 1660. Biblioteca Nazionale Centrale, Florence
- V.2.1** Sandro Botticelli. *St. Augustine in his Study*. Circa 1480. Detached fresco; 152 x 112 cm. Church of Ognissanti, Florence
- V.2.2** Anonymous. *The Motions of the universe*. 1450-1500. Flemish tapestry; 415 x 815 cm. Cathedral Primada de Toledo, Toledo
- V.3.1** *Byzantine Sundial-Calendar*. V-VI century. Brass, partly tinned; diameter: 13.5 cm. Science Museum, London
- V.3.2** *Byzantine Sundial-Calendar*. Brass, partly tinned, wax; 18.2 x 16.8 cm; diameter: 13.5 cm. Centre for the History of Science, Technology & Medicine, London
- V.3.3** Anonymous. *Astrolabe*. 1062. Brass; diameter: 37.5 cm. Musei Civici d'Arte e Storia, Brescia
- V.3.4** Regiomontanus. *The Astrolabe presented to Cardinal Bessarion*. 1462. Brass; diameter 11,6 cm. Private collection, UK
- V.3.5** *French geared astrolabe*. XIV century. Brass; 21.5 x 15 x 3 cm. Science Museum, London
- V.3.6** Anonymous. *Astrolabe bearing monastic numeral ciphers*. Picardy XIV century. Brass; diameter: 11.7 cm. Private collection
- V.3.7** Georg von Peurbach. *Astrolabe*. Vienna 1457. Brass; diameter: 12.9 cm. Germanisches nationalmuseum, Nuremberg

**SECTION VI**  
**THE REBIRTH OF ASTRONOMY**

- VI.1.1** Giuliano d'Arrigo also called "Il Pesello". *Northern hemisphere*. 1442-1446. Fresco; diameter 400 cm. San Lorenzo Old Sacresty, Florence
- VI.1.2** Matteo Palmieri. *Città di Vita*. XV century. Manuscript; 39 x 28 cm. Biblioteca Medicea-Laurenziana, Florence
- VI.1.3** Petrus Bienewitz Apianus. *Astronomicum Caesareum*. 1540. Biblioteca Nazionale Centrale, Florence

- VI.1.4** Ottavio Pisani. *Astrologia: Seu motus et loica sidereum*. Antwerp 1613. Istituto e Museo di Storia della Scienza, Florence
- VI.1.5** Franchino Gaffurio. *Practica musicae utriusque cactus excellentis....* Venetiis 1512. Biblioteca Nazionale Centrale, Florence
- VI.1.6** *De Spera*. Circa 1470. Manuscript; 24,5 x 17 cm. Biblioteca Estense, Modena
- VI.1.7** Baccio Baldini. *The Seven Planets (Moon, Saturn, Jupiter, Venus, Sun, Mercury, Mars)*. Circa 1460. Engraving; 32 x 22 cm. Museo Civico, Pavia
- VI.1.8** Albrecht Durer. *Melancholia I*. 1514. Burin engraving; 23,9 x 19 cm. Gabinetto Disegni e Stampe degli Uffizi, Florence
- VI.2.1-2** Albrecht Durer. *Northern and Southern maps*. 1515. Woodcut; 42 x 42,7 cm. Gabinetto Disegni e Stampe degli Uffizi, Florence
- VI.2.3** Johann Bayer. *Uranometria...* Ausburg 1603. Biblioteca Nazionale Centrale, Florence
- VI.2.4** Johann Schöner. *Celestial Globe*. Nuremberg circa 1533. Papier maché, vellum, brass; 38 x 32 cm Royal Astronomical Society (Science Museum), London
- VI.2.5** J.Hondius, A.Veen. *Celestial Globe*. 1613. Wood, papier maché, chalk; 97 x 78 cm; diameter 53,5 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.2.6 a,b,c,d** Antonio Lupicini. *Armillary spheres of Planets*. Florence 1570-1574. Brass, bronze, wood; height 70 cm; diameter min 23 cm max 32,5 cm. Biblioteca Medicea-Laurenziana, Florence
- VI.2.7** Girolamo della Volpaia. *Geocentric Armillary Sphere*. 1570-1580. Gilded bronze, wood, silver and translucent enamel; height 55 cm. Galerie J. Kugel, Paris
- VI.2.8** Girolamo della Volpaia. *Model of Lunar sphere*. Florence 1557. Gilded brass, wood; diameter 14,5 cm; height 23,6 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.2.9** Girolamo della Volpaia. *Armillary Sphere*. 1564. Gilded brass, bronze, rock crystal; diameter 49 cm; height 77,5 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.2.10** Vincenzo de' Rossi. *Hercules with celestial sphere*. Florence circa 1570. Gilded bronze, ebony; height: 38 cm. Private collection
- VI.2.11** Anonymous. *Celestial globe*. Mian and Prague 1600. Rock crystal, steel; diameter 5.5 cm. Galerie J. Kugel, Paris
- VI.2.12** Anonymous. *Celestial and terrestrial mechanical globe*. France XVI century. Brass; diameter 25 cm; height 46,8 cm. Museo Correr, Venice
- VI.3.1** Gualterus Arsenius. *Planispheric astrolabe*. Louvain 1572. Gilded brass; diameter: 34,1 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.2** Egnazio Danti. *Astrolabe*. Florence 1570. Gilded brass, wood; diameter 80 cm; height 86 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.3** Christoph Schissler. *Planispheric astrolabe*. Ausburg 1560. Gilt brass; diameter 21,5 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.4** Hans Christoph Schissler jr. *Mathematical Compendium*. Second half XVI century. Gilt brass, silver; 19,8 x 20 x 9 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.5** Christoph Schissler. *Quadrant*. 1559. Gilt brass; side 38 cm. Istituto e Museo di Storia della Scienza, Florence

- VI.3.6** Josuah Habermel. *Quadrant*. After 1582. Gilt brass; radius 15 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.7** Tobias Volckmer. *Quadrant*. Braunschweig 1608. Gilt copper; side 36 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.8** Egnazio Danti. *Instrument of the Primum Mobile*. Florence 1568. Gilded brass; radius 27,9 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.9** Erasmus Habermel. *Full Circle*. End XVI century. Gilt copper; height: 26.5 cm; diameter: 26.8 cm Observatoire de Paris, Paris
- VI.3.10** Anonymous. *Nocturnal*. 17th century. Brass; diameter: 10 cm; length: 19 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.11** Girolamo della Volpaia. *Nocturnal and Horary Quadrant*. 1568. Brass; diameter: 14,7 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.12** Camillo della Volpaia. *Horizontal Sundial*. 1542. Wood; 11,5 x 8 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.3.13** Anonymous. *Book-Shaped Sundial*. Germany XVI century. Silver-plated and gilt brass. Istituto e Museo di Storia della Scienza, Florence
- VI.3.14 – 15** S. Buonsignori. *Sundials*. XVI century. Wood; height: 20,3 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.4.1** Lorenzo della Volpaia. *Planetary Clock (replica)*. 1510. Brass, enamel iron; 235 x 117 x 175 cm. Istituto e Museo Di Storia Della Scienza, Florence
- VI.4.2** Philippus Imsserus. *Astronomical Clock*. Strasbourg 1555-1557. Gilt brass; height 88 cm; base 55 x 55 cm. Technisches Museum, Vienna
- VI.4.3** Copy from Hans Holbein the Younger. *Portrait of Nikolaus Kratzer*. XX century. Oil on canvas; 156 x 124 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.4.4** Pierre de Fobis. *Mechanical celestial sphere*. Lyon 1540 – 1550. Gilded bronze, silver and glass; height: 54 cm; diameter 8 cm; diameter: celestial sphere 15.2 cm; diameter: coordinated sphere 17 cm. Galerie J. Kugel, Paris
- VI.4.5** Eberhard Baldewein. *Mechanical Celestial Globe*. Kassel 1574. Gilded and silver-plated brass, wood; height 36.5 cm; diameter: 14 cm. Galerie J. Kugel, Paris
- VI.4.6** Johannes Reinhold. *Mechanical celestial sphere*. Ausburg 1588. Brass, wood, glass; diameter: 31 cm; height: 49 cm. Musée des Arts et Métiers, Paris Cedex 03
- VI.4.7** Hans Christopher Schissler. *Mobile celestial sphere*. Ausburg 1600. Silver plated copper, gilded bronze; height 46 cm; diameter 16 cm. Galerie J. Kugel, Paris
- VI.4.8** Caspar Rauber. *Table astronomical clock*. Southern Germany circa 1575. Gilded brass, silver; 21.4 x 15.1 x 32.3 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.5.1** Nicolaus Copernicus. *De Revolutionibus.... Norimbergae* 1543. Biblioteca Nazionale Centrale, Florence
- VI.5.2** Vincenzo Coronelli. *Epitome Cosmografica o compendiosa..... Venezia* 1693. Istituto e Museo di Storia della Scienza, Florence
- VI.5.3** Andreas Cellarius. *Atlas Coelestis seu Harmonia Macrocosmica.....Amsterdam* 1660. Biblioteca Nazionale, Florence

- VI.5.4** Andreas Cellarius. *Atlas Coelestis seu Harmonia Macrocosmica*.....Amsterdam 1660. Biblioteca Nazionale, Florence
- VI.5.5** Richard Glynne. *Armillary Orrey*. 1720. Brass, silvered brass, steel, ivory wood; height 101 cm; diameter 73 cm. Museum of the History of Science, Oxford
- VI.5.6** Anonymous. *Biccherna Panel - The Committee for the Reform of the Calendar*. Siena July 1582 - June 1583. Tempera and gold on wood; 52.4 x 67.8 cm. Archivio di Stato, Siena
- VI.5.7** Anonymous. *Portrait of Wilhelm Schickard*. 1632. Oil on canvas; 60.5 x 49 cm. Universität Tübingen, Tübingen
- VI.5.8** Tycho Brahe. *De Mundi Aetherei...Phaenomenis*. Frankfurt 1610. Istituto e Museo di Storia della Scienza, Florence
- VI.5.9** Tycho Brahe. *Astronomiae Instauratae Progymnasmata*. Frankfurt 1610. Istituto e Museo di Storia della Scienza, Florence
- VI.5.10** Willem Janszoon Blaeu. *Le Grand Atlas*..... Amsterdam 1667. Istituto e Museo di Storia della Scienza, Florence
- VI.5.11** Andreas Cellarius. *Atlas Coelestis seu Harmonia Macrocosmica*.....Amsterdam 1660. Biblioteca Nazionale, Florence
- VI.5.12** Andreas Cellarius. *Atlas Coelestis seu Harmonia Macrocosmica*.....Amsterdam 1660. Biblioteca Nazionale, Florence
- VI.5.13** Jansz Willem Blaeu. *Celestial Globe*. After 1630. Wood, paper; 111 x 92 cm; diameter 68 cm. Istituto e Museo di Storia della Scienza, Florence
- VI.5.14** Jost Bürgi. *Sextant*. Circa 1600. Steel, brass, wrought iron, wood; radius 112,2 cm; height 170 cm. National Technical Museum in Prague, Prague
- VI.5.15** Erasmus Habermel. *Sextant*. 1600. Steel, brass, wrought iron; radius 131,7 cm; height 170 cm. National Technical Museum in Prague, Prague

## **SECTION VII**

### **GALILEO: THE COSMOS THROUGH THE TELESCOPE**

- VII.1.1** Carlo Marcellini. *Bust of Galileo with compasses and telescope*. 1674-1677. Marble; height 78 cm. Istituto e Museo di Storia Della Scienza, Florence
- VII.1.2** Florentine painter of the XVII century. *Portrait of Galileo Galilei with telescope and ring of thye Accademia Lincei*. 1640-1645. Oil on canvas; 78 x 64 cm. Domus galileiana, Pisa
- VII.1.3** Ottavio Leoni. *Portrait of Galileo Galilei*. 1624. Black stone, white lead and red ochre on turquoise blue paper; 23,7 x 16,5 cm. Biblioteca Marucelliana, Florence
- VII.1.4** John Rowley. *Pair of Planetaria, Ptolemaic and Copernican*. Circa 1700. Brass, silvered brass, brass wire, ivory, wooden stands; diameters 40 cm, 39 cm. Museum of the History of Science, Oxford
- VII.1.5-6** Matthäus Greuter. *Celestial and terrestrial globes*. Rome 1632 and 1636. Paper, wood; 152 x 83 cm; diameter 49 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.1.7** *The Middle Finger of Galileo's Right Hand*. Reliquiary 1737. Marble, glass; 44,5 x 15 cm. Istituto e Museo di Storia della Scienza, Florence

- VII.2.1** Galileo Galilei. *Sidereus Nuncius*..... Venice 1610. Biblioteca Nazionale Centrale, Florence
- VII.2.2** Galileo Galilei. *Autograph diary of the observations of Jupiter*. 1619. Biblioteca Nazionale Centrale, Florence
- VII.2.3** Galileo Galilei. *Letter to Belisario Vinta*. Padua July 1610. Biblioteca Nazionale Centrale, Florence
- VII.2.4** Galileo Galilei. *The Assayer*. Rome 1623. Biblioteca Nazionale Centrale, Florence
- VII.2.5** Galileo Galilei. *Drawings of Sunspots*. 1612. Biblioteca Nazionale Centrale, Florence
- VII.2.6** Galileo Galilei. *Istoria e Dimostrazioni Intorno alle Macchie Solari*..... Rome 1613. Biblioteca Nazionale Centrale, Florence
- VII.2.7** Jean Chalette. *Astra Medicea*. 1611. Pen with indian ink; 31 x 21,5 cm. Carpentras, Bibliothèque Inguimbertaine
- VII.2.8** *Galileo's Telescope*. Florence 1610. Glass, wood, leather; diameter 6 cm; length: 92,7 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.9** *Exploded replica of Galileo's Telescope*
- VII.2.10** Galileo Galilei. *Objective Lens*. Padua 1610. Glass; 5,8 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.11** Evangelista Torricelli. *Telescope*. Florence 1647. Brass, cardboard, glass; length: 111,5 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.12** Evangelista Torricelli. *Objective Lens*. Florence 1646. Glass, cardboard, leather; diameter: 11,5 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.13** Eustachio Divini. *Octagonal Telescope with seven extensions*. Rome 1674. Wood, cardboard, glass; length: 565 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.14** Eustachio Divini. *Eyepiece with biconcave lens*. Cardboard, glass; diameter 6,3 cm; length 10,7 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.15** Giuseppe Campani, *Telescope*, wood, cardboard, leather, glass, 1666, length: 3430 mm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.16** Giuseppe Campani. *Lens*. Glass, 1665, diameter: 13.7 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.2.17** Giuseppe Campani, *Metal Shapes for Telescopes and Microscopes*, circa 1650, diameter: min. 3.5 cm; diameter: max. 16 cm. Museo di Fisica - Università di Bologna, Bologna
- VII.2.18** Giuseppe Campani, *Measuring Bundle*, iron, circa 1650, length: min. 6 cm; length: max. 37.5 cm. Museo di Fisica - Università di Bologna, Bologna
- VII.2.19** Chérubin d'Orléans, *Binocular Telescope*, wood, leather, glass, circa 1675, length: 1050 mm. Istituto e Museo di Storia della Scienza, Florence
- VII.3.1** Peter Paul Rubens, *Saturn Devouring One of His Children*, oil on canvas. 1636 – 1638. 180 x 87 cm; dimensions with frame: 196,5 x 103.2 x 6.2 cm. Museo Nazionale del Prado, Madrid
- VII.3.2-3-4-5** Maria Clara Eimmart, *Phases of Venus, Aspect of Jupiter, Aspect of Saturn, Phase of the Moon*. 1693-98. Water-colour on blue card. 56 x 43 cm. Università di Bologna - Museo della Specola, Bologna
- VII.3.6** Donato Creti. *Astronomical Observations: the Moon*. Oil on canvas, circa 1711, dimensions: 51 x 35 cm. Musei Vaticani, Vatican City

- VII.3.7** Donato Creti. *Astronomical Observations: Jupiter*. Oil on canvas, circa 1711, dimensions: 51 x 35 cm; Musei Vaticani, Vatican City
- VII.4.1** Gianni Miglietta. *Galileo's Moon*.
- VII.4.2** Galileo Galilei. *Drawings of the Moon*. November-December 1609. Autograph watercolour  
Biblioteca Nazionale Centrale, Florence
- VII.4.3-5** Thomas Harriot. *Three drawings of the Moon*. 1609-1611. Quill and ink on paper; 30.5 x 20 cm.  
Egremont, Petworth, West Sussex
- VII.4.6** Francesco Fontana. *Novae coelestium terrestriumq[ue] rerum observationes et fortasse hactenus non  
Vulgatae*. Neapoli, apud Gaffarum, 1646. Milan, Biblioteca del Dipartimento di Astronomia.
- VII.4.7** Claude Mellan and Pierre Gassendi. *Three charts of the Moon*. 1637. Engravings on paper; 20.8 x 23.3 cm; 22.3 x 16.8 cm;  
224 x 13.1 cm. Musée Boucher de Perthes, Abbeville
- VII.4.8** Michael Florent Van Langren. *Map of the Moon "Plenilunii Lumina Austriaca Philippica"*, 1645.  
Engraving on paper; diameter 35 cm. Crawford Library at the Royal Observatory, Edinburgh
- VII.4.9** Antonius Maria Schyrleus de Rheita. *Oculus Enoch et Eliae...*, Antwerp 1645. Istituto e Museo di Storia della  
Scienza, Florence
- VII.4.10** Johannes Hevelius, *Selenographia*, 1647, height: 36 cm. Istituto e Museo di Storia della Scienza,  
Florence
- VII.4.11** Eustachio Divini. *Chart of the moon*. 1649. Engraving on paper; 44 x 37cm. Biblioteca Comunale "Francesco  
Cini", Osimo (Ancona)
- VII.4.12** Giovanni Battista Riccioli. *Almagestum Novum*.... Bononie 1651. Istituto e Museo di Storia della Scienza, Florence
- VII.4.13** Geminiano Montanari. *Moon chart*. In Cornelio Malvasia, *Ephemerides novissime motuum coelestium*. Mutinae, ex  
typographia Andreae Cassiani, 1662. Modena, Biblioteca dell'Osservatorio Astronomico
- VII.4.14** Robert Hooke, *Micrographia*... London 1665. Biblioteca Nazionale, Florence
- VII.4.15** Chérubin d'Orléans, *La Dioptrique Oculaire*... Istituto e Museo di Storia della Scienza, Florence
- VII.4.16** Giandomenico Cassini, *Drawings of the Moon*. 1671-79. Sanguine and black pencil on prepared blue  
paper; 63.5 x 47.5 cm. Observatoire de Paris, Paris
- VII.4.17** Giandomenico Cassini, *Large Map of the Moon*, Engraving. 1679. dimensions: 56 x 56 cm; Observatoire de  
Paris, Paris
- VII.4.18** John Russel, *Printed Gores and Polar Caps of the Moon*. 1797, length: 36.5 cm  
pair of gores; diameter: 10.3 cm pair of caps. Museum of the History of Science, Oxford
- VII.4.19** John Russel. *Lunar Globe*. 1797-1805. external diameter: 48 cm; base: 23 cm; height: 52 cm. Science Museum,  
London
- VII.5.1** *Congregation of the Index Decree dated 5 March 1616*, Edicts, Briefs, Bulls, paper, Rome, 5 March 1616  
sheet: 415 x 274 mm. Biblioteca Casanatense, Rome
- VII.5.2** Galileo Galilei, *Dialogue Concerning the Two Chief World Systems*, octavo paper copy with notes in margin, Florence  
1632, closed book: 223 x 172 x 38 mm. Biblioteca Nazionale, Florence
- VII.5.3** Cristiano Banti, *Galileo Appears Before the Tribunal of the Inquisition*, oil on canvas, 1857  
dimensions without frame: 108 x 140 cm; dimensions with frame: 140 x 172 x 15 cm. Alberto Marri, Carpi (Modena)
- VII.5.4** Borgognone (Jacques Courtois), *The Miracle of Joshua Suspending the Motion of the Sun*, oil on canvas  
dimensions without frame: 64.4 x 53 cm. Galleria Spada, Rome
- VII.6.1** *Galileo's Jovilabe*, brass, second half of 17th century, dimensions without frame: 400 x 195 mm. Istituto e Museo di Storia  
della Scienza, Florence

- VII.6.2** *Model of the Application of the Pendulum to the Clock*, iron, brass, 1879, sculpture: 16 x 35 cm. Istituto e Museo di Storia della Scienza, Florence
- VII.6.3** Christiaan Huygens, *Cycloidal Pendulum*, steel; wood; ivory; brass; textile, sculpture: 200 x 35.5 x 160 cm. Musée des Arts et Métiers, Paris Cedex 03
- VII.6.4** Johannes van Ceulen, *Pendulum Clock*, 1675, sculpture: 42.5 x 29.5 x 15 cm. Science Museum, London
- VII.6.5** Leonard Salzer (after John Harrison), *Marine Timekeeper (replica)*, brass; bronze; steel; oak; lignum vitae 1970, height: 67.3 cm. National Maritime Museum, Greenwich (London)
- VII.6.6** Paul Philip Barraud, *Marine Chronometer*, silver, brass, glass, double mahogany case, circa 1850 sculpture: 205 x 195 x 195 mm. Università di Bologna - Museo della Specola, Bologna

### **SECTION VIII FROM GALILEO TO NEWTON**

- VIII.1.1** Johann Kepler, *Tabulae Rudolphinae*, in-folio paper copy, illustrated, Ulm 1627, closed book: 35 x 24.5 x 3 mm. Biblioteca Nazionale, Florence
- VIII.1.2** Robert Fludd, *Utriusque Cosmi...* (Volume I), in-folio volume, 1617, closed book: 32 x 20.7 x 6 mm Biblioteca Nazionale, Florence
- VIII.1.3** Gianni Miglietta. *Model of the Monochord Man*
- VIII.1.4** Athanasius Kircher, *Musurgia Universalis...* (2 volumi), in-folio paper volume, Rome 1650 closed book: 33.5 x 23 x 6 mm. Biblioteca Nazionale, Florence
- VIII.1.5** George Starkey, *Musaeum Hermeticum Reformatum...*, quarto paper volume, illustrated with engraved plates, Frankfurt 1678, closed book: 22.4 x 19 x 7.3 mm. Biblioteca Nazionale, Florence
- VIII.1.6** Jan Brueghel the Elder, *Linder Gallery Interior*, oil on copper, circa 1625, dimensions: 56.5 x 82.2 cm. The Robert Allen Group, New York
- VIII.2.1** Johann G. Doppelmayr, *Atlas Coelestis (loose plates)*, closed book: 57 x 36 x 2 cm. Biblioteca dell'Osservatorio Astronomico di Brera, Milan
- VIII.2.2** Sébastien Leclerc, *Louis XIV Visits the Académie des Sciences: in the background, The Royal Observatory Under Construction*, circa 1680, sheet: 44 x 32.5 cm. Observatoire de Paris, Paris
- VIII.2.3** A. Coquart, *Northern View of the Paris Observatory*. Southern Façade of the Paris Observatory, 1705 Sheet: 25.2 x 35 cm. Observatoire de Paris, Paris
- VIII.2.4** Sante Menini. *Movable Astronomical Quadrant*, iron stand and frame, brass graduated limb and shield 1710, sculpture: 150 x 180 x 50 cm. Università di Bologna - Museo della Specola, Bologna
- VIII.2.5** Gianni Miglietta. *Model of the Dimensions of the Planets*
- VIII.3.1** Andreas Cellarius, *Atlas Coelestis, plate 27*, Amsterdam 1661, dimensions without frame: 51 x 60 cm size of double plate. Biblioteca Nazionale, Florence
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## I Abjure, Curse and Detest

*The life, the discoveries and convictions of Galileo Galilei, the Tuscan scientist who has become a symbol of the battle for freedom of thought*

### ***Birth, Early Life and Education (1564-1580)***

Galileo Galilei was born in Pisa on 15 February 1564, the son of Vincenzo Galilei (1520-1591) and of Giulia Ammannati (1538-1620). His father, an impoverished noble of Florentine origin, was a celebrated musicologist, music theorist, lutenist and mathematician. Galileo attended primary school in Pisa. When the family returned to Florence in 1574, he studied under the Vallombrosan monks but his father withdrew him before end of the course of study.

### ***University Studies (1580-1589)***

He enrolled at Pisa University's Faculty of Medicine and Philosophy in 1580, but he broke off his studies partly because he was disenchanted with the academic milieu, and partly because he developed an overriding interest in geometry. He began to study Archimedes in some depth, and this offered him a methodological base that was the exact opposite of the Aristotelian philosophy prevailing at the time. He wrote, though did not publish, *The Little Balance* and *Theorem on the Centre of Gravity of Solids*.

### ***First Teaching Positions (1589-1592)***

He was appointed to the Chair of Mathematics at Pisa University in 1589, and it was there that he began to take an interest in the motion of falling weights. His low salary and disputes with his colleagues, however, prompted him to transfer to the University of Padua.

### ***Padua and Florence (1592-1608)***

In Padua from 1592, Galileo devoted his energies to public and private teaching, giving lessons in mechanics, the art of war and cosmology. He continued to pursue his research into the motion of falling weights and began to harbour serious doubts regarding the truth of the Aristotelian-Ptolemaic system, which seemed to him less likely to be true than the system of Copernicus. He got involved in the first scientific debates on the appearance of a supernova in 1604, and on the geometrical and military compass.

### ***Astronomical Discoveries and the Return to Florence (1609-1610)***

In 1609 Galileo built his first telescope and began to observe the heavenly bodies. The following year he published his *Sidereus Nuncius*, the *Starry Messenger*, in which he announced his discoveries, which appeared to him to confirm Copernicus' vision. The same year he left Padua for Florence, whither the Grand Duke of Tuscany had called him to be his Chief Mathematician and Philosopher.

### ***Chief Mathematician and Philosopher to the Grand Duke of Tuscany (1610-1611)***

Galileo continued to pursue his cosmological studies in Florence, travelling for the first time in 1611 to Rome, where his discoveries were initially afforded a favourable reception.

#### UFFICI STAMPA

Catola & Partners  
tel. +39 055 5522867 – 892  
riccardo.catola@catola.it

Fondazione Palazzo Strozzi  
tel. +39 055 2776461  
l.rinaldi@fondazionepalazzostrozzi.it

Sue Bond Public Relations  
tel. +44 (0)1359 271085  
info@suebond.co.uk

#### PROMOZIONE

Susanna Holm – Sigma CSC  
tel. +39 055 2340742  
susannaholm@cscsigma.it

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***Water and Sun (1611-1613)***

At odds with the Aristotelians in Florence, he published a series of works on the behaviour of floating bodies. In 1613, with his *Istoria e dimostrazioni intorno alle macchie solari e loro accidenti*, he countered the position of the Jesuit Christoph Scheiner, and for the first time he addressed the issue of scientific method, explicitly coming down on the side of the Copernican system.

***Against the Motion of the Earth (1612-1615)***

Goaded by a number of fervently anti-Copernican Florentine Dominican friars, Galileo adopted a position on the relationship between scientific theory and the Holy Scriptures, upholding the autonomy of science over the theological interpretation of scripture. He wrote, though did not publish, the *Letter to Benedetto Castelli* and the *Lettera to Christina of Lorraine*.

***Black Clothing Befits Our Times... (1615-1616)***

Galileo was reported to the Inquisition and, in Rome in 1616, Cardinal Bellarmine warned him against supporting the theories of Copernicus, which were pronounced false and not consistent with the Holy Scriptures. Copernicus' book *De revolutionibus* was temporarily banned, pending correction.

***Comets (1617-1619)***

Galileo was involved in a dispute on the nature of comets. In 1619 he published, though did not sign, a *Discourse on Comets* in which he faulted support for the system devised by Tycho Brahe, a system on which the Jesuits had fallen back after Ptolemy's theory was proved to be untenable.

***Scales and Balances (1619-1623)***

The controversy over comets continued, coming to a head in 1623 with the publication of *The Assayer*, in which Galileo delivers a sharp attack on the Jesuits over scientific method. The response he elicited was an equally vehement attack on the theological level.

***Hopes (1624-1631)***

Cardinale Maffeo Barberini was elected to the papacy, taking the name of Urban VIII, in 1623. Galileo was relying on his support to restore Copernicus' good name and to prove the truth of his own world system but the Pope was not as open-minded as he seemed.

***The Beginning of a New Age (1632)***

1632 saw the publication of the *Dialogue Concerning the Two Chief World Systems* in which Galileo, who could not openly argue the truth of Copernicus' system, still managed to find a way of making the Copernican hypothesis appear to be the most plausible one simply by proving the Aristotelian-Ptolemaic position to be untenable.

***Irate Theologians (1632-1633)***

The *Dialogue Concerning the Two Chief World Systems* did not receive a favourable reception in Rome. The Pope, in the grip of a tricky political crisis, was incensed by the fact that Galileo did not treat his personal opinions with due respect. A commission of theologians examined the work and found a large amount of material on which to bring charges. The matter passed into the hands of the Holy Office, which promptly ordered a trial.

***The Trial (1633)***

Galileo had to travel to Rome, where he was taken into custody and tried in 1633. He was found guilty of "vehement suspicion of heresy" and his *Dialogue* was banned.

***The Abjuration (1633)***

Pronouncing the famous formula '*I abjure, curse and detest*', Galileo was forced to deny his beliefs as a scientist and to declare that he would never again concern himself with the earth's motion, considered at this juncture to be outright heresy. The publication of certain of his works was prohibited, but the ban was not complied with outside Italy.

***The Last Light (1634-1642)***

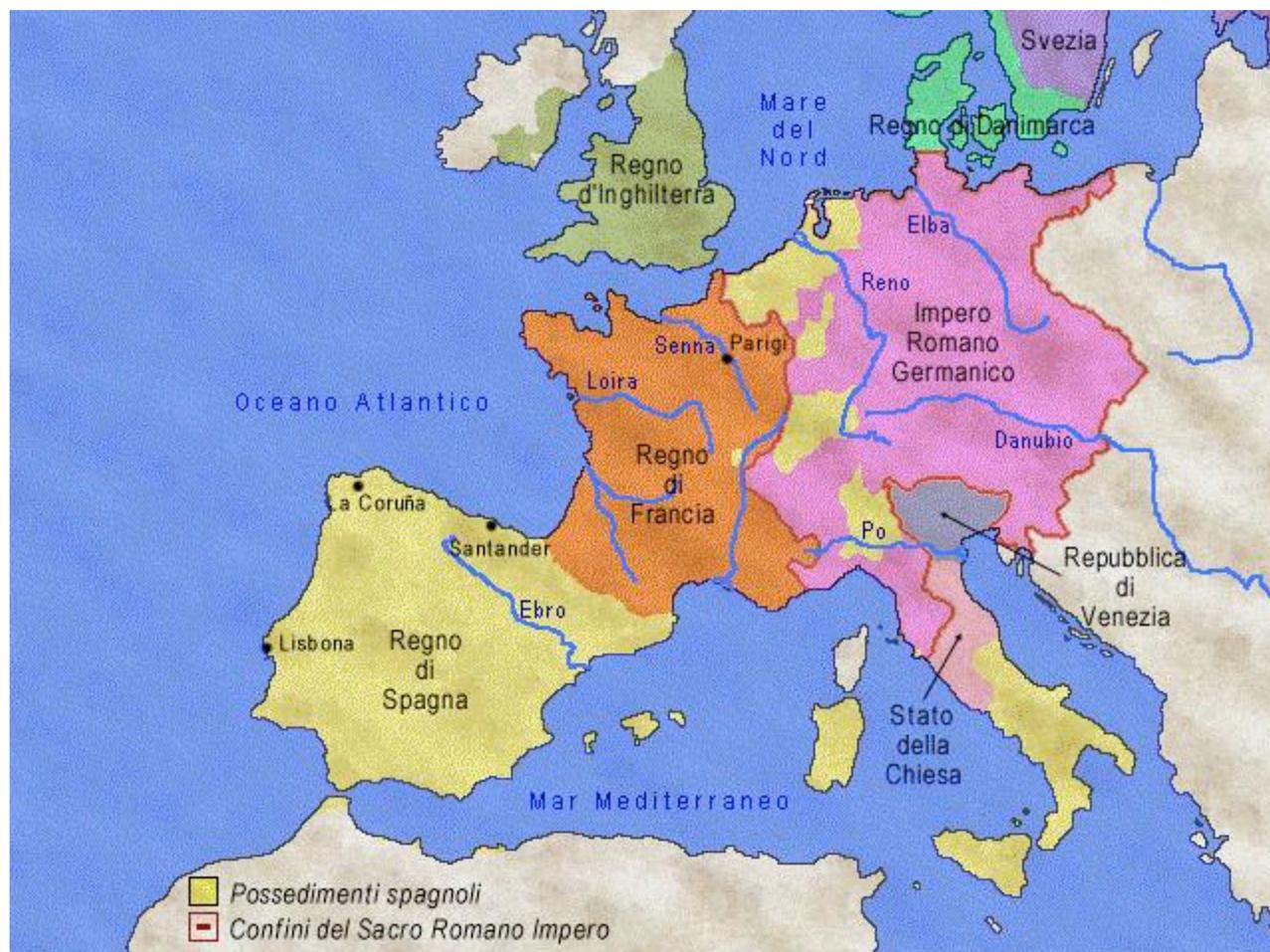
Galileo was confined to his villa at Arcetri. Given that he could no longer concern himself with cosmological questions, he resumed his research into the motion of falling weights, and in 1638 he published his *Discourses and Mathematical Demonstrations Concerning Two New Sciences Pertaining to Mechanics and Local Motions* in Leyden. Despite his failing sight, he carried on studying to the end and died, blind, in 1642.

***After Galileo***

Even after Galileo's death, the verdict's effect was felt for many years, having a major impact on the direction taken by research wherever the Roman Catholic Church wielded any influence.

**Further information: <http://brunelleschi.imss.fi.it/portalegalileo/index.html>**

## Europe and Italy in the Age of Galileo



*Political map of Europe in the 16<sup>th</sup> and 17<sup>th</sup> centuries*

Anno Domini 1564. While Europe was in the grip of a religious crisis, William Shakespeare was born in England and Galileo Galilei was born in Pisa under the rule of Cosimo I de' Medici, who was to be appointed Grand Duke by papal bull in 1569. The Council of Trent (1545–1563) had recently come to an end, dictating new draconian rules designed to repress heresy in general and Luther's (1517) and Calvin's (1536) schisms in particular.

A widespread Protestant rebellion against the authority and dogmas of the Roman Catholic Church, which was accused of being misleading, obtuse and corrupt, had already split Christendom in two, propounding doctrines based on predestination and a free interpretation of Holy Scripture, on moral stringency and a new kind of spirituality. These were the years of the Reformation against the Catholicism of free will and an omnipotent clerical class, of the sale of indulgences and reprehensible conduct on the part of the popes themselves, of pomp and splendour, and of rampant corruption.

### UFFICI STAMPA

Catola & Partners  
tel. +39 055 5522867 – 892  
riccardo.catola@catola.it

Fondazione Palazzo Strozzi  
tel. +39 055 2776461  
l.rinaldi@fondazionepalazzostrozzi.it

Sue Bond Public Relations  
tel. +44 (0)1359 271085  
info@suebond.co.uk

### PROMOZIONE

Susanna Holm – Sigma CSC  
tel. +39 055 2340742  
susannaholm@cscsigma.it

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By the second half of the 16<sup>th</sup> century the Protestant revolt had spread throughout the continent. Devastated by a bloody peasant war, Germany also had to face a major civil clash between Catholic Emperor Charles V and the League of Protestant Princes. Henry VIII's England rebelled (1534), dragging the Scandinavian kingdoms and the Low Countries with it and even going as far as to elect the king to the position of highest religious authority in the land. In Catherine de' Medici's France the fragile peace of Amboise (1564), which barely established a temporary truce in the first war of religion, was soon to give way to countless similar clashes that would bloody the country right into the middle of the 17<sup>th</sup> century.

The crown of France, however, stayed Catholic even when Calvinist convert Henri IV of Navarre came to the throne in 1589; and Spain under the Bourbons, on whose empire the sun never set, was staunchly Catholic. Along with the Habsburg Holy Roman Empire, Spain was a fully fledged papal bulwark. Occasionally allied, thanks to arranged marriages but pitted against one another more often than not, the three kingdoms fought for continental supremacy. England took sides in accordance with its best interests, as did Holland, and meanwhile both were getting rich on trade with the East thanks to their powerful fleets.

Thus dynastic and territorial wars intermingled with religious conflict. The game of alliances was more changeable than ever, and confusion reigned supreme. There was fighting everywhere, in villages, on borders, on the high seas and in the new colonies across those seas. Massacre followed on from massacre as Europe laboriously dragged itself out of the Middle Ages. The new ideology of absolutism was gaining ground, and with it the figure of the autocratic sovereign appeared on the scene. Louis XIV would soon be able to claim: "*L'état c'est moi*".

Italy in the age of Galileo was a country split into a myriad fragments and largely occupied by Spain (the area of Milan which figures in Manzoni's *The Betrothed*, parts of Piedmont and Emilia, the whole of the south and the islands). The Pope's temporal power stretched over Lazio, Umbria, the Marches, Romagna and a large part of Emilia. The only independent state where a minimum of freedom of thought could be exercised was Venice, which had recently celebrated its decisive defeat of the Turkish fleet at Lepanto (1571). The rest, including Tuscany, now lived in the orbit of the Holy Roman Empire. The Counter-Reformation and the Inquisition set the agenda for cultural life, and the country's economy was also going rapidly downhill.

Events, following on from one another at a hectic pace, were often tragic. The Protestant Huguenots were slaughtered in France in 1572. The power of Spain took a mighty blow when the "invincible Armada" sent to invade Elizabeth I's England sank to the bottom of the Channel in 1588. The next year the French King Henri III, the last of the old house of Valois, was assassinated and the Valois' place taken by the house of Navarre. King Henri IV brought his new and staunchly Catholic queen, Marie de' Medici, home from Florence in 1600. That same year the Inquisition ordered heretical free-thinker and philosopher Giordano Bruno to be burned at the stake along with his *Infinite Universe and Worlds*.

Nor does it end there. The year 1600 saw the birth in England of the East India Company that was to dominate trade with the East. Three years later, Elizabeth I died after reigning for 54 years. Spain went bankrupt in 1607. In 1610 a fanatic murdered Henri IV and the regency was entrusted to his widow. So now, after Catherine, another Medici was ruling France. 1619 marked the start of a war that was to devastate Europe for 30 years, and an appalling outbreak of bubonic plague killed millions, in Italy too, from 1629 to 1631. Louis XVI came to the throne in Paris in 1638, inaugurating a new season of war and conquest. Galileo had already been tried for the first time (1633) and was now living in seclusion in his villa on the hills above Florence, placed under "house arrest" by Pope Urban VIII. He was to die there in 1642. That same year saw the birth in England of Isaac Newton, a scientist who was to discover new and crucial laws of physics.

The 17<sup>th</sup> century witnessed the consolidation of the formation of our modern states, of new capitalism, of the bourgeoisie and of trade. Science and industry broke new ground and rationalist thought gradually gained a firm foothold. Despite the chaos of religious, dynastic and territorial war, Europe had set out on the path that would lead to the Enlightenment and modernity.

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## Horoscopes and Telescopes

Are you Cancer? Well then, you're going to find your soulmate. Aquarius? You're going to get an inheritance. Aries? You may get a headache. The radio, television and newspapers are full of these harmless prophecies: horoscopes that would mean absolutely nothing if people didn't follow them so passionately. The unpredictability of fate, the insecurity of the age and a desire for magic all have that effect. If that's true today, you can imagine how true it was back in **Galileo's** superstitious day, when mathematics, astronomy and astrology were all the same thing, and even rubbed off on medicine. You've got a tummy ache, have you? Of course you have, Mars is in opposition to Mercury so remember to drink that infusion at dawn on the first new moon. That's the kind of thing they taught at the universities of Pisa, Padua and Bologna!

So it was inevitable that the arcane relationship between the observation and the interpretation of the heavens should have a section devoted to it in *Galileo. Images of the universe from antiquity to the telescope*, the exhibition that Florence is dedicating to the Tuscan scientist on the 400<sup>th</sup> anniversary of his first astronomical discoveries (Palazzo Strozzi, 13 March to 30 August 2009, [www.palazzostrozzi.org](http://www.palazzostrozzi.org)). This article is a portrait of a complex age bestriding the 16<sup>th</sup> and 17<sup>th</sup> centuries, starting to slide from the Middle Ages towards the modern era, the age when knowledge began to turn into science. Graziella Federici Vescovini, a lecturer in the history of philosophy at Florence University who has contributed an important essay entitled *The Astrological Vision of the Universe and of Man in the Middle Ages* to the exhibition catalogue, helped us to "paint" it.

In some historians' view, she explained, the age of Galileo (1564-1642) was the "age of witchcraft", a magical world that was by no means marginal to European culture, indeed it was central to it, with works by **Marsilio Ficino, Tommaso Campanella, Cornelio Agrippa, Giordano Bruno, Paracelsus** and many others. Galileo, the father of modern science, only trusted what he could see through his telescope, but he didn't forego the exercise of astrology simply because it helped to top up his salary. Other great astronomers such as **Kepler** engaged in it because they actually believed in it. It was the spirit of the age, in line with extremely ancient traditions going back to the Egyptians, Greeks and Romans. In the Renaissance, astrology was extremely fashionable at the courts of kings, princes and popes. **Giovanni de' Medici, Lorenzo the Magnificent's** second son, is reputed to have consulted the stars even over the choice of his name, **Leo X**, when he was elected to the throne of St Peter.

From time immemorial, and transcending all class barriers, mankind has always sought guarantees for his future in the sky. If I marry that woman, will she stay faithful? Is my business going to do well? Am I going to have children? Will my health fail me? Am I going to win the football pools? Is my enemy going to have an accident? There is very little difference between the Middle Ages and our own era. Back then, just like today, people saw the stars and planets as letters in some kind of cosmic alphabet; all you had to do was to decipher them according to their colour, shape, motion, speed and relationship with other heavenly bodies. In actual fact, an overwhelming majority of historians consider that astrology was simply man's most ambitious attempt to impart some kind of comprehensible order to the disconcerting jungle of human affairs. But according to its detractors, the variety of methods, procedures, systems of calculation and interests involved turned it into a realm of purely arbitrary discretion.

### UFFICI STAMPA

Catola & Partners  
tel. +39 055 5522867 – 892  
riccardo.catola@catola.it

Fondazione Palazzo Strozzi  
tel. +39 055 2776461  
l.rinaldi@fondazionepalazzostrozzi.it

Sue Bond Public Relations  
tel. +44 (0)1359 271085  
info@suebond.co.uk

### PROMOZIONE

Susanna Holm – Sigma CSC  
tel. +39 055 2340742  
susannaholm@cscsigma.it

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PALAZZO  
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History is rich in capital episodes with their attendant legends. We are told of **Coluccio Salutati** who chose the time and place to attack the Pisan forces at the battle of Cascina in 1364 on the basis of indications provided by mathematician and astrologer **Paolo dall'Abaco**. Neoplatonic philosopher **Marsilio Ficino**, on the other hand, took it upon himself to provide Lorenzo the Magnificent with the right astrological formula (time, date, place) for building a new villa. Despite his high intellectual standing, Lorenzo was very superstitious and never let a good-luck ring he owned bearing the sign of Capricorn out of his sight. His personal astrologer, the unfortunate **Pier Leone da Spoleto**, was also his physician. Sadly for him, he was suspected of poisoning the prince and was tossed into a well without further ado – his prediction that he himself would die by drowning thus coming true.

Kings, popes and emperors have never ceased questioning the heavens. While **Queen Elizabeth II** still has a salaried court astrologer, back in the 13<sup>th</sup> century **Emperor Frederick II** of Swabia hired Scottish mathematician and philosopher **Michael Scot (Dante's Michele Scotto)**, who took his cue from physiognomical astrology to suggest to his employer whom he could trust and whom he could not: Aries or Leo? Choleric. Capricorn or Scorpio? Devious. Gemini or Libra? Liars.

Leo X even went as far as to have the Pontiff's Hall in the Vatican decorated with a spectacular self-celebratory fresco cycle in which divine favour was supplemented by the endorsement of the stars. Banker **Agostino Chigi**, one of the Renaissance's great art patrons, commissioned a similar fresco from **Baldassarre Peruzzi**, depicting a beautiful horoscope that we can still admire in the Galatea Room in Rome's Villa Farnesina. **Botticelli**, **Luca Signorelli** and other celebrated painters of the time also produced paintings with a wealth of astrological references, many of which are extremely hard to decipher today.

Feared, sought after and well paid, astrologers held a position that certainly was fraught with risk. The only difference today is that if their predictions are wrong and the team doesn't win the cup or the party the election, the worst thing that can happen is that people pour scorn on them. Once upon a time, however, they could afford to be no less than infallible. If Scot had got something wrong, the emperor would have shown no hesitation in having his head lopped off – an occupational hazard that has reaped more than one victim in history.

**Pico della Mirandola** quite simply loathed them and wrote a weighty tome against them *Disputationes ad versus astrologiam divinatricem*, from which **Girolamo Savonarola** took his inspiration for *Treatise Against Astrologers*. No less than three astrologers prophesied that he would die a horrible death and their predictions did indeed come true. Pico died in 1494 aged only 31. The *Responsiones contra Picum* in which **Lucio Bellanti** took issue with the poor fellow was only one of the many publications in favour of astrology – others were **Gabriele Piravano's** *De astronomica veritate*, **Campanella's** *7 Astrologicorum libri*, **Antonio Magini's** *Discorsi*. These publications came in for numerous attacks, many of which were penned by Jesuits because of their prophesies against the papacy and their political content (the coming of the Antichrist, the collapse of the Church of Rome and so forth). The violent dispute between Catholics and Lutherans over **Martin Luther's** horoscope was typical.

With the split in medieval Christian universality, the response to Luther and **Calvin** came with the Council of Trent (1545-1563), the invention of the Index, and the catechism of **Pope Pius V**. In Italy, and especially in Europe, dogmatic disputes and wars of religion broke out between Catholics and Protestants leading to widespread mutual slaughter: 100 years of hell that are still smouldering beneath the ashes. Galileo had the misfortune to live right in the middle of that era. The fundamental objection raised by the opponents of astrology, with **Giovanni Pico** heading the list, concerned the sphere of freedom. If fate is written in the stars, then what room for manoeuvre does that leave free will and man's moral autonomy?

It is common knowledge that Galileo first had (painless) dealings with the Inquisition in 1604, then again in 1616 when Cardinal **Bellarmino** officially warned him that Copernican astronomy ran counter to Holy Scripture and that he should not challenge dogma. His final trial in 1633 ended with the famous abjuration “*I abjure, curse and detest...*” and house arrest for life, first in Siena then in Florence by decree of **Pope Urban VIII**.

But astrology played no part in Galileo's woes in Rome. What did play a very big part were Galileo's scientific works especially the *Starry Messenger* and the *Dialogue Concerning the Two Chief World Systems* - what might be called the “telescope effect”, the impact of the instrument that revolutionised the very concept of the universe, suddenly showing it to be not a universe but a *multiverse* without a specific centre (the earth) created by divine omnipotence specially for man. The telescope not only undermined the venerable religious beliefs contained in the Bible, but it also deprived the heavens of the magical emanations

that had permeated them since the late 15<sup>th</sup> century, when astrology had taken on an aura of pagan magic, hermetism, diabolism and irrationalism.

What happened next is well-known. Galileo's mathematical method and Descartes' rationalism took the place of the archaic rationalism of **Aristotle**'s physics and the celestial geometry of **Ptolemy**, founding father of medieval physical astrology.

Contemporary astrology has inherited the magical contamination of pagan astrology that was so fashionable in the Renaissance. Astrologers today are fortune-tellers once more, and in the uncertainty of our daily lives, the irrational appeal of cheap horoscopes is more widespread than ever, feeding more than ever before on man's eternal fears and desires. It represents the dark side of the human psyche, just as Galileo's telescope represents the crystal clear gaze of reason.

## Something for Children

*Kits and special telescopes, competitions, workshops and guided tours for young children and schools*

Galileo is "at home" at the Palazzo Strozzi from 13 March to 30 August 2009. The *Images of the universe from antiquity to the telescope* exhibition not only has special captions devised by famous Czech children's writer **Peter Sís**, it also offers a range of activities specially devised for children aged 3 to 12, with workshops held in Italian and English and a variety of initiatives designed to allow the whole family to have fun:

### The Starry Messenger's Postbag

The "Starry Messenger's Postbag" is a kit designed to help children and the grownups accompanying them visit the exhibition in a fun way. For the would-be starry messenger, the postbag contains a map of the exhibition with a special route marked out for younger visitors designed as a game where the "big questions" on the mysteries of the universe are broken down into smaller problems and practical experiments.

The postbag also contains astrolabes, maps of the stars, sundials and sextants - in other words, cardboard reproductions of ancient instruments that allow kids to familiarise themselves with the way astronomers observed the sky with the naked eye for thousands of years before the telescope was invented. They can also play with a model of Galileo's telescope that can be fully disassembled so they can see how it works, and more than that, so they can grasp the revolutionary nature of Galileo's gesture when he pointed it at the sky.

The "Starry Messenger's Postbag" can be booked at the Palazzo Strozzi ticket office, tel. +38 055 2645155.

### The "Fantastic Journey" Competition

Open to all ages, the "Fantastic Journey" is a competition that ties in with the exhibition. Entrants have to answer a few questions, and after concluding their visit, they can give free rein to their creativity by drawing a map of the exhibition showing all their favourite exhibits.

The best maps, in the view of a jury chaired by Peter Sís, will be published on the [www.palazzostrozzi.org](http://www.palazzostrozzi.org) website. Maps and answers must be submitted before 23 August 2009 either via the special dedicated section on the website [www.palazzostrozzi.org](http://www.palazzostrozzi.org), or posted by "snail mail" to: "Viaggio fantastico", Fondazione Palazzo Strozzi, Piazza Strozzi 50123 Firenze, Italy.

### Discover Galileo's Milky Way

Before the telescope was invented, man knew little about the moon. It was thought to be some kind of star, probably made of crystal because its light appeared to come from inside. Thanks to the telescope, however, Galileo discovered that it was in fact a planet with mountains and valleys, and that it was lit by the sun, just like the earth. These and other discoveries began to reveal the true nature of the universe.

#### UFFICI STAMPA

Catola & Partners  
tel. +39 055 5522867 - 892  
riccardo.catola@catola.it

Fondazione Palazzo Strozzi  
tel. +39 055 2776461  
l.rinaldi@fondazionepalazzostrozzi.it

Sue Bond Public Relations  
tel. +44 (0)1359 271085  
info@suebond.co.uk

#### PROMOZIONE

Susanna Holm - Sigma CSC  
tel. +39 055 2340742  
susannaholm@cscsigma.it

RESPONSABILITÀ SCIENTIFICA

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The Fondazione Strozzi can now offer children a chance to become astronomers and to take home a telescope made out of a special milk carton. It only costs €5.00, but supplies are limited so you have to register early on [www.palazzostrozzi.org](http://www.palazzostrozzi.org).

### **Workshop**

Workshops are held every Sunday at 10.00 and at 12.00, and are designed for children aged 4 to 11. The cost of the workshop is free with a ticket to the exhibition, price €4.00 for children (free for children aged 6 and under) and €8.00 for accompanying adults.

The workshop is structured in two separate phases:

1) *Our Starry Skies*. A guided tour of the exhibition exploring different themes and following different itineraries: a different way of admiring the masterworks on display and of discovering weird and wonderful instruments and machines.

2) The workshop itself starts immediately after the visit, and is held in a fully-equipped area where experts teach the children how to build new stars in motion, suspended in imaginary universes.

**“Domeniche Viola” Sundays:** *Dad goes to the football match, mum and the kids go to the show!*

On those Sundays when Fiorentina football club is playing at home (22 March, 26 April, 3, 17, 31 May 2009), the “morning workshops” will be repeated in the afternoon at 15.00, as outlined above.

### **For Schools**

#### *Primary and Secondary*

Travelling in the worlds of science, art, history and literature: a guided tour of the exhibition, following a specially designed itinerary tailored to suit each individual school year.

Price: (max. 25 students) €50.00 + admission to the exhibition (€4.00 per student).

#### *Primary Schools*

Discovering the mysteries of the sun and moon, Venus, Saturn and the rest: guided tour of the exhibition exploring different themes and following different itineraries.

The workshop starts straight after the visit, and is held in a fully-equipped area where students can build new worlds and new stars.

Price of visit + workshop (max. 25 students) €70.00 + admission to the exhibition (€4.00 per student).

**All of the above activities must be booked in advance.**

### **Reservations**

Sigma CSC

Monday to Friday 09.00 to 13.00, 14.00 to 18.00

[prenotazioni@cscsigma.it](mailto:prenotazioni@cscsigma.it)

[www.palazzostrozzi.org](http://www.palazzostrozzi.org)

Tel. +39 055 2469600, Fax +39 055 244145

FIRENZE  
PALAZZO STROZZI

13 MARZO  
30 AGOSTO 2009

# GALILEO

IMMAGINI DELL'UNIVERSO  
DALL'ANTICHITÀ AL TELESCOPIO

SOTTO L'ALTO PATRONATO  
DEL PRESIDENTE DELLA  
REPUBBLICA ITALIANA

MINISTERO PER I BENI E  
LE ATTIVITÀ CULTURALI  
MINISTERO DEGLI AFFARI ESTERI

## Passport for Galileo

*Once again, as for past exhibitions, a special passport with themed itineraries tying in with the exhibition, and the chance to benefit from free admission to various museum, will be available for the exhibition on the great Tuscan scientist!*

The *Passport for Galileo* is a free booklet that the Fondazione Palazzo Strozzi is pleased to offer visitors to its exhibition on Galileo entitled *Images of the universe from antiquity to the telescope* ([www.palazzostrozzi.org](http://www.palazzostrozzi.org)). Exactly the same size, shape and colour as a passport, it is packed with historical and practical information on the exhibition, as well as maps, itineraries and useful information for visiting many of the museums, galleries, collections, institutions, churches, villas and homes throughout Tuscany that are connected in some way with the figure of Galileo.

The Passport also illustrates the full range of initiatives promoted by the Fondazione Palazzo Strozzi and by the most important cultural institutions in Florence and Tuscany, where the booklet may also be picked up at the ticket office.

How does the Passport work? Anyone visiting one of the museums involved in the initiative or taking part in one of the collateral events that tie in with the exhibition on Galileo can get their passport stamped on each occasion. Then, when they show their Passport with at least 5 stamps on it at the ticket office, they will be given a **free ticket** to the exhibition.

The Fondazione Palazzo Strozzi will be issuing a similar Passport for its forthcoming exhibition on *Trompe l'œil* too, just as it has done for past events. The full collection of brochures offers a series of themed itineraries that allow the more adventurous visitor to explore some of the lesser known yet most fascinating corners of this beautiful city and its enchanting region.

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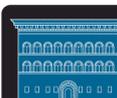
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## In Galileo's Footsteps in Florence

**Florence** - The Fondazione Strozzi has organised a series of guided tours to run concurrently with its *Galileo. Images of the universe from antiquity to the telescope* exhibition at the Palazzo Strozzi (13 March to 30 August 2009). The tours take in the most important sites with Galileo connections in Florence which, while not generally open to the public, are to be specially opened for the occasion. Reservations will be required, and can be made by calling or e-mailing Sigma CSC (+39.055.2469600; [prenotazioni@cscsigma.it](mailto:prenotazioni@cscsigma.it)). Below is a list of the sites, what there is to see at each one and the tour schedule.

**Accademia delle Arti del Disegno (Via Orsanmichele, 4).** Every Wednesday until 17 June and every Wednesday in July (from 10.00 to 12.00). A member of the Accademia dei Lincei since 1611, Galileo was appointed a member of the Accademia delle Arti del Disegno (Academy of the Art of Drawing) by Grand Duke of Tuscany Cosimo II in 1613. The visit is organised in conjunction with the Accademia itself and with the *Conoscere Firenze* association.

**Former Casino Mediceo, today the Appeal Court (Via Cavour, 57).** Guided tours, for exhibition ticketholders only, are scheduled for 15.00 on Tuesday 24 March, 21 April, 19 May and 23 June. The former "Casino", or "Pleasance", hosts a famous allegorical fresco attributed to Francesco Furini entitled *Astronomy Showing Cosimo II the Medici Satellites*. In another fresco, possibly by Giovanni da San Giovanni, we see *The Grand Duke Reawakening Science*.

**Villa Il Gioiello (Via del Pian dei Giullari, 42).** At 11.00 on Sunday 10 May, 24 May, 14 June, 5 July. The Villa Il Gioiello is where the Tribunal of the Inquisition sentenced Galileo to house arrest. He lived there till his death on 8 January 1642. The guided tours will be organised by the Museo di Storia Naturale dell'Università di Firenze.

In each one of these three sites visitors will be able to get a free stamp for their **Passport for Galileo**. This is a special booklet devised by the Fondazione Strozzi to involve visitors in the tour devoted to Galileo and Science that covers the whole of Tuscany. The Passport is packed with information on related exhibitions, maps and itineraries. Five stamps allow the holder to claim one free ticket to the exhibition ([www.palazzostrozzi.org](http://www.palazzostrozzi.org)).

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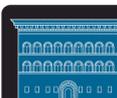
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## When the Cosmos Was Divine Harmony

*The choir of Pisa's Scuola Normale has chosen the Galileo exhibition to present the first ever performance of the angelic canon for 36 voices by Athanasius Kircher, a German Jesuit who set the motions of the planets and the song of the angels to music*

by **Natacha Fabbri**

(Research Fellow in Philosophy at the Scuola Normale Superiore di Pisa)

The exhibition on *Galileo. Images of the universe from antiquity to the telescope* is to host the ever performance of the angelic canon for 36 voices from the frontispiece of the *Musurgia Universalis* (1650) by German Jesuit **Athanasius Kircher** (1602 - 1680). The heavenly singing, in a realisation by **Michele Ignelzi** and performed by the *Vincenzo Galilei Choir* from the Scuola Normale Superiore di Pisa conducted by **Francesco Rizzi**, can be heard in the film entitled *Harmony of the Spheres*.

Structured on the basis of the Pythagorean principle of the perfect translatability of the visible, the audible and the intelligible, this canon is one of the clearest examples of the fertile nature of the interplay between philosophy and music. The harmony of creation is celebrated in a musical composition characterised by a circular structure which can potentially be executed *ad infinitum*, and which thus reflects the peculiar nature of planetary motion and of the song of the angels. Kircher's theological transfiguration of the canon was what was to make its fortune in Lutheran circles, its popularity continuing right up to the era of **Johann Sebastian Bach** and his son **Carl Philipp Emanuel**, who devised a realisation for it.

*Harmonia est discordia concors*. Writing in 1508, that was how **Franchino Gaffurio** began his *Angelicum ac Divinum Opus Musicae*, harking back to a long tradition stretching from **Heraclitus** to **Galen**, **Seneca**, **Martianus Capella**, **Nicholas of Cusa** and **Ficino**. Indeed, the concept of *harmony* had tended to dominate the history of thought since the days of the **Pythagoreans**, also spreading to the cosmological, socio-political and medico-physiological spheres. In Medieval culture, the ordered structure of the cosmos was also echoed in liturgical chant, which was not only one of the principle paths leading to the 'Father's house', but which also managed to achieve the *cor unum et anima una* (*Acts of the Apostles*) precisely through concord, in other words through the harmony of hearts (*cum-cordis*).

The reflection on harmony reached a peak in the late 16th century with the introduction of a God who was not simply a Geometrician but also, and above all, a Musician: the harmony of creation was reflected in the harmonic justice of **Jean Bodin's** *République* and in the *concordia discors* of his *Colloquium*. Heirs to neoplatonic philosophy on the one hand and to trinitarian theology on the other, **Johannes Kepler**, **Marin Mersenne** and Athanasius Kircher sought signs of the divine model of harmony in creation, displaying the *utilité de l'harmonie* in the context of metaphysics, religion, and moral and natural philosophy.

Defined by **Descartes** as the *vis activa* of reality, harmony spawned a variety of different cosmological models in the 17th century. The Hermetic tradition was represented by Rosicrucian physician **Robert Fludd**, whose vague analogies were countered by Kepler's harmonic ellipses generated by the comparison between the quantitative aspects of orbital motion. With the author of the *Harmonice Mundi* we see the transition from the static harmony of the Copernican cosmos to the dynamic harmony of celestial physics: each planet is no longer assigned a single but a musical interval, the equivalent in sound of the variation in speed of its rotatory motion.

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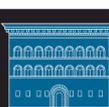
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The precise mathematical calculations underlying the *rational concert* of the planets are based on a metaphysical view of harmony, where a correspondence is established between the physical structure of the universe and the divine geometric-cum-musical archetype, which is in turn co-essential and co-eternal with God.

The harmony of Galileo's cosmos, on the other hand, is based on the observation of what the universe is *de facto*. Galileo abandons the *chimera* of the Ptolemaic model – *very much out of proportion*, just like **Tasso's** *Jerusalem* –, and describes a *fabrica*, or machine, in which order no longer depends on the positioning of the heavenly bodies on the basis of their natural seats, but in which it is harmonic (in the etymological sense of ἁρμόζω) because it is conceived as a system of proportions between quantitative variables of physical reality and of relationships between different constituent parts of a unit (*uni-versum*).