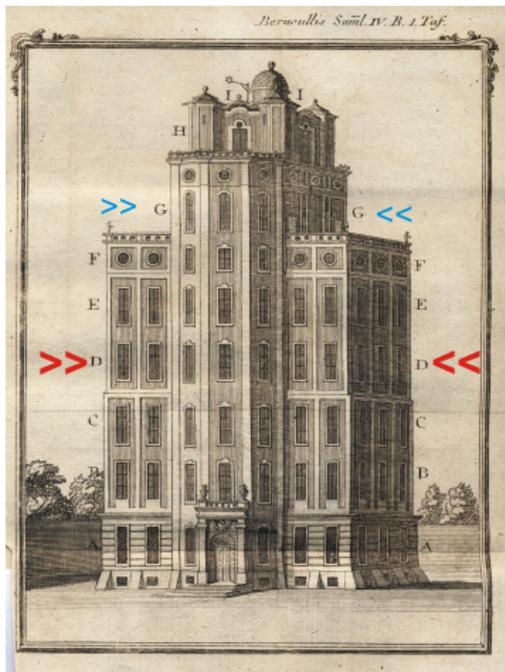


The battle of books in the library of the observatory in the monastery Chremsinster



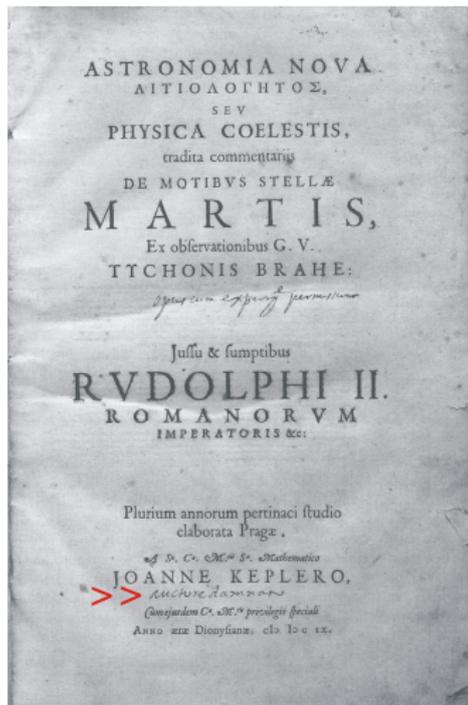
R. Folk - University Linz - Lausanne - 15.-17. June 2011

Where is Chremsinster?



Honter, *Rudimenta cosmographia* 1552

Old battles

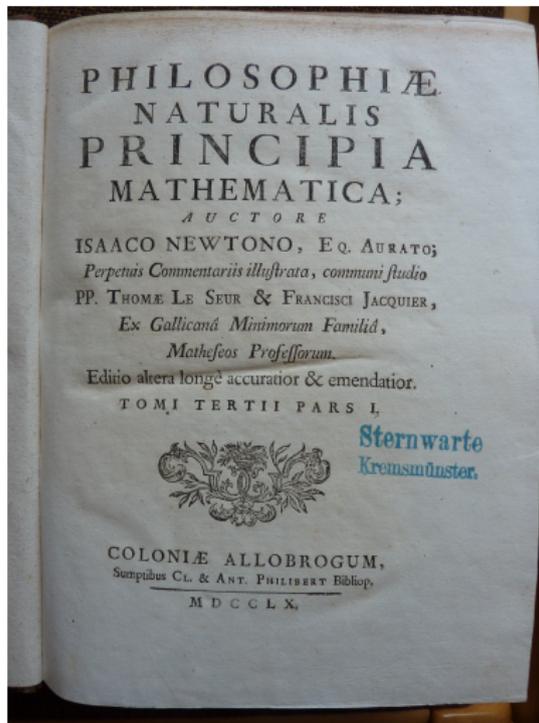


Kepler's *Astronomia nova* of 1609

[Martayan Catalogue 32 Item 57]



Riccioli's *Almagestum* of 1651



Newton's *Principia* of 1760

Eine einfache Anwendung des Newtonschen Gravitationsgesetzes auf die kugelförmigen Sternhaufen.

Von
Albert Einstein Berlin.

Es dürfte wohl kaum zu bezweifeln sein, daß das Newtonsche Gesetz über diejenigen Abstände hinaus, für die es verifiziert ist, extrapoliert werden darf. Dies Vertrauen wird auch durch die allgemeine Relativitätstheorie gestützt, die dem Newtonschen Gesetze eine rationale Begründung verleiht, so daß eine Extrapolation auf größere Distanzen der aufeinander wirkenden Körper um so berechtigter erscheint. Allerdings läßt die allgemeine Relativitätstheorie für den Fall, daß unsere Welt räumlich endlich ist, erhebliche Abweichungen vom Newtonschen Gesetze voraussehen, aber nur in dem Falle, daß die mittlere Dichte der Sternmaterie in dem untersuchten gravitierenden Gebilde nicht erheblich größer ist als die mittlere Dichte der Sternmaterie in der Welt überhaupt.

Einstein Festschrift 1921

nichtleuchtende Massen

PHIL 105, 211303 (2010)

PHYSICAL REVIEW LETTERS

week ending
19 NOVEMBER 2010

Model for Gravity at Large Distances

Daniel Grumiller

Institute for Theoretical Physics, Vienna University of Technology, Wiedner Hauptstrasse 8-10/136, A-1040 Vienna, Austria
(Received 7 September 2010; published 17 November 2010)

We construct an effective model for gravity of a central object at large scales. To leading order in the large radius expansion we find a cosmological constant, a Rindler acceleration, a term that sets the physical scales, and subleading terms. All these terms are expected from general relativity, except for the Rindler term. The latter leads to an anomalous acceleration in geodesics of test particles.

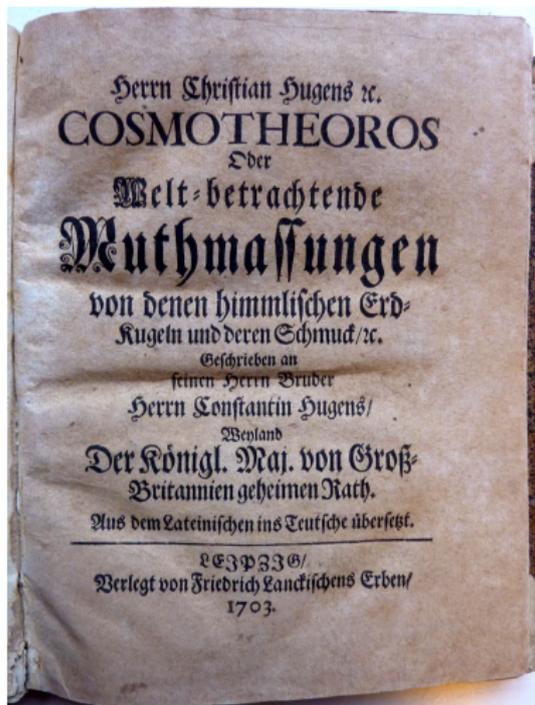
DOI: 10.1103/PhysRevLett.105.211303

PACS numbers: 04.00.-n, 95.35.+d, 96.30.-i, 98.62.Dn

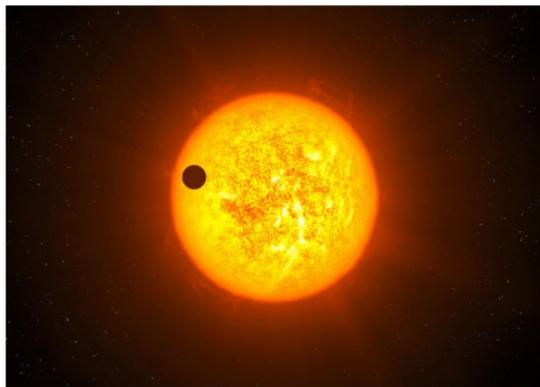
Grumiller's Rindler force 2010

a constant acceleration at large distances

Ongoing speculations



Huygens's *Cosmotheores* of 1703



THE LICK-CARNEGIE SURVEY: FOUR NEW EXOPLANET CANDIDATES

STEFANO MESCHERI¹, GEORGY LAUGHLIN¹, STEVEN S. VOGT¹, R. PAUL BUTLEN², EUGENIO J. RIVERA¹, NADIR HACHEGHIGUER¹ AND PETER JALOWICZOR

Draft version November 22, 2010

ABSTRACT

We present new precise HIRES radial velocity (RV) data sets of five nearby stars obtained at Keck Observatory. HD 31253, HD 218566, HD 177830, HD 99992 and HD 74156 are host stars of spectral classes F through K and show radial velocity variations consistent with new or additional planetary companions in Keplerian motion. The orbital parameters of the candidate planets in the five planetary systems span minimum masses of $M \sin i = 27.43 M_{\oplus}$ to $8.28 M_{\oplus}$, periods of 17.05 to 4696.36 days and eccentricities ranging from circular to extremely eccentric ($e \approx 0.63$).

The 5th star, HD 74156, was known to have both a 52-day and a 2500-day planet, and was claimed to also harbor a 3rd planet at 336d, in apparent support of the "Packed Planetary System" hypothesis. Our greatly expanded data set for HD 74156 provides strong confirmation of both the 52-day and 2500-d planets, but strongly contradicts the existence of a 336-day planet, and offers no significant evidence for any other planets in the system.

Subject headings: Planets and satellites: detection, Methods: numerical

Life on exoplanets? Giese 581d?

R. D. Wordsworth et al, *Astrophysical Journal Letters* 2011

- The nature of space: empty or not, finite or infinite
- The center of the world: sun or earth
- The nature of motion: straight or circular
- The nature of force: needed for every motion or only for acceleration
- The nature of inertia and its consequences
- The nature of gravity: short ranged or long ranged
- The shape of the earth: lemon or orange
- The size of the planetary system: Venus transit
- The origin of the planetary system: Kant 1755 and Laplace 1796

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Why monasteries are interested in astronomy?



Hogarth's famous *Give us our Eleven Days* protest slogan against the **Gregorian calendar**



F. Bianchini, *Kalendario et cyclo Caesaris ... Romae, Comitibus 1703*

J. L. Heilbron, *The Sun in the Church* Hacard Univ. Press 1999;
Copernican Cosmology in Catholic Countries around 1700, 2007

Time on earth is set by motion in the sky

The observatory under the directory of Fixlmillner (1762-1791)



- Construction of the observatory 1748 - 1758
- Cabinet of wonders: physics, biology, mineralogy
- Teaching in the knight academy, research in the observatory: observational astronomical, meteorological and geological
- Since the 16th century instruments in the monastery, astronomical observations and records kept, used by the teachers at the university of Salzburg (f. 1622)

Fr. Fellöcker, *Geschichte der Sternwarte ...* Linz 1864

The sources for the reconstruction of the library

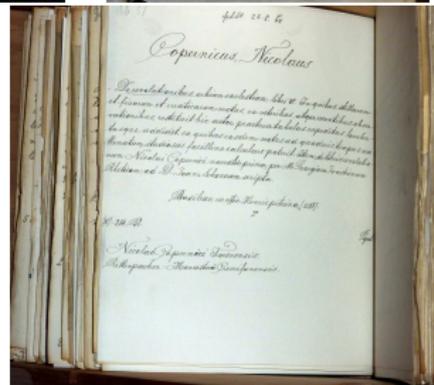
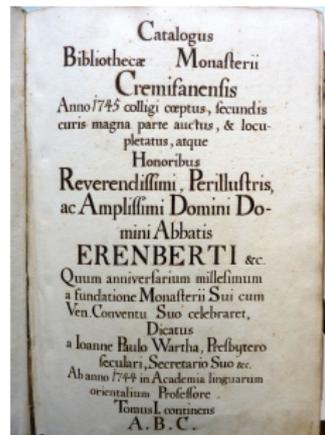
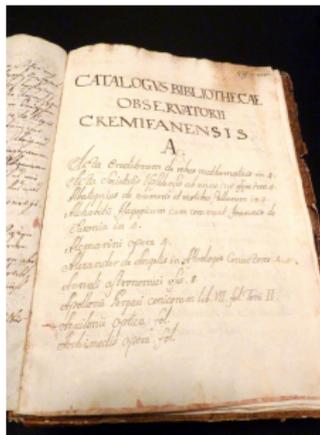
- Digital catalogue of the monastery
- Card index of the 19th and 20th century
- Catalogue by P. Johann Paul Wartha 1766 (until 1745 und additions until 1798)
- **Catalogue by Fr. Laurenz Doberschiz (1734-1799) until 1792** 249 items

Transcribed by Fr. Amand Kraml, *Berichte des Anselm Desing Vereins* Vol. 1 1996

- Catalogue by P. Simon Rettenbacher (acquisition 1665)

The 'mathematical' books transcribed by M. Gruber, *Thesis TU Vienna* 1996

- Card index in the observatory, digital catalogue under construction



Range of scale

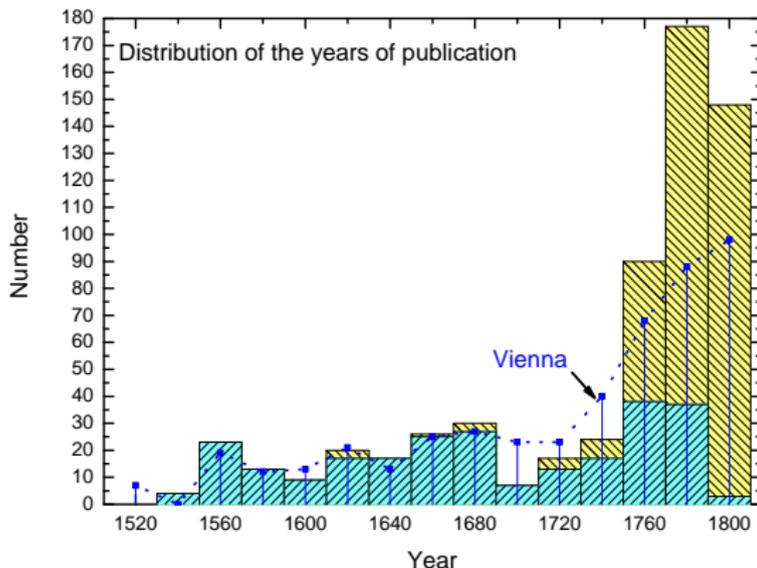
Year	Library	Number	Year	Library	Number
1617	Schweinfurt [†]	135	1727	Newton ^{††}	211
1630	Zinner [*]	4500	1750	Macclesfield ^{**}	2290
1643	Guldin	300	1800	Chremsminster [‡]	605
1654	Jungius ^{††}	499	1800	Vienna [‡]	477
1685	Flamsteed	260	XVII	Lalande ^{**}	1735
1691	Boyle	3571	XVIII	Lalande ^{**}	1654
1695	Huygens [*]	406	XVII	Struve ^{**}	943
1703	Hook ^{††}	747	XVIII	Struve ^{**}	1432

Table: Sizes of different libraries until the end of acquisition, † without manuscripts, * [1500,1630], †† from the field of astronomy, 'physica', mathematics, optics, mechanics and metereology, * only the 'mathematical' books, ** only the sientific books, ‡ [1500,1800[, ** in the given century.

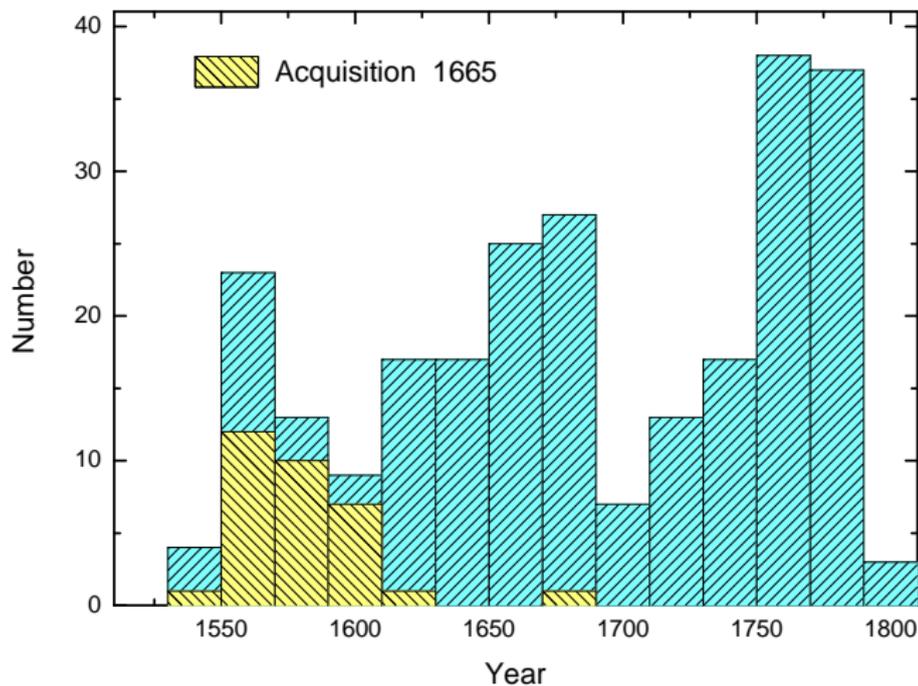
Books in the observatory until 1800

- Fr. Laurenz Doberschiz (1734 - 1799) writes the catalogue
- 1764 he starts writing the catalogue
- 1792 youngest item: Lalande *Ephemerides*
- 1521 oldest item: Alchabitius *Isagogicum*
- 249 in total; 93 in [1600,1700]; 48 before 1600
- Astronomy, optics, mathematics, measurement technique, instruments
- Language: latin, french, german

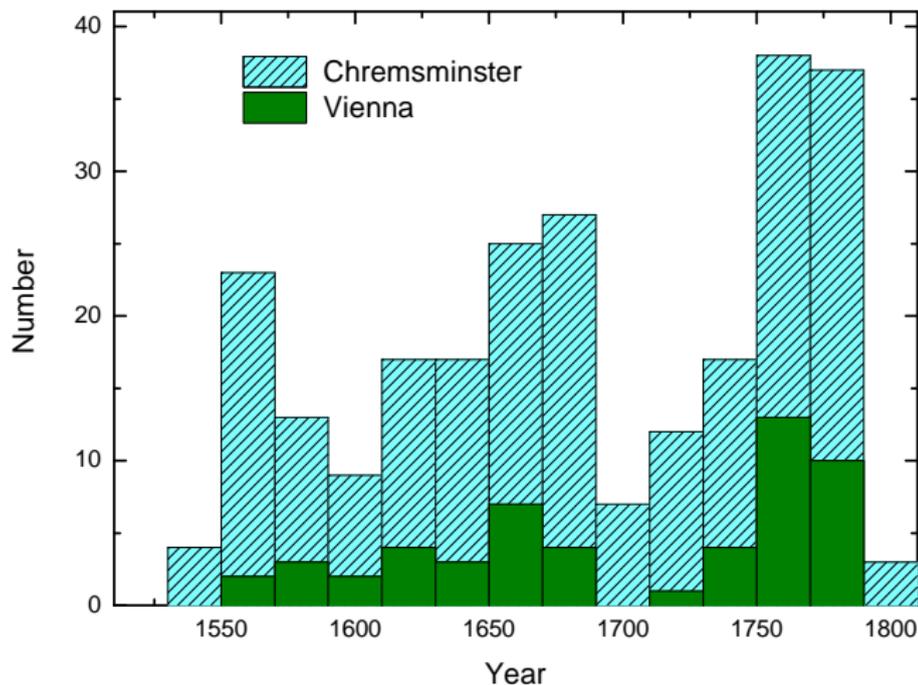
Comparison with the library of the observatory at the university of Vienna



Catalogus Bibliothecae Observatorii Cremifanensis



Catalogus Bibliothecae Observatorii Cremifanensis



Authors by date of birth

Ptolemaeus (100-175) Diophant (um 160) Apollonius (262-190) Archimedes (287-212) Euklid (360-280) Eutocius (480-540) Alfraganus (-861) Albategnius (858-929) Alchabitius (967-) Sacrobosco (1195-1256) Burchardus (-1285) Peuerbach (1423-1461) Regiomontanus (1436-1476) Kopernikus (1473-1543) Gauritio (1476-1558) Stöffler (1452-1531) Pflaum () Schöner (1477-1547) Scheubel (1494-1570) Honter (1498-1549)

Camerarius (1500-1574) Dryander (1500-1560) Cardano (1501-1576) Garcaeus (1502-1558) Taisnier (1508-1562) Gemma (1508-1555) Mizauld (1510-1578) Reinhold (1511-1553) Santbech (-1564) Ramee (1515-1572) Beyer (1516-1577) Peucer (1525-1602) Stadius (1527-1579) Wickner (1528-1564) Dasypodius (1530-1600) Simi (1530-1564) Moleti (1531-1588) Rockenbach (1536-1611) Clavius (1537-1612) Vieta (1540-1603) Angelis (1542-1620) Tycho Brahe (1546-1601) Maestlin (1550-1631) Rensberger (1550) Libavius (1555-1616) Magini (1555-1617) Origanus (1558-1628) Gellibrand (1561-1630) Pitiscus (1561-1613) Lansberge (1561-1632) Longomontanus (1562-1647) Galilei (1564-1642) Chiaramonti (1565-1652) Blancanus (1566-1624) Uffenbach (1566-1636) Aguilon (1567-1617) Argoli (1570-1657) Metius (1571-1635) Kepler (1571-1630) Bayer (1572-1625) Scheiner (1573-1650) Liceti (1577-1657) Ritter (1579-1641) Schiller (1580-1627) Bettinus (1582-1657) Petau (1583-1652) Gregorius (1584-1667) Mydorge (1585-1647) Habrecht (1589-1633) Welper (1590-1664) Baranzano (1590-1622) Gassendi (1592-1655) Schickard (1592-1635) Leotaud (1595-1672) Wilhelm (1595-1669) Eichstaedt (1596-1660) Riccioli (1598-1671)

Bartsch (1600-1633) Kircher (1602-1680) Schyrlaus (1604-1660) Boulliau (1605-1694) Renieri (1606-1647) Hedraeus (1608-1659) Schott (1608-1666) Honold (1609-1690) Vogler (1610-1676) Hevelius (1611-1687) Tacquet (1611-1660) Deusing (1612-1666) Perrault (1613-1688) Coccaeus (1615-1672) Renaldini (1615-1679) Wallis (1616-1703) Streete (1621-1689) Dechalles (1621-1678) Welsch (1624-1677) Morisani (1625) Cassini (1625-1712) Weigel (1625-1699) Huygens (1629-1695) Sturm (1635-1703) Le Clerc (1637-1714) de la Hire (1640-1718) Zahn (1641-1707) Newton (1643-1727) Flamsteed (1646-1719) Leibniz (1646-1716) Plumier (1646-1704) Simonelli (1650-1710) Scheffelt (1652-1720) Bernoulli, Jakob (1655-1705) Fontenelle (1657-1757) Gregory (1659-1708) Bianchini (1662-1729) Gauppius (1667-1738) Marinoni (1667-1755) Junius (1670-1726) Keill (1671-1721) Agricola (1672-1738) Manfredi (1674-1739) Cassini (1677-1756) Wolff (1679-1754) Kegler (1680-1746) Hadley (1682-1744) Poleni (1683-1761) Reaumur (1683-1757) Briga (1686-1749) Zwicker (1686-1740) s'Gravesande (1688-1742) Rost (1688-1727) Crivelli (1690-1743) Weidler (1691-1755) Musschenbroeck (1692-1761) Penther (1693-1749) Perriere (1694-1776) Thomas (1694-1767) Belidor (1697-1761) Maire (1697-1767) Bouguer (1698-1758) Maupertuis (1698-1759)

Polack (1700-1771) Hallerstein (1703-1774) Belgrado (1704-1789) Gujot (1706-1786) Gallon (1706-1775) Riccati (1707-1775) Jügel (1707-1786) Euler (1707-1783) Lewis (1708-1781) Maraldi (1709-1788) Zanotto (1709-1782) Cametti (1711-1789) Bosovich (1711-1787) Hell (1713-1789) Caille (1713-1762) Clairaut (1713-1765) Audiffrenis (1714-1794) Cassini de Thury (1714-1784) Monnier (1715-1799) Kästner (1719-1800) Liesganig (1719-1799) Savarien (1720-1805) Fixmillner (1721-1791) Chappe (1722-1769) Mako (1723-1793) Helfenzrieder (1724-1803) Frisi (1728-1784) Stättler (1728-1797) Barth (1729-) Lalande (1732-1807) Sajnovics (1733-1785) Priestley (1733-1804) Cotte (1740-1815) Bernoulli (1744-1807) Denicke (1757)

Kopernikus-Kepler-Galilei

Kopernikus *Copernicus de revolutionibus orbium caelestium*, Fol.
banned 1616 unbanned if corrected 1620
Astronomia instaurata, Fol.

Kepler *Keplerus de noua stella serpentarii*, in 4
Mysterium cosmographicum, Fol. *Harmonia mundi*, Fol.
Epitome Astronomiae Copernicanae, in 8
banned 1619
Kepler Tabulae Rudolphinae, Fol.

Galilei *Systema Cosmicum*, in 4, enthält auch *Discursus Et
Demonstrationes Mathematicae : circa duas novas scientias*
banned 1633 neutralized version 1744
Galilaei Dialogi de Systemate mundi, in 8

all books teaching earth's motion etc unbanned 1757

but the books remained on the index until 1835

M. A. Finocchiaro in *Largo campo di filosofare : Eurosymposium Galileo 2001* Eds.

Carlos Sols Santos, *Fundacion Canaria Orotava*, 2001, Seite 491-511

Kopernikus-Kepler-Galilei

Library	Kopernikus	Kepler	Galilei
Observ.	2	8	2
Vienna	3	7	1
Jungius	1	16	8
Hook	1	12	4
Guldin	3	10	3
Huygens	2	10	2
Flamsteed	1	0	7
Newton	0	0*	0*

Table: Number of books by different authors in several libraries. * Newton owned only Gassendi's *Institutio astronomica* of 1682, where Galilei's *Nuntius Siderus* and Kepler's *Dioptrice* is contained.



Book	First edition	Chrems-minster	Vienna
<i>De revolutionibus</i>	1543	1665	1615*
<i>Astronomia nova</i>	1609	CARD INDEX	1609 [†]
<i>Epitome Astronomiae</i>	1618	WA	1618 [†]
<i>Dialogo</i>	1632	1663	1718 [†]
<i>Principia</i>	1686	1744	1714 [†]

Table: Comparison of the year of first publication of scientific highlights and dates of presence in the libraries of the observatories. * **Collegij Societatis Jesu Viennae Catalogo inscriptus A^o 1615**, [†] stamp of Hell's era: **Observatorium Universitatis Vindobonensis C: R:**

Lit.: H. W. Duerbeck, Book Review in J. Astr. Data 11, 4 (2005) points to the information on title pages of the books of the observatory Vienna

I thank

- **Fr. Petrus Schuster for access to the monastery library**
- **Fr. Amand Kraml for access to the observatory and helpful discussion concerning the observatory and its history**
- **Fr. Altman Pötsch for helpful discussion on calendar problems and church architecture**