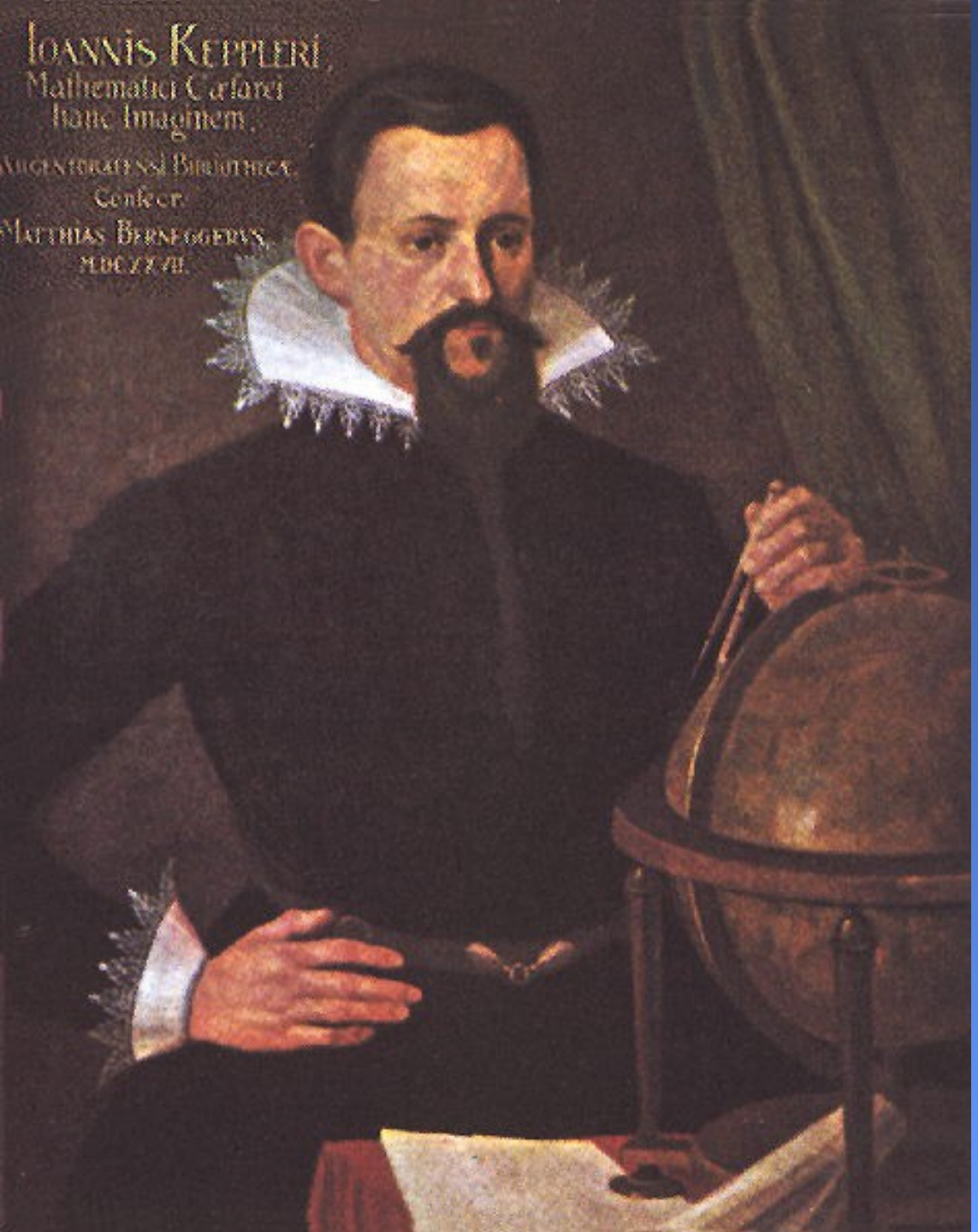


Update on the 400th Anniversary of

Kepler's *Astronomia Nova*

T. J. Mahoney

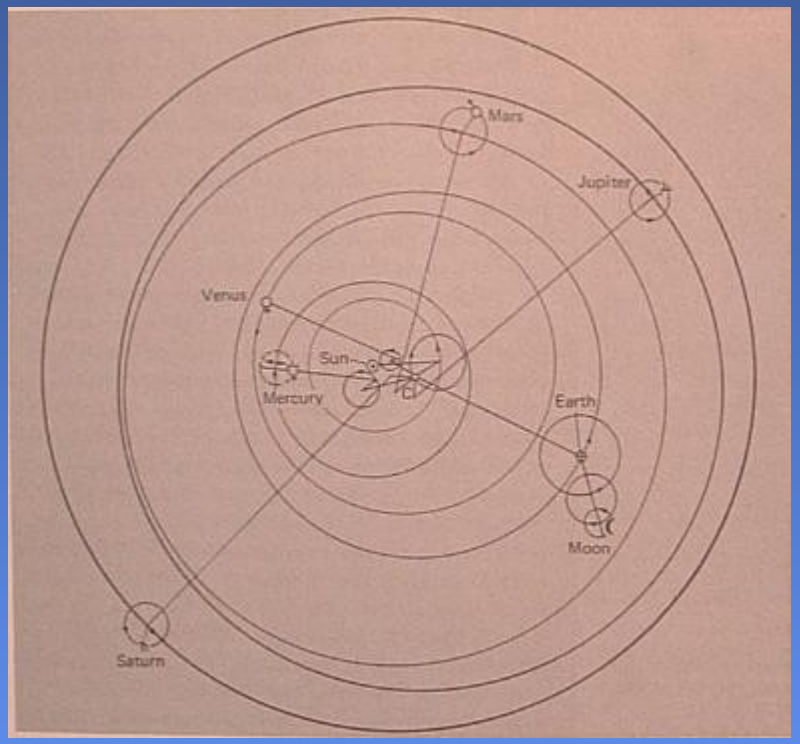
Instituto de Astrofísica de Canarias

Why Kepler?

- 2009 marks the 400th anniversary of the publication of ***Astronomia Nova*** (which contained the first two laws of planetary motion) – the most important scientific publication prior to Newton's ***Principia***
- Kepler, with his tolerant views on religion, is a positive example of unity to a much religiously troubled 21st century

Kepler's Problem: The real Copernican model

- Planets orbit the centre of motion of the Earth's orbit – NOT the Sun!
- Predictions of planetary positions not much better than with using the Ptolemaic system



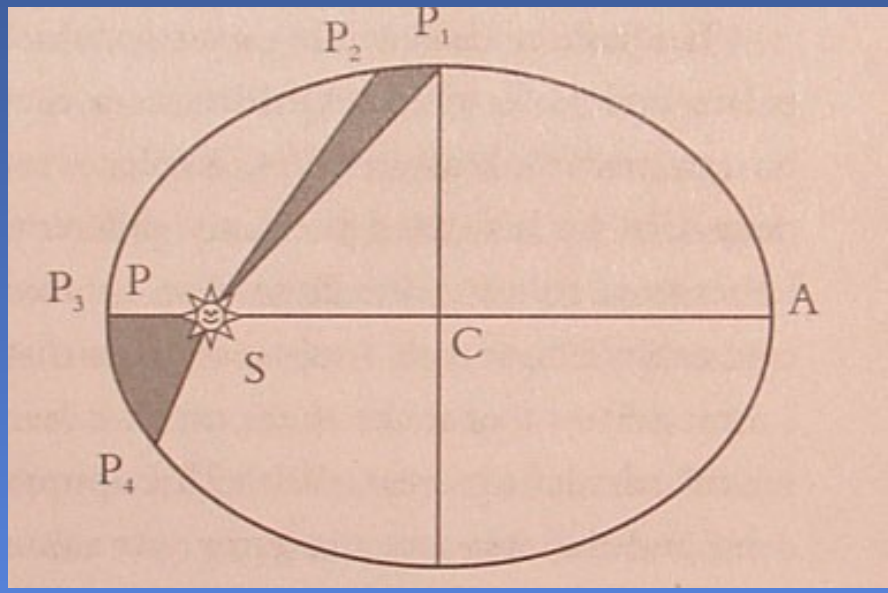
Kepler and Tycho at Benatky

- Kepler joins Tycho at Benatky Castle (near Prague)
- The collaboration lasted only 20 months (until Tycho's death in 1601)

Planetary motions: Kepler' first two laws (in the correct order)

Kepler discovered his first two laws in the following order:

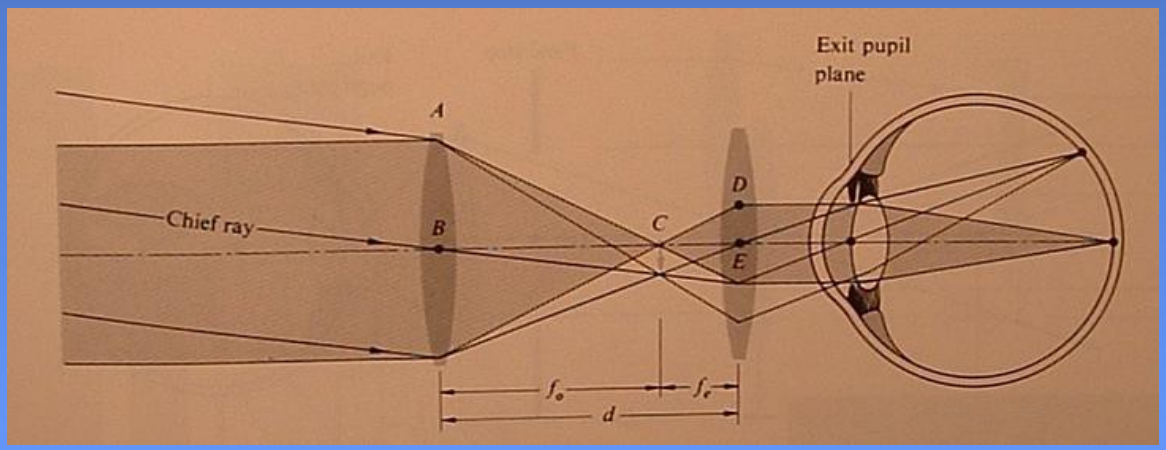
1) **The radius vector sweeps out equal areas in equal times.**
2) **The planets move in elliptical orbits with the Sun at one focus.**



Kepler resorted to elliptical orbits ONLY because circles didn't work with the equal-areas-in-equal-times law.

Other Kepler Firsts:

- **1604 (*Astronomia pars optica*):**
  - **Discovery of inverse square law of photometry**
  - **First correct explanation of how the human eye works**
- **1611 (*Dioptrice*):**
  - **Invention of the astronomical telescope**
- **1620 (*Epitome Astronomiae Copernicanae*):**
  - **First textbook on heliocentric astronomy**
- **1629: *...admonitio ad astronomos...***
  - **First predictions of transits of Mercury and Venus**



His Finest Hour

- Kepler's Mercury transit prediction was out by a mere 6 hours.
- Brahe's observations and Kepler's laws led to the *Rudolphine Tables* giving a factor 20 improvement in the prediction of planetary positions.

IYA Kepler Task Group

- Membership
  - T. Mahoney (IAC, Chair)
  - D. Koch (NASA *Kepler* Mission)
  - T. Posch (Institut für Astronomie, Vienna)
  - Tapio Markkanen (Univ. Helsinki)
  - S. Bajtlik (Copernicus Astron. Center, Warsaw)
  - R. Fienberg (*S&T*)
  - S. Pompea (NOAO)

IYA Kepler Task Group

- Aim:
  - Raise Kepler's public profile through inreach (telling ***astronomers*** about Kepler), education, outreach
- Means
  - Conferences, public talks, exhibitions, articles, books, radio
- Resources:
  - Bibliography, museums, monuments, TV documentaries, letters, literature & arts

Tasks

- Organize Special Session on Kepler at IAU GA 2009 (Rio de Janeiro)
- Investigate possibility of getting Kepler's correspondence published in English (at an affordable price)
- Investigate commemorate stamps/coins
- Promote Kepler as Astronomy Ambassador

IAU GA 2009 SPS

- Title: ‘Marking the 400th Anniversary of Kepler’s ***Astronomia Nova***
- Letter of Intent now listed on IAU website
- Formal proposal being prepared to deliver by December 2007

Planned Kepler Celebrations 2008/9

- Planned launch of ***Kepler*** Mission in Feb. 2009
- Czech Republic: International symposium in Prague
- Poland: International symposium in Zagan
- Austria: Exhibitions and other activities in Linz, Vienna and Graz
- Germany: Weil der Stadt has plans (German SPoC urgently needed!!)

Kepler 2008: From Tübingen to Sagan

- Organized by University of Zielona Góra & Institute for the History of Science, Warsaw
- Venue: Zielona Góra (22-26 June 2008)

NASA's *Kepler* Mission

- The *Kepler* Mission is a space observatory being developed by NASA.
- It will be solely dedicated to the search for extrasolar planets
- Over 4 years, it will measure the brightness of 100,000 stars, looking for transits of stars by exoplanets

2009: Beginning of the New Journey into the Universe

- Organized by the National Technical Museum of Prague
- Venue: Prague (21-27 August 2009)

But what can astronomy really offer the world in 2009?

- A message of peace through Kepler!

The persecution of Kepler

- Kepler was persecuted for his religious (not his scientific) views:
  - Expelled from Catholic principalities for being a Lutheran
  - Excommunicated from Lutheran community for his Calvinist leanings and his advocacy of the Gregorian (Catholic!) calendar and tolerance towards Catholics

Taking Astronomy to the UN

- The aim of UNESCO (Alarcón, this conference):
  - ‘Build peace in the minds of men through education, the social and natural sciences, culture and communication.’

'Beware that you do not punish an innocent person with exclusion. [...] I know that your adversaries have sinned against love; but that is not my concern. I know that we have to be good to our enemy and to love those who hate us, that is, that we should examine their dictum regardless of their having sinned against love.'

Linz, 11 April 1619

An Aside for IYA2009

- Astronomy begins when we leave the telescope and start to puzzle over what we have seen there.
- Astronomy is our attempt to ***understand*** the Universe rather than just ***look*** at it.
- We must offer the public more than mere celestial tourism.

Kepler is astronomy's best ambassador to the UN!

Conclusions

- Kepler was:
  - The father of modern astronomy because:
    - He discovered the laws of planetary motion
    - He laid the foundations of astronomical optics
    - He invented the first scientifically useful telescope design
- He has been shamefully ignored by the IAU in its planned IYA2009 celebrations
- Kepler must be given the recognition he so thoroughly deserves by the world's astronomers and astronomy communicators in 2009!

Mysterium Cosmographicum: Towards a new cosmology

- **Why were the planets spaced as they were in order of distance from the Sun?**
- **Had God arranged the Universe in accordance with the perfect precepts of geometry?**
- **Could we discover the true cosmic harmony?**