

The Astronomers (who also did other things)

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Nicolaus Copernicus (1473-1543)

- another polymath: he got his doctorate in canon law, but also worked in astronomy, mathematics, physics, classics, administrator, diplomat, economics.
- studied in Poland and Italy, but mostly lived and worked in what is now Poland from 1503 on.
- as an astronomer he made planetary observations, compiled into a set of tables
- he promoted a version of the heliocentric hypothesis
c. 1514 he circulated a manuscript (Commentariolus) among his friend describing the basis of his ideas, which he then spent the next two or three decades working out
- his final work De revolutionibus orbium coelestium (On the revolution of the celestial spheres) was mostly completed by 1533 or so, but publication was delayed until around the time of his death in 1543.

- He presented a Ptolemaic-style model (circular orbits modified by deferents & epicycles, etc) with the Sun at the centre and the planets (in the order they actually are), orbiting the sun. (2)
- he also used various refinements of the Ptolemaic model developed by al-Tusi and other Islamic astronomers
- using a heliocentric allowed for a simpler model overall, because things like retrograde motion of the planet could be explained by the Earth moving along its orbit.
- very sophisticated of all the mathematical astronomy known at the time
- The book, once published, attracted a lot of criticism, for its use of a heliocentric hypothesis.
(Mostly from Protestants initially, but later also from Catholics.)

Galileo Galilei (1564 - 1642)

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- astronomer, physicist, mathematician, engineer

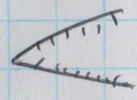
As a physicist, he was one of the pioneers of doing quantitatively oriented experiments. eg

- timing the rolls of balls down an incline
- observed that the period of a pendulum depends on the length of the pendulum, but not on the amplitude

As an astronomer, he gave priority to observations, especially with telescopes of which one of the earliest users in astronomy. (from 1608)
(He discovered the four large moons of Jupiter, ~~that~~ in 1610, which pushed him further into favouring the heliocentric hypothesis.)

Very competent applied mathematician, eg he used geometry to analyze the strength beams, also anticipated various modern ideas (eg cardinality of sets).

As an engineer, besides developing a lot of theory, he also developed a "geometric & military compass" which was sold with considerable success from 1597 on. (Two rulers hinged together.)



Various tricks allowed one to do computations for proportions, interest, etc.

Wrote a number of articles & treatises, of which two are particularly important:

(4)

Dialogue concerning the two chief systems (1632)

- a debate between proponents of the Ptolemaic & Copernican hypotheses [the advocate of the Ptolemaic is "Simplicio"]

- This got him into trouble with the Inquisition, and resulted in his being put in house arrest for most of the rest of his life.

Dialogue concerning two new sciences (1638)

- strength of materials
- dynamics (mechanics)

Both dialogues have a lot of mathematics, geometry, and ideas verging infinitesimal analysis of motion.