TO THE SOURCES OF MODERN SCIENCE .....

EMERGENCE

GALILEO

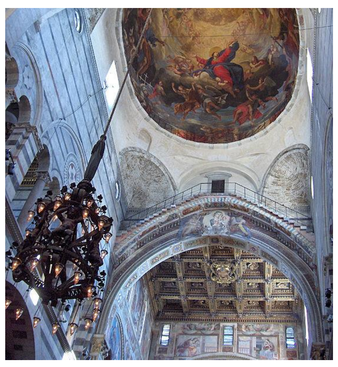
Pise 1564 - Arcetri 1642

"Father of the experimental method" and "Founder of modern science", are expressions very often associated with the name of Galileo. He imposed himself strikingly on this pivotal period in the history of science and was an experimenter and an observer out of the ordinary.

"il Grande libro della Natura e' scritto nel linguaggio della matematica, e non possiamo capirla se prima non ne capiamo i simboli"

« The Great Book of Nature is written in the language of mathematics, and we cannot understand it without first understanding the symbols »

Galileo was born in 1564 into rather well off and cultivated family. At the age of 19 he met a student of Tartaglia who transmitted his admiration for Archimedes and Euclid to him. He abandoned his medical studies for mathematics. From then on, he was enthralled by science and technology.

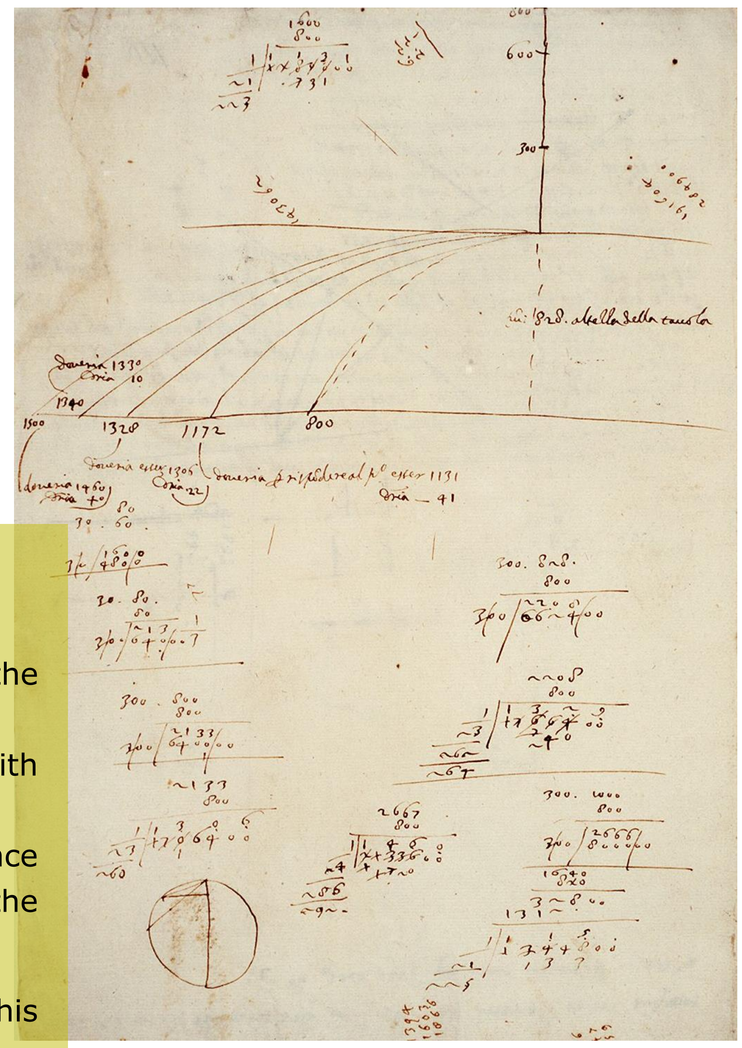


His first significant result in 1583 was to find the formula for the period of oscillation of a simple pendulum, by using his own pulse, to measure the small oscillations of the large chandelier in Pisa Cathedral (above). $T = 2\pi\left(\sqrt{\frac{l}{g}}\right)$ **where** l **is the length of the pendulum and** g **the gravitational constant at the Earth's surface.**

His measurements were often of limited accuracy and he probably didn't make all the experiments that his first biographers have assigned to him. Above all, it was his exceptional intuition of the laws of nature that guided him.

«The distances travelled by a heavy body are between them as the square of time»

$y = 0,5gt^2$

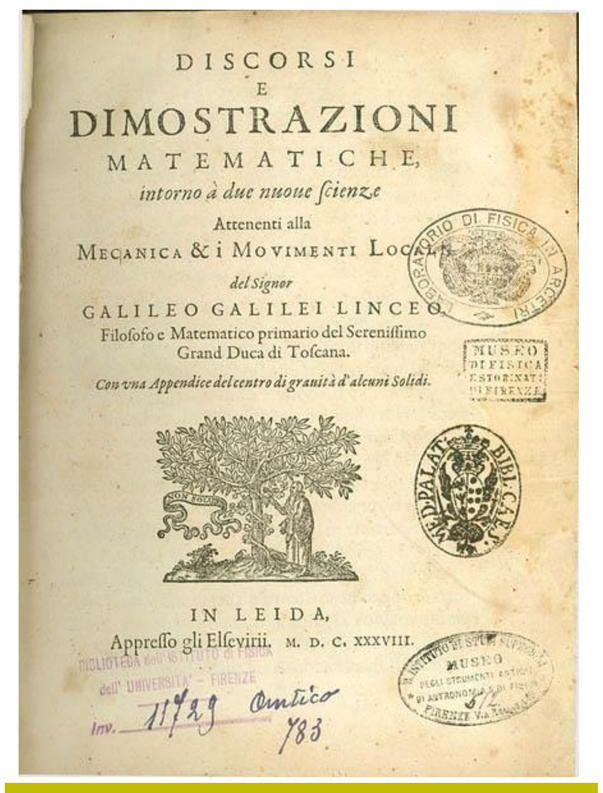


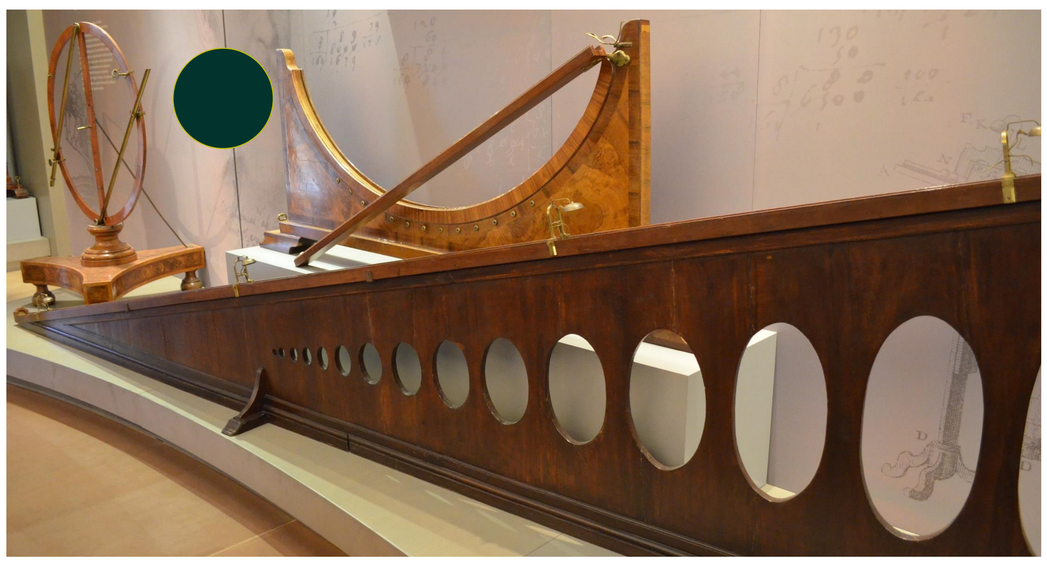
METHOD

APPLICATION TO FALLING BODIES

1. He distinguished the factors influencing the falling motion and prioritized them
2. He set out a hypothesis: speed increases with the time of fall.
3. He drew a mathematical law from it: distance travelled is proportional to the square of the time of travel. $D = \frac{1}{2}gT^2$
4. He developed an experiment to compare this law to reality.

Proportional compass of Galileo (Galileo Museum in Florence): a true handheld calculator !





Inclined plane to study the fall of a ball

He published little, through fear of the conflicts and controversy that he would undoubtedly provoke. The synthesis of his work on mechanics is his "Discourses and mathematical demonstrations concerning two new sciences" 1638

His "Dialogue Concerning the Two Chief World Systems" published in 1632, was the straw that broke the camel's back for the church. He was condemned and had to recant his ideas.

The trial of Galileo

"Eppur si muove"

«And yet it turns »

« If I have seen further it is by standing on ye shoulders of Giants »

Sir I.Newton in 1676 referring to Galileo and Kepler

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