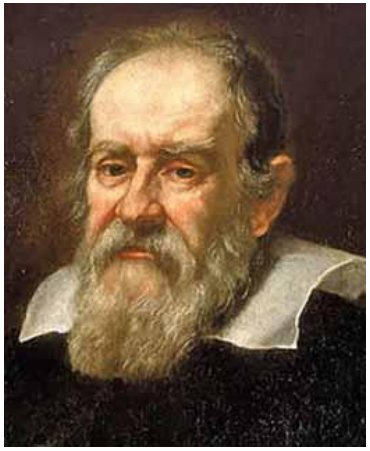
Famous Scientific Observations, Experiments and Demonstrations

#1 Equality of falling objects

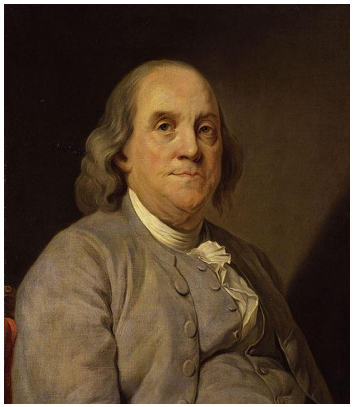
Galileo Galilei, early 1600s

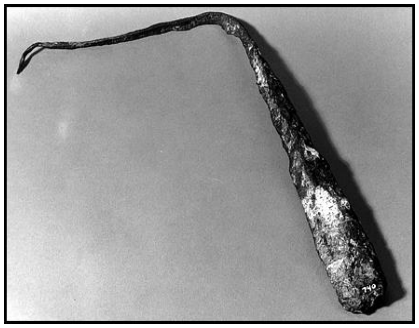


- **Common wisdom (Aristotle):**
  heavier objects fall faster than lighter ones.
- The story is now legendary: Galileo **dropped two different weights (balls)** from the top of the Leaning Tower of Pisa and **showed them landing at the same time**.
- **Result:** while *losing his job* as a mathematics professor at the University of Pisa for establishing a new fact, Galileo became famous throughout the continent…
- **Demonstration repeated:** Apollo astronauts dropped a feather and a hammer on the moon, again demonstrating Galileo's equality of falling bodies. This was possibly the "most watched experiment" of all time…

#2 Kite experiment

Benjamin Franklin, 1752





- Franklin proposed an experiment to prove that **lightning is electricity** by *flying a kite in a storm* that appeared capable of becoming a lightning storm.
- According to the legend, Franklin kept the string of the kite dry at his end to insulate him while the rest of the string was allowed to get wet in the rain to provide conductivity. A key was attached to the string and connected to a Leyden jar (an early form of capacitor), which Franklin assumed would accumulate electricity from the lightning.
- **"…the sameness of the electrical matter with that of lightning completely demonstrated."**
- Franklin's electrical experiments led to his **invention of the lightning rod**.

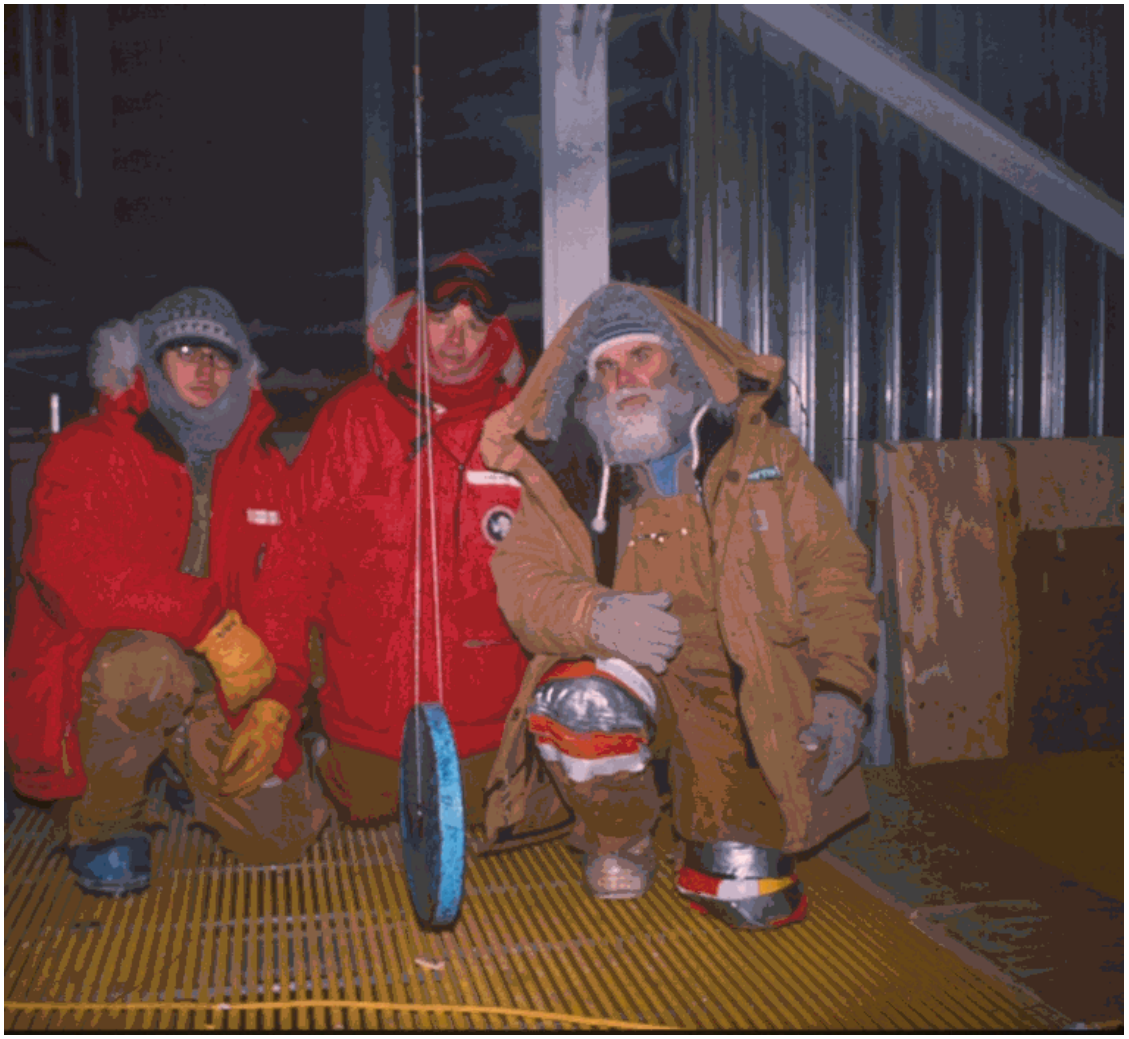
#3 Foucault's Pendulum

Leon Foucault, 1851

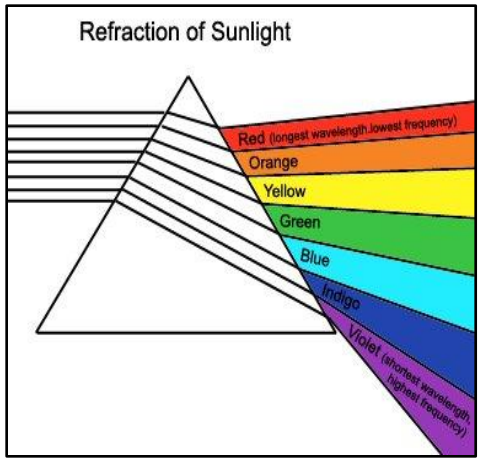
- **Demonstration showing that the Earth revolves on its axis.**
- A 62-pound iron ball was suspended from 220 feet long steel wire attached to the dome of the Panthéon and set in motion. A marker extending from the ball barely touched a circle of damp sand underneath.
- **Common wisdom:** the pendulum will *trace the same places* over and over again.
- **In reality**, the **pendulum appeared to shift positions** leaving a slightly different trace with each swing.
- **The reason: the Earth** and therefore the floor **was rotating**!

South Pole Foucault Pendulum

Winter 2001

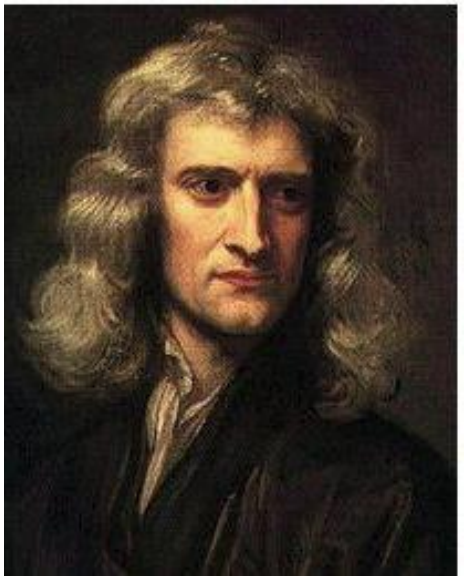


A Foucault Pendulum at the South Pole was determined to have a period of 24 hours, ± 50 minutes. The rotation of the Earth was in a clockwise direction if looking down from above the South Pole.

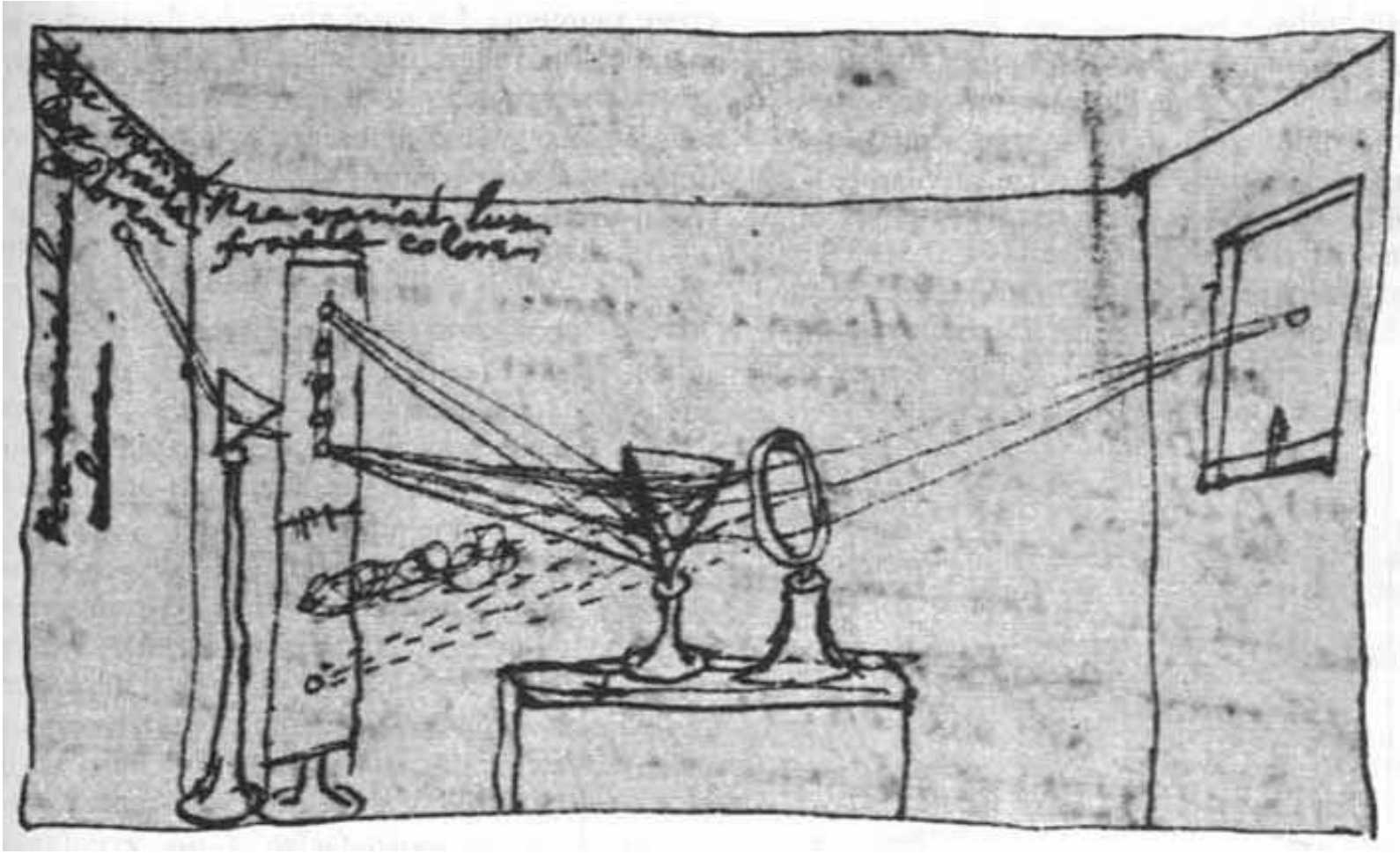


#4 Decomposition of Sunlight

Isaac Newton, 1665



Common (Aristotle) wisdom:
white light is the purest form - colored light must therefore have been altered somehow…

- Newton **shined a beam of sunlight through a glass prism** and showed that it decomposed into a **spectrum** cast on the wall – therefore all the colors were together in the sunlight.
- He thought he then should be able to combine the colors of the spectrum and make the light white again: he placed another prism upside-down in front of the first prism. The band of colors combined again into white sunlight.
- Newton was the first to prove that **white light is made up of all the colors that we can see**.

A drawing 23 years old Isaac Newton made of the prism experiment he conducted in his dorm room in Cambridge.