



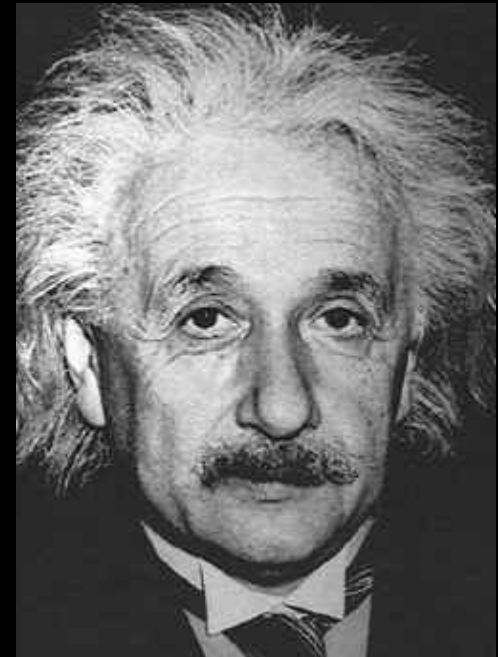
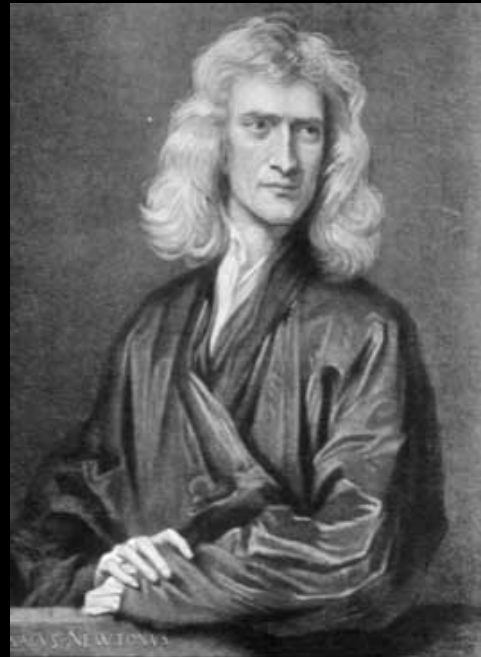
The Making of Method

A Comparative Study of Early Optical and Gravitational Wave Astronomy

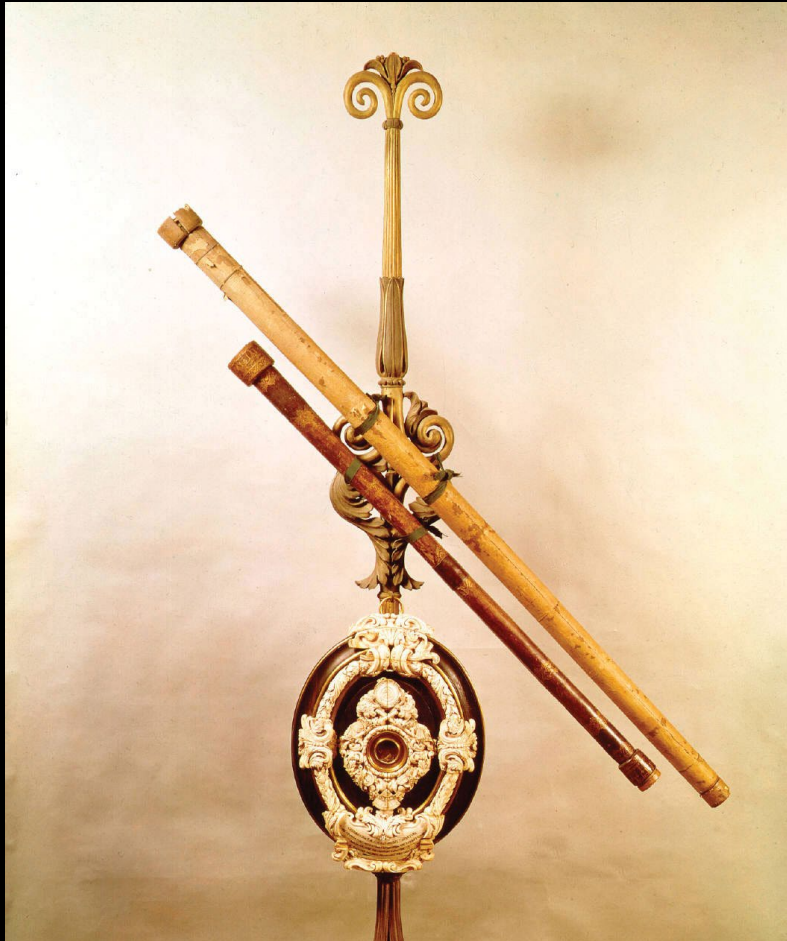
Maria Stokes
University of Utah



The Narrative



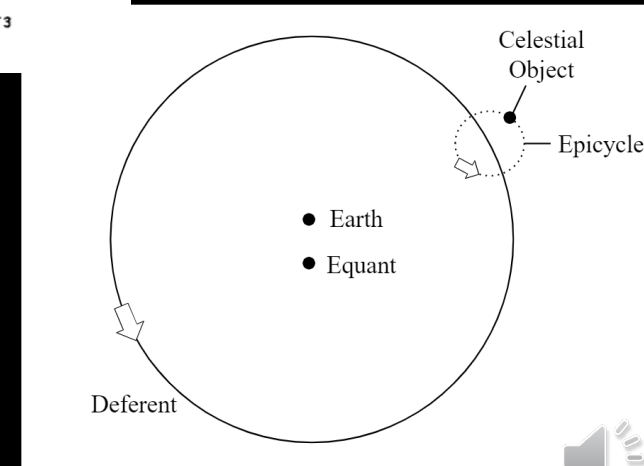
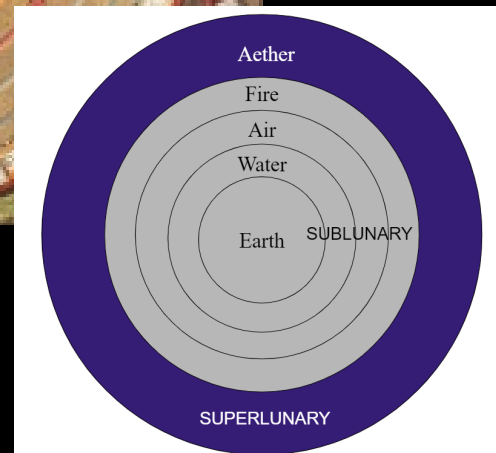
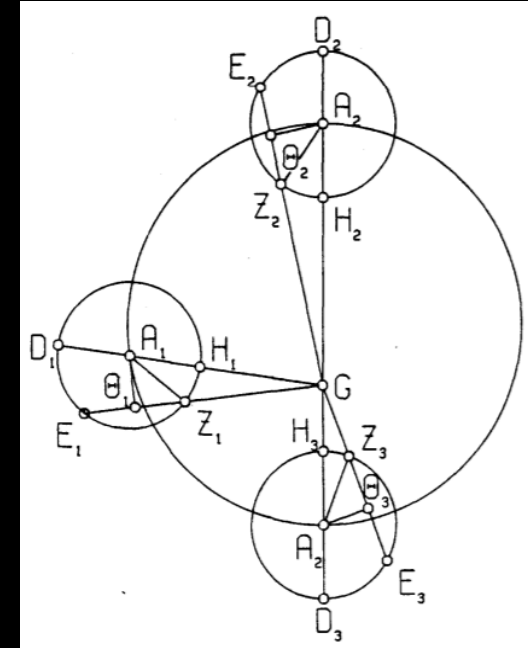
Two Instruments



Sources: Institute and Museum for History of Science, Florence & LIGO Scientific Collaboration, Livingston

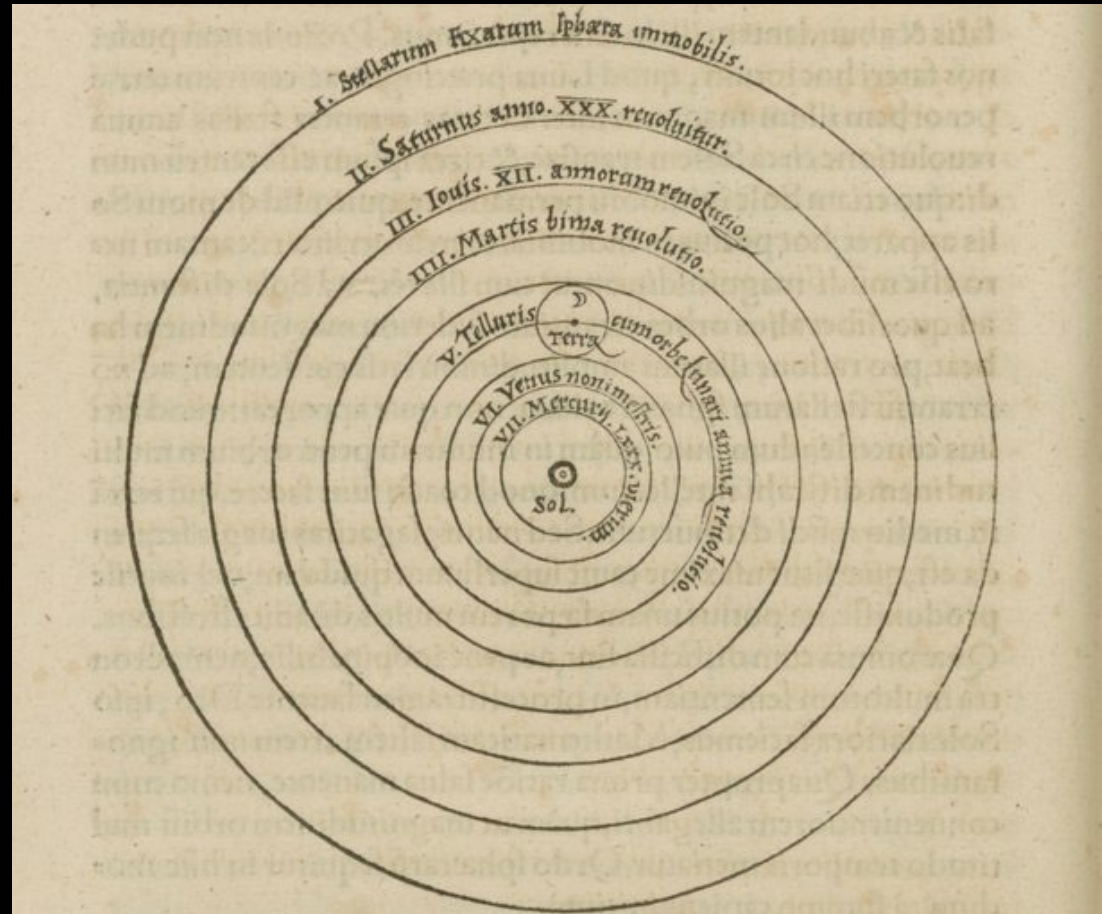


Case One: First Theory – Aristotelian/Ptolemaic Cosmos



Sources: Drake's *Discoveries and Opinions of Galileo* & Ptolemy's *Almagest*

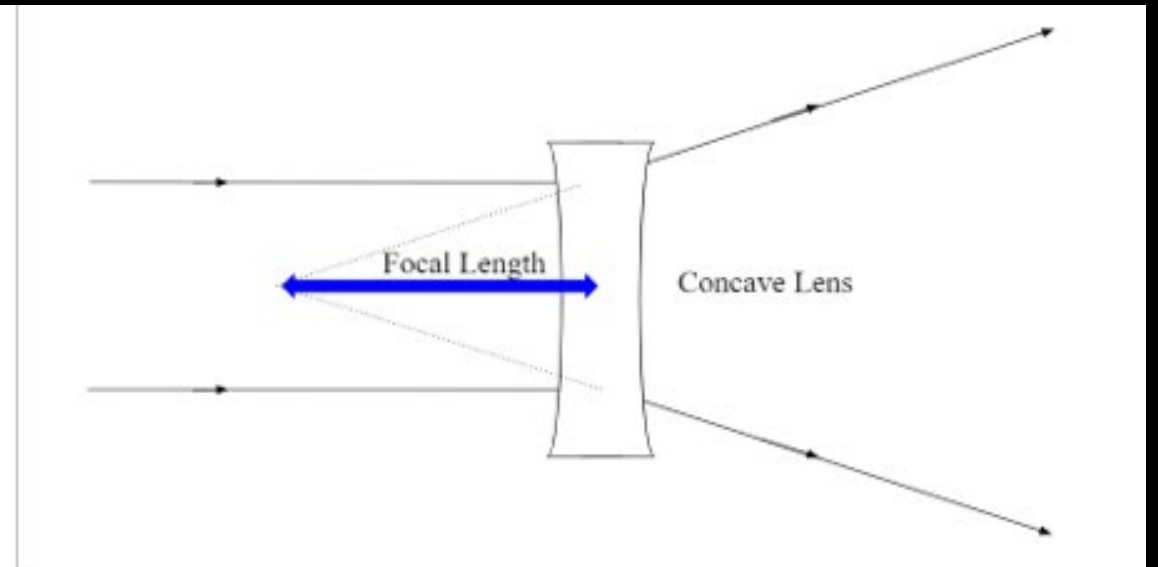
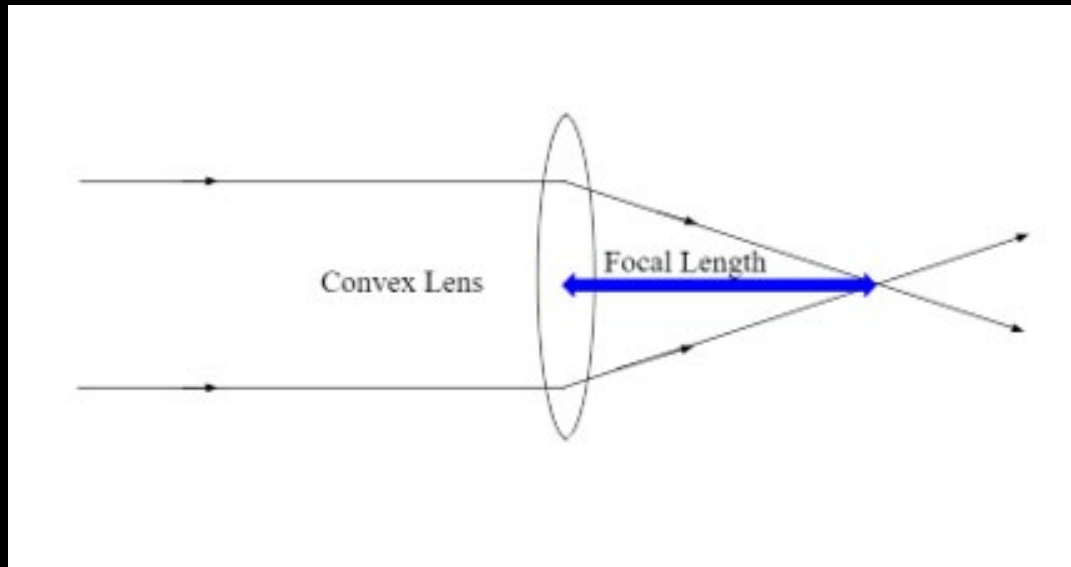
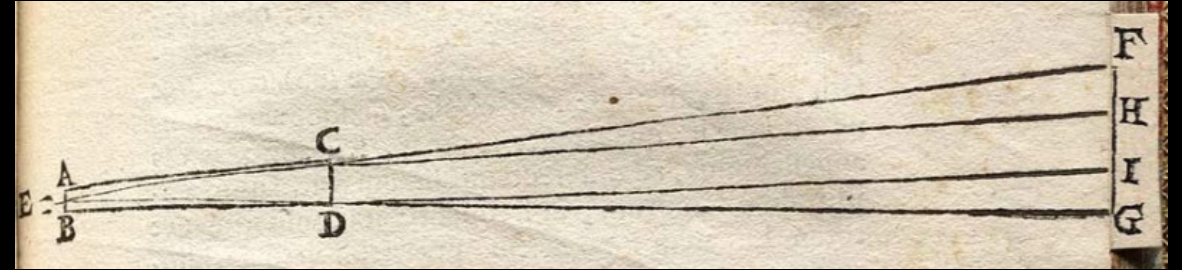
Case One: Second Theory – Copernican Cosmology



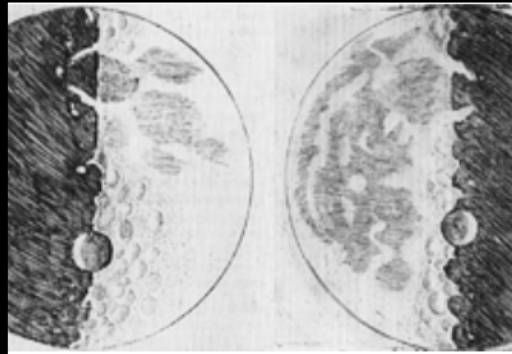
Case One: Technology

- Magnification:

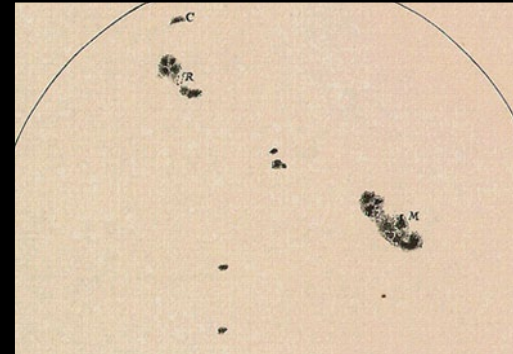
$$M = -\frac{f_{\text{objective}}}{f_{\text{ocular}}} = -\frac{980 \text{ mm}}{-50 \text{ mm}} = 20$$



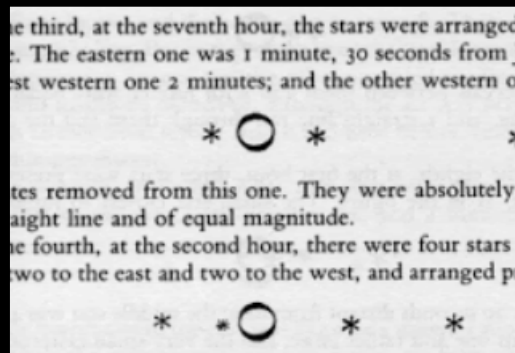
Case One: Observations



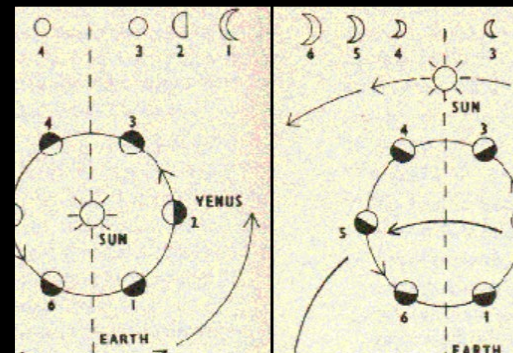
The Moon's
Craters



Sunspots



Galilean Moons



Phases of Venus

Sources:
Galileo 1609-1642



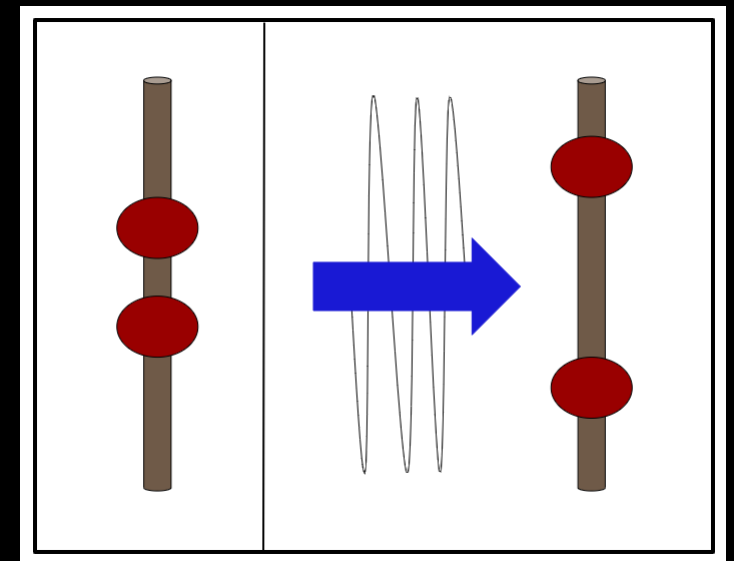
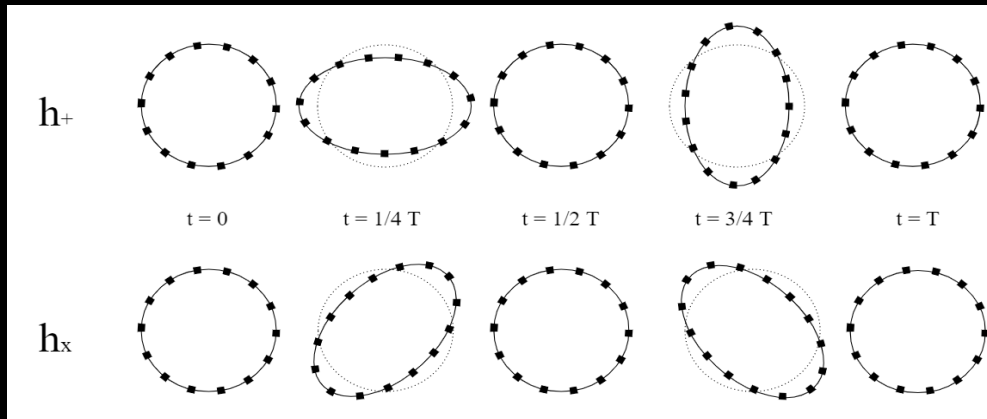
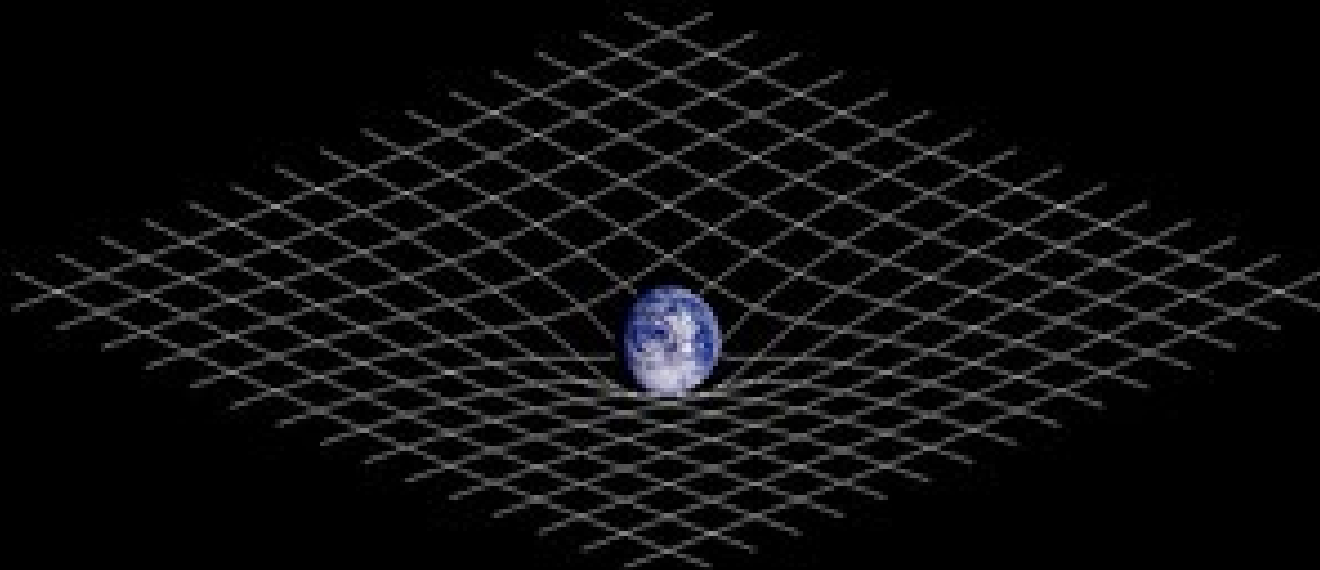
Case Two: First Theory – Newton's Law of Universal Gravitation



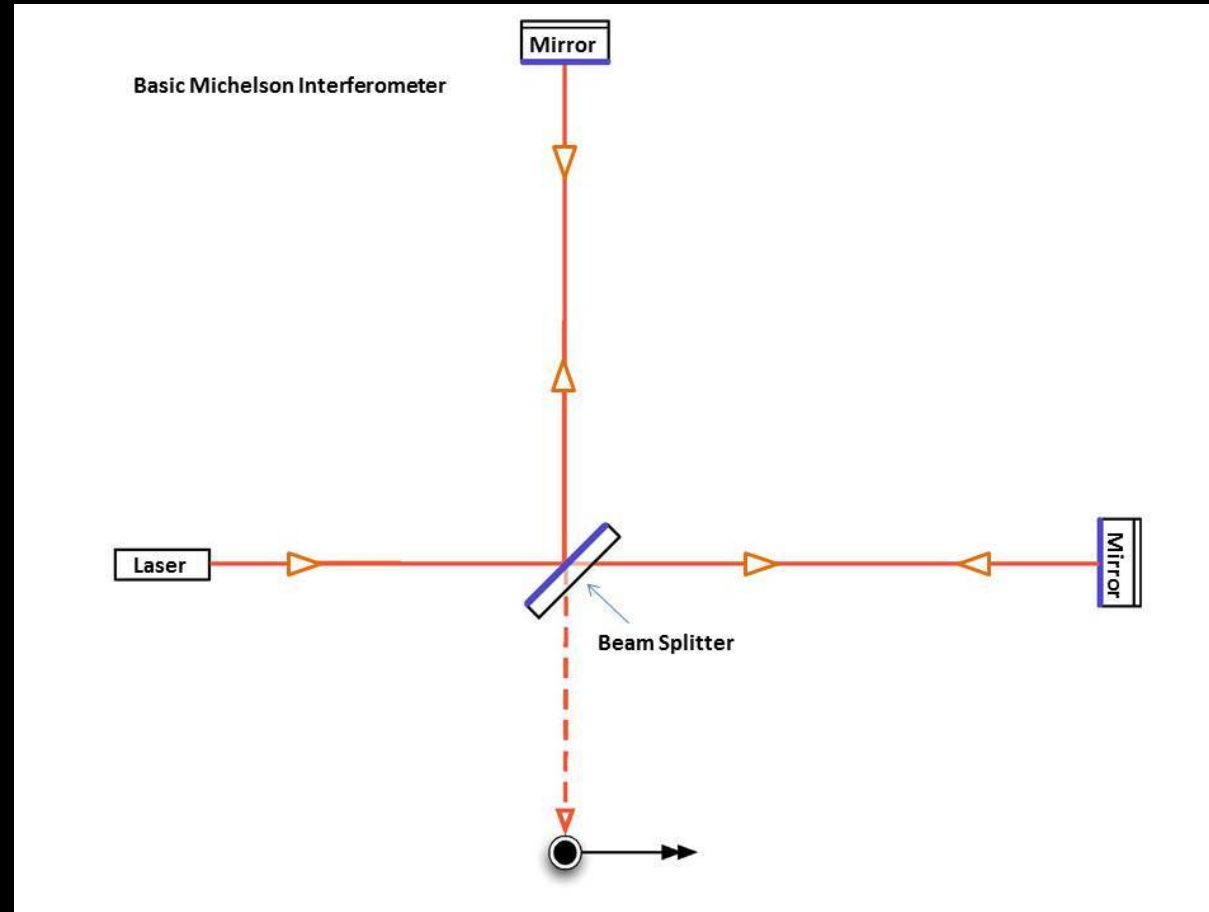
$$\underline{F} = - \frac{G \, m_1 m_2}{\underline{r^2}}$$



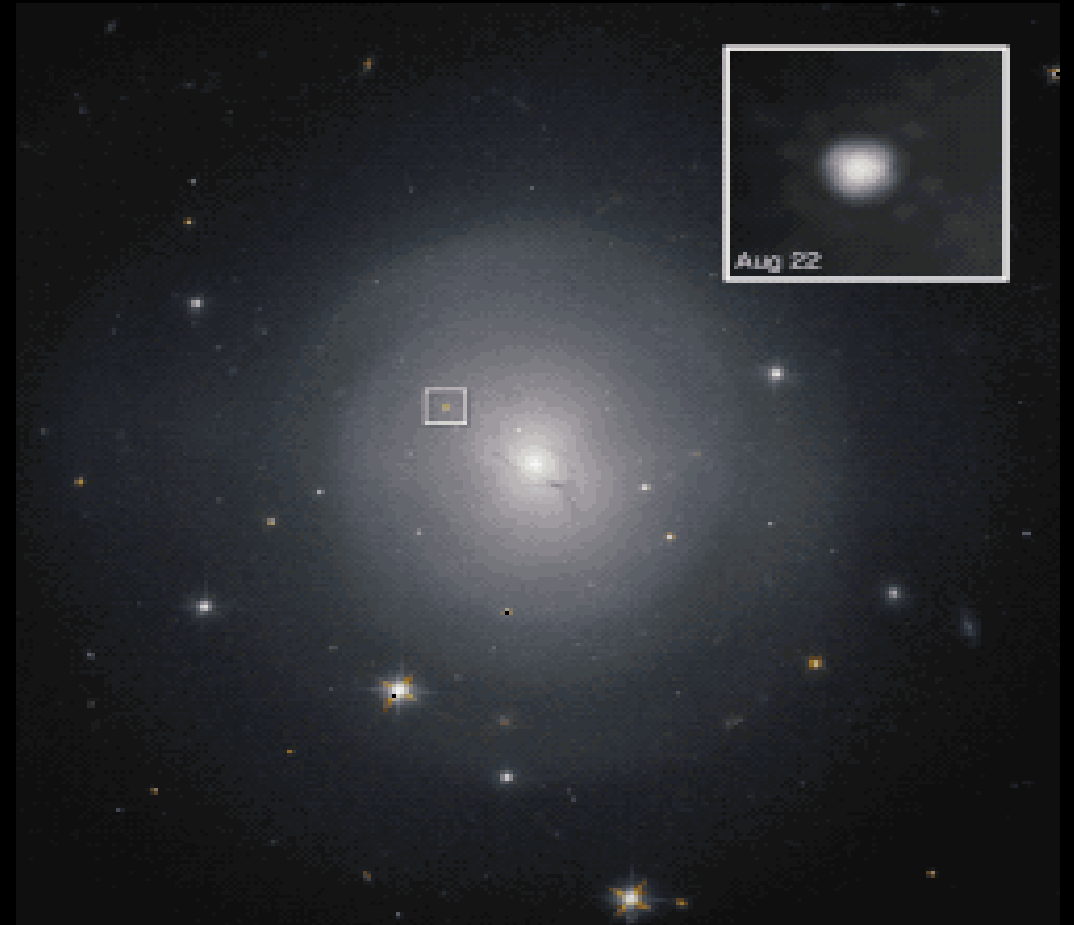
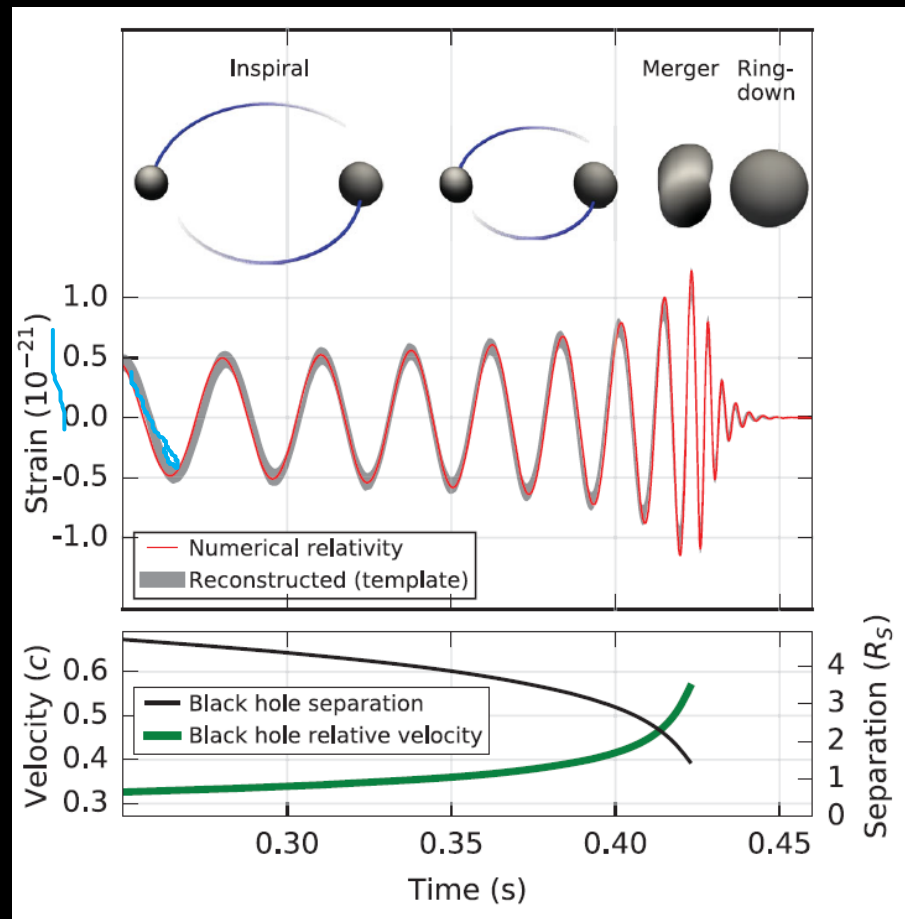
Case Two: Second Theory – Einstein's General Theory of Relativity



Case Two: Technology



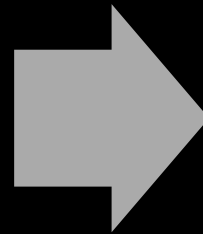
Case Two: Detections



Analysis

Re-Evaluating Frameworks

Inductive & Deductive
Or
Experimental &
Theoretical



Curiosity-Driven
Research



Acknowledgements



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