

Physics 104 Overview

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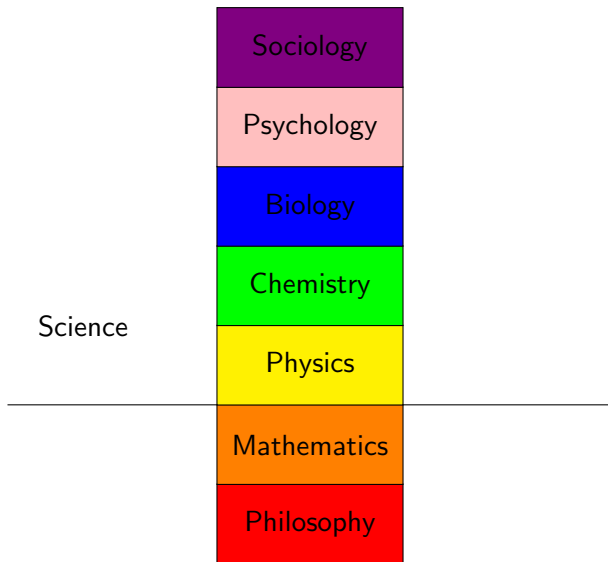
Four big philosophical questions

- ▶ What is there? (Ontology)
- ▶ How can we know anything? (Epistemology)
- ▶ How should we behave? (Ethics)
- ▶ What are the best ways for people to interact? (Politics)

Physics is the science whose subject matter is furthest from people.

- ▶ Sociology cares about people.
- ▶ Psychology goes beyond people to care about brains.
- ▶ Biology goes beyond brains to care about all life.
- ▶ Chemistry goes beyond life to care about all atoms and molecules.
- ▶ Physics goes beyond atoms and molecules to care about the fundamental building blocks of the universe.

Physics is the ground floor of science.

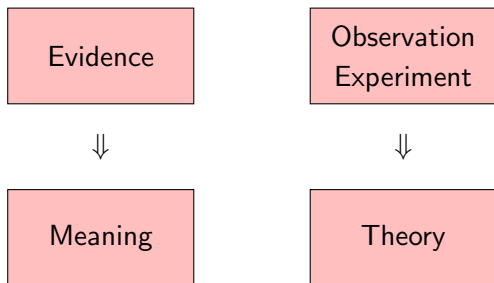


Some important physicists (terribly oversimplified)

Physicist	contribution	when?
?	Warren Field lunar calendar	8000 BCE
?	optics, lenses	2000 BCE
Newton	theory of motion	late 1600s
Young	wave optics	early 1800s
Faraday	electromagnetic induction	1830s
Stokes	fluid dynamics	1840s
Kelvin	thermodynamics	1854
Maxwell	electromagnetic theory	1865
Einstein	better theory of gravity	1915
Noether	symmetry in physics	1918
Heisenberg	quantum mechanics	1925
Feynman	quantum electrodynamics	1940s
Gell-Mann	quarks, standard model	1964, 1995, 2012
Thorne	gravitational waves	2015
Mayor	exoplanets	1992–2020

Meaning from Evidence

In physics, making theories is our way of constructing meaning from evidence.



A natural way for people to process information is to construct meaning from evidence.

Theories in Physics

nonrelativistic quantum

wave
mechanics
Schrödinger
1926

electricity
Coulomb
1800

wave optics
Young
1803

mechanics
Newton
1687

gravity
Newton
1687

nonrelativistic classical

relativistic quantum

QED
Feynman
1949

Electroweak
Weinberg
1967

QCD
Wilczek
1973

quantum
gravity
?

EM Theory
Maxwell
1865

SR
Einstein
1905

GR
Einstein
1915

relativistic classical

Physics 104 Overview

- ▶ 1865 Electromagnetic Theory of Faraday and Maxwell
 - ▶ Electricity
 - ▶ Electric Circuits
 - ▶ Magnetism
 - ▶ Optics (theory of light)
- ▶ 1925 Quantum Mechanics of Heisenberg and Schrödinger
 - ▶ Atomic physics
 - ▶ Nuclear physics