

Philosophy and Science

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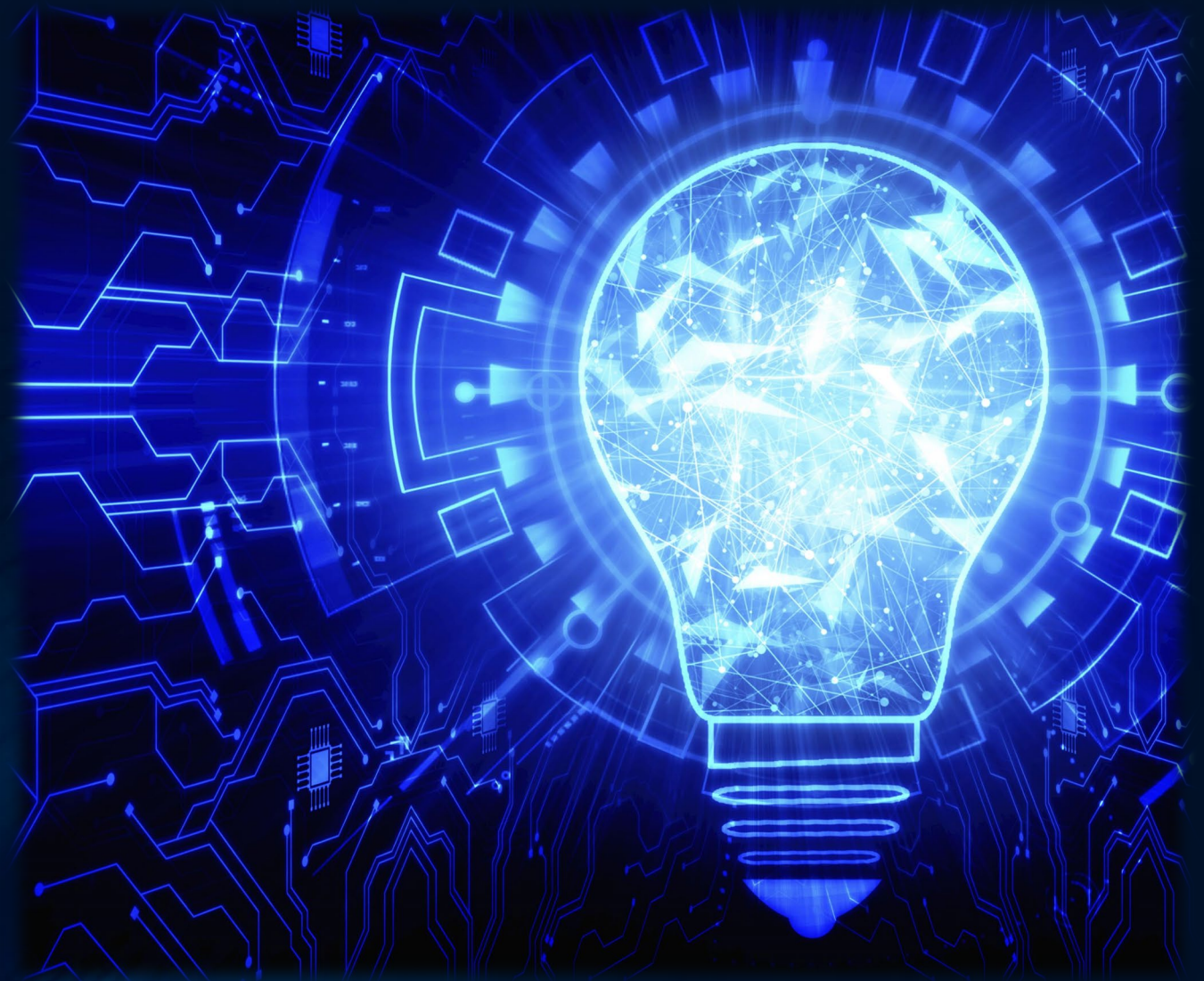
Learning Outcomes

- To describe Philosophy of Science
- To compare Physics, Metaphysics and Mathematics
- To distinguish empirical and rational sciences
- To map sciences into natural, human and social sciences

Inquiries

- What is Philosophy of Science?
- What are the scopes of Physics, Metaphysics and Mathematics?
- What is the difference between empirical and rational sciences?
- What scientific disciplines belong to natural, human and social sciences?

What is Philosophy of Science?



Philosophy

- Western Philosophia
 - Christian, Islamic and secular influences
 - E.g., Aristotle, Kuhn
- Chinese Zhexue
 - E.g., Zhu Xi, Fung Yu-lan



- Indian Darshana
 - E.g. Adi Shankara, Daya Krishna
- Islamic Falsafa and Kalām
 - E.g., Ibn Sina, al-Ghazali



Philosophy of Science

- The study of foundation, beliefs, impacts of science
 - Foundations - metaphysics, epistemology
 - Beliefs - presumptions, expectations
 - Impacts - technological, ethical

Levels of knowledge:

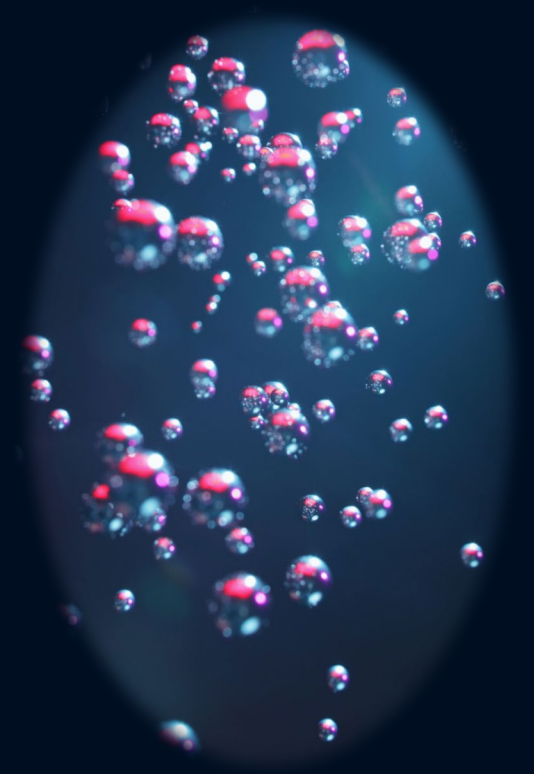
1. 'Vaccines reduce symptoms.'
(Daily experience)
2. 'What are the theories that explain how vaccines work?'
(Science)
3. 'What are the accepted criteria to evaluate theories?'
(Philosophy of Science)

1. 'I use AI to write an email.'
(Daily experience)
2. 'How do we use RLHF to train AI to interact like humans?'
(Science)
3. 'As AI becomes more human-like, how do we differentiate an AI unit and a human person?'
(Philosophy of Science)

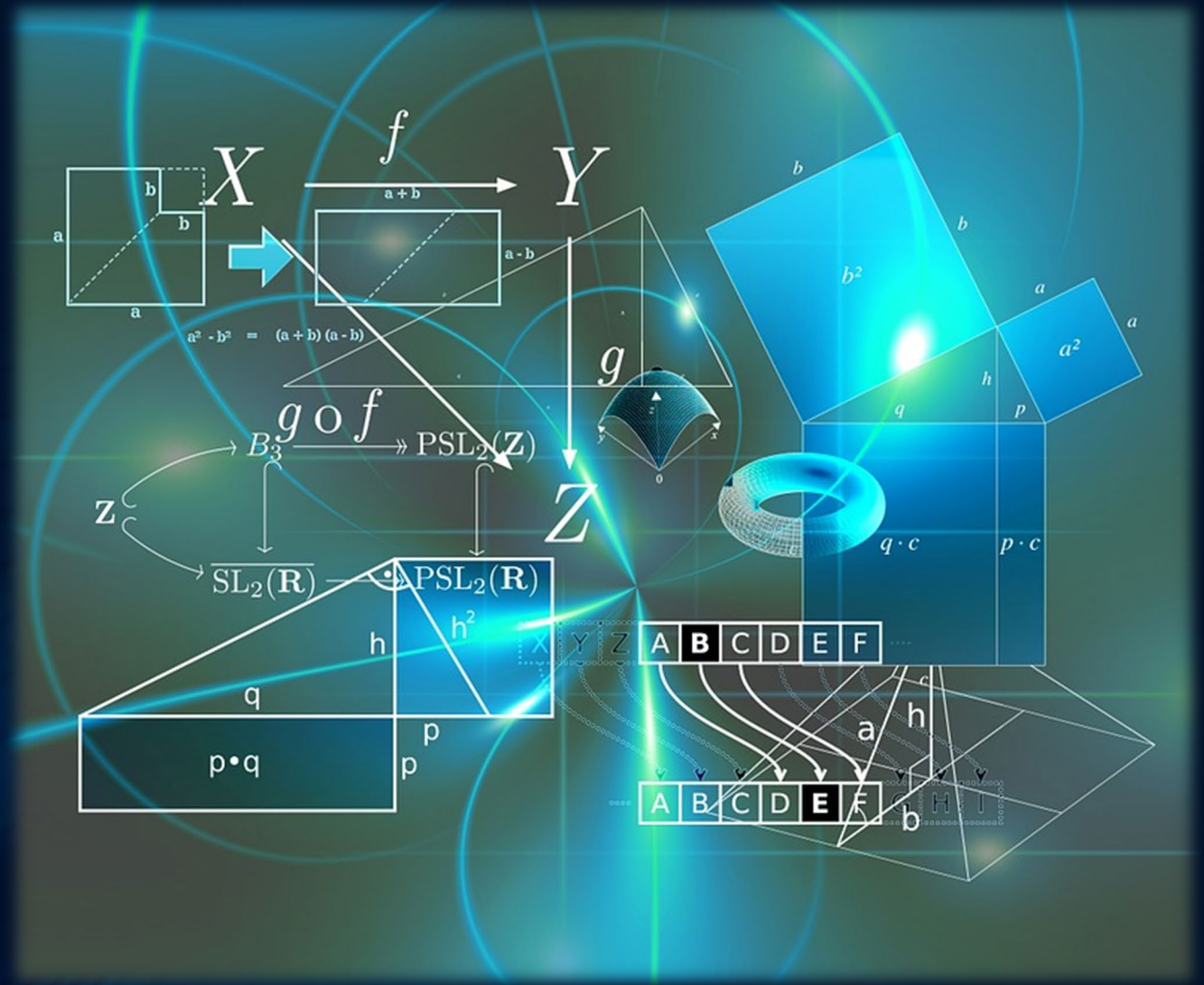
1. 'Babies are born with certain features.'
(Daily experience)
2. 'How do we use CRISPR to edit genes before the babies are born?'
(Science)
3. 'What kind of editing should we do?'
(Philosophy of Science)

Why learn Philosophy of Science?

- Protection against
 1. Pseudoscience
 - Beliefs masquerading as science
 2. Scientism
 - Belief that science is the ultimate truth
 3. Relativism
 - Belief that scientific truths are relative to opinions

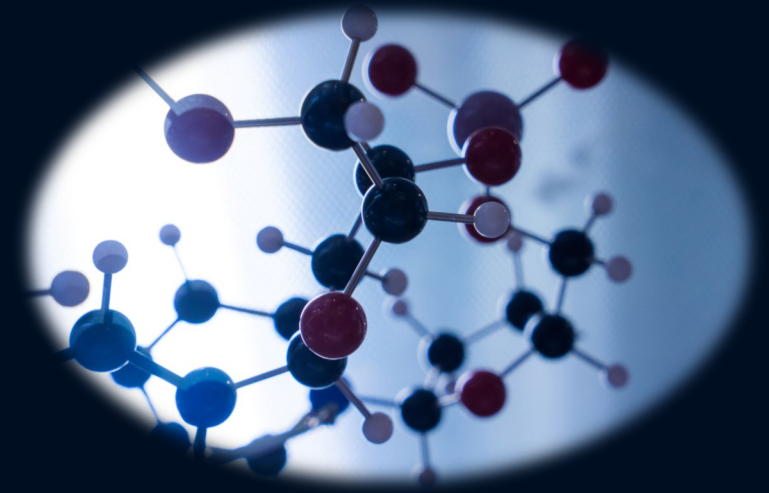


What are the
scopes of Physics,
Metaphysics and
Mathematics?

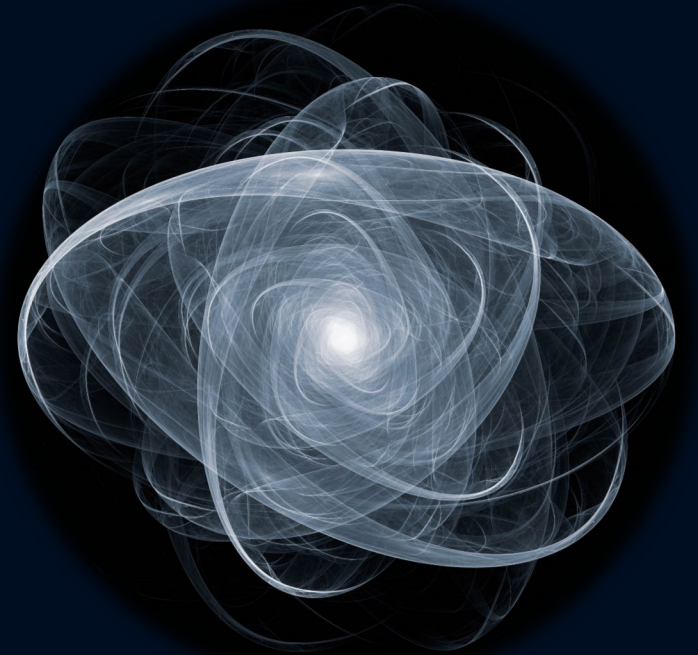


Philosophy: Physics, Metaphysics, Mathematics

- Physics
 - Matter and energy
 - Highly quantitative
 - Observable



- Metaphysics
 - The study of the essential nature of reality
 - Unobservable truths that do not change
 - E.g., Ontology - what exists
 - Highly qualitative



- Mathematics

- Associated with physics and metaphysics

- Study of abstract entities as

- Logic – relationship between ideas ('if-then')

- Intuitive object – mental constructions ('lines')

- Formal object – symbols represent concrete ('vectors')

What is the
difference
between empirical
and rational
sciences?

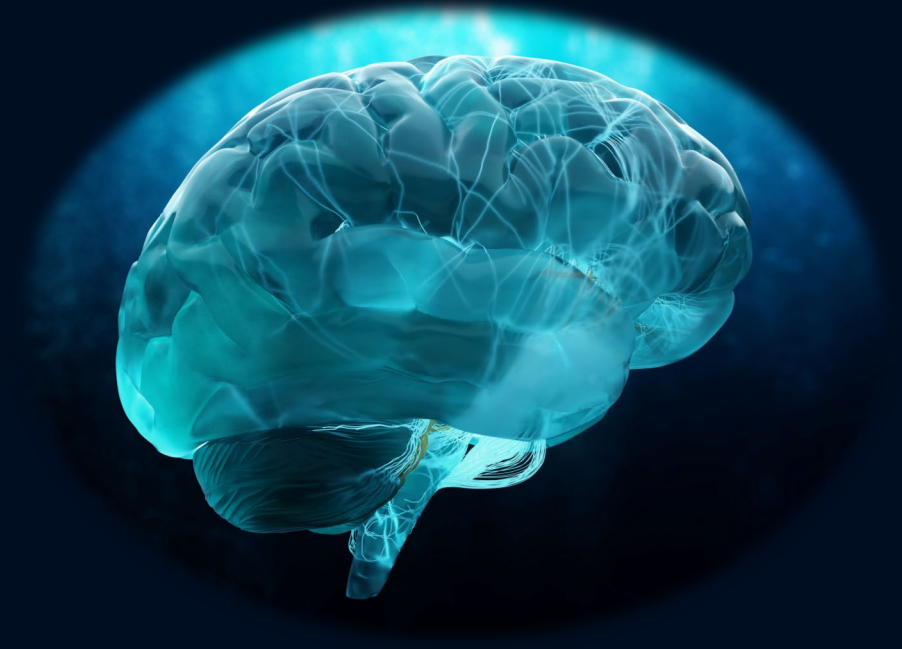


Empirical and Rational Sciences

- Empirical science
 - Prioritise external senses
 - Observable
 - Include natural sciences
 - Physics, Chemistry, Biology



- Rational science
 - Prioritise reasons
 - Conceptual
 - *Gedankenexperiment*
 - Qiyās
 - Include human sciences
 - E.g. Logic, Theology



[illegible]

Natural, Human and Social Sciences

- Natural sciences
 - Study phenomena of physical nature
 - E.g., humans as biological entity, instead of self-reflective, subjective consciousness
 - Least attention to non-observable, non-quantifiable reality

- Human sciences
 - Humans as intellectual, conscious beings
 - Study what is real but non-observable
 - Through reason, revelation, intuition
 - E.g., Logic, Theology, Philosophy
 - Humanities – Art, Literature

- Social sciences
 - Study humans as communal beings
 - Use resources from natural and human sciences
 - E.g., Economy, Linguistics, Political Science

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Discussion