UCLouvain

FIAL
Un éventail de formations, une multitude d'horizons

Carnap and Popper

LFILO2602 – Philosophy of Science
Session 1

Introductions

Welcome!

Course Website

I *hate* Moodle. So visit:

https://charlespence.net/courses/lfilo2602/

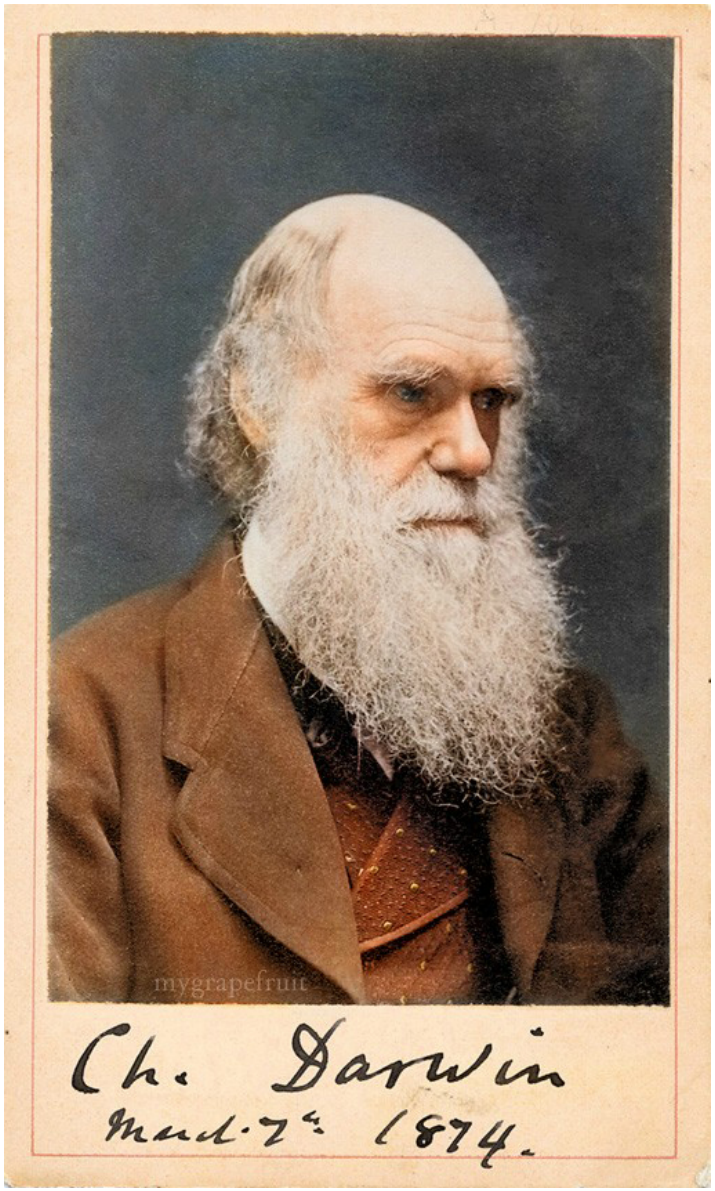
(or just https://charlespence.net/, then click “Courses,” then our course)

Readings

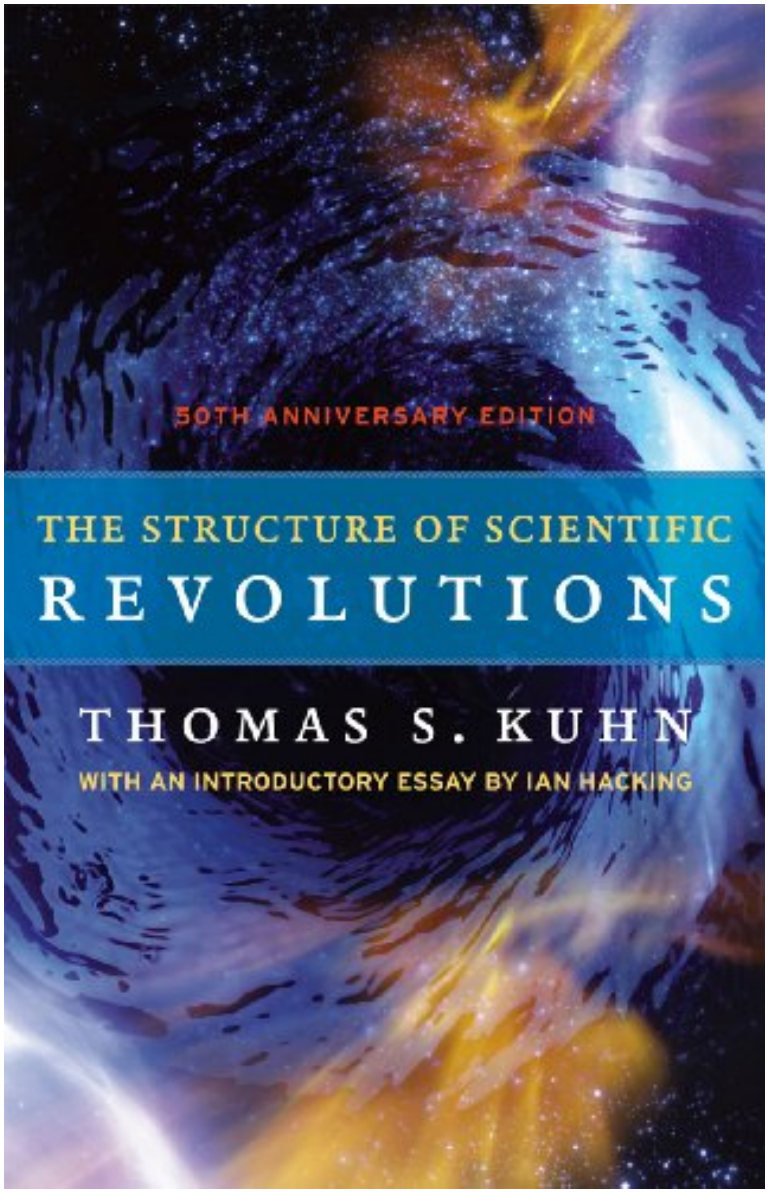
Almost everything:

https://readings.charlespence.net/

Password



Except


50TH ANNIVERSARY EDITION
THE STRUCTURE OF SCIENTIFIC
REVOLUTIONS
THOMAS S. KUHN
WITH AN INTRODUCTORY ESSAY BY IAN HACKING

Administrative Details

- **Look at the syllabus** before you do the reading!
- Grade:
  - 60%: Final written work
  - 40%: Oral presentation

Language

This course alternates between an English version and a French version every year. Obviously, this year, it's in English.

Mais c'est *French-friendly*, ce qui veut dire que vous pouvez toujours poser des questions en français, et écrire vos travaux en français.

Topics

An “advanced survey course.” What?

- The history of the philosophy of science: Carnap, Popper, Feyerabend, Hanson, Kuhn
- Specific topics:
  - Scientific explanation
  - Scientific realism
  - Science and values
  - Feminist philosophy of science
  - Agnotology
  - Science and capitalism

Rudolf Carnap (1891–1970)

Ernst Mach (1838–1916)

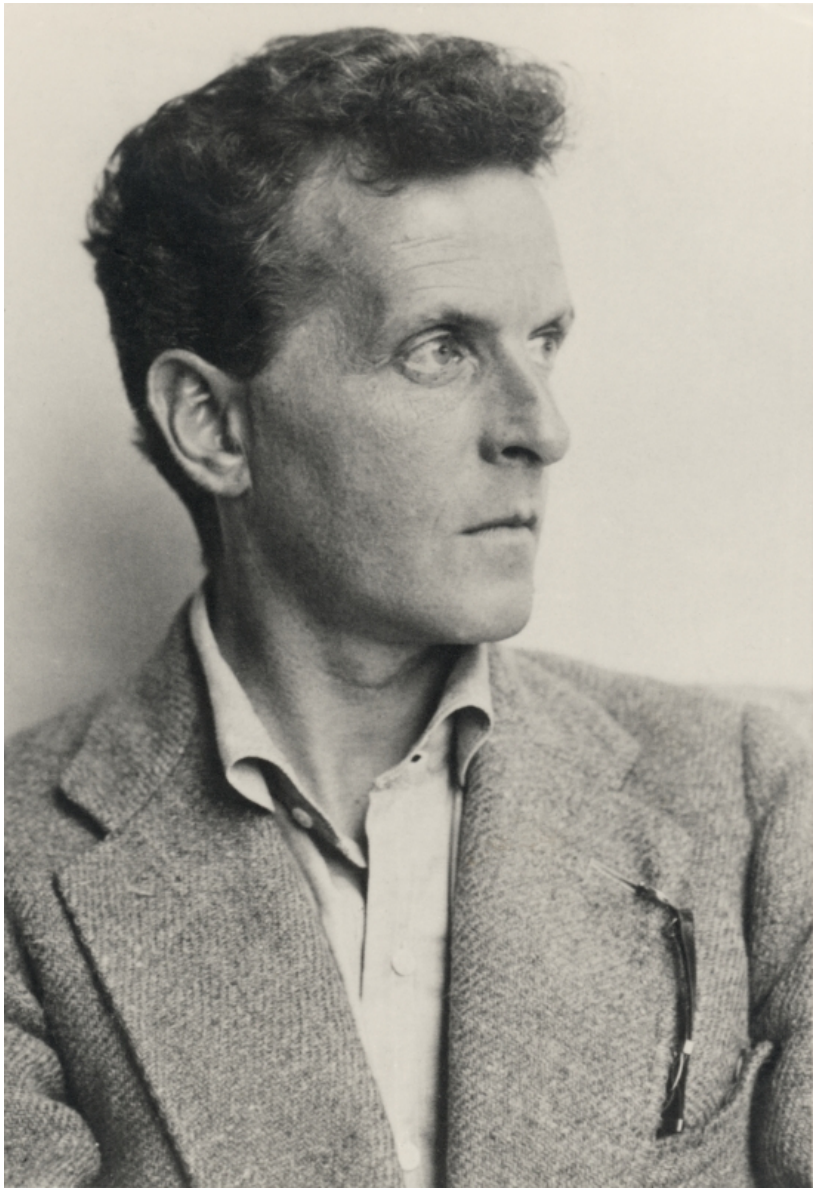
Mach, *The Analysis of Sensations* (1914)

> Colors, sounds, temperatures, pressures, spaces, times, and so forth, are connected with one another in manifold ways; and with them are associated dispositions of mind, feelings, and volitions. Out of this fabric, that which is relatively more fixed and permanent stands prominently forth, engraves itself on the memory, and expresses itself in language.

Mach, *The Analysis of Sensations* (1914)

> Relatively greater permanency is exhibited, first, by certain complexes of colors, sounds, pressures, and so forth, functionally connected in time and space, which therefore receive special names, and are called bodies. Absolutely permanent such complexes are not. (Mach 1914, p. 2)

Ludwig Wittgenstein (1889–1951)



Wittgenstein, *Tractatus* (1921)

The correct method in philosophy would really be the following: to say nothing except what can be said, i.e. propositions of natural science—i.e. something that has nothing to do with philosophy—and then, whenever someone else wanted to say something metaphysical, to demonstrate to him that he had failed to give a meaning to certain signs in his propositions.

[…]

What we cannot speak about we must pass over in silence.

The Rejection of Metaphysics

> Philosophers have ever declared that their problems lie at a different level from the problems of the empirical sciences. Perhaps one may agree with this assertion; the question is, however, where one should seek this level. The metaphysicians wish to seek their object *behind* the objects of empirical science; they wish to enquire after the essence, the ultimate cause of things. But the logical analysis of the pretended propositions of metaphysics has shown that they are not propositions at all, but empty word arrays, which on account of notional and emotional connections arouse the false appearance of being propositions. (p. 5)

Philosophy *as* philosophy of science

> [W]e must take a *step back and take science itself as the object. Philosophy is the theory of science*.… [Unlike psychology or sociology of science, p]hilosophy deals with science only from the *logical* viewpoint. *Philosophy is the logic of science,* i.e., the logical analysis of the concepts, propositions, proofs, theories of science.… (p. 6)

Philosophical Proposals

[A] philosophic theorem…can be meant in different ways:

A. As *Assertion;* e.g.,

1. In the language of science available today (or a part of it: of physics, biology, …) such and such holds.
2. In every language (or: in every language of such and such a nature) such and such holds.
3. There is a language for which such and such holds.

Philosophical Proposals

B. As *Proposal;* e.g.,

1. I propose to build up the language of science (or of mathematics, of psychology, . . .) so that it acquires such and such properties.
2. I wish (along with other things) to investigate a language which possesses such and such properties. (pp. 14–15)

Special Sciences

- **Mathematics:** “questions of the syntax of mathematical language…as of a part language of the language of science” (p. 17)
- **Physics:** “the problem of the verification of physical laws… the problem of induction… the problem of the finitude or infinity and other structur[al] properties of time and space… the problem of [causality]” (p. 18)

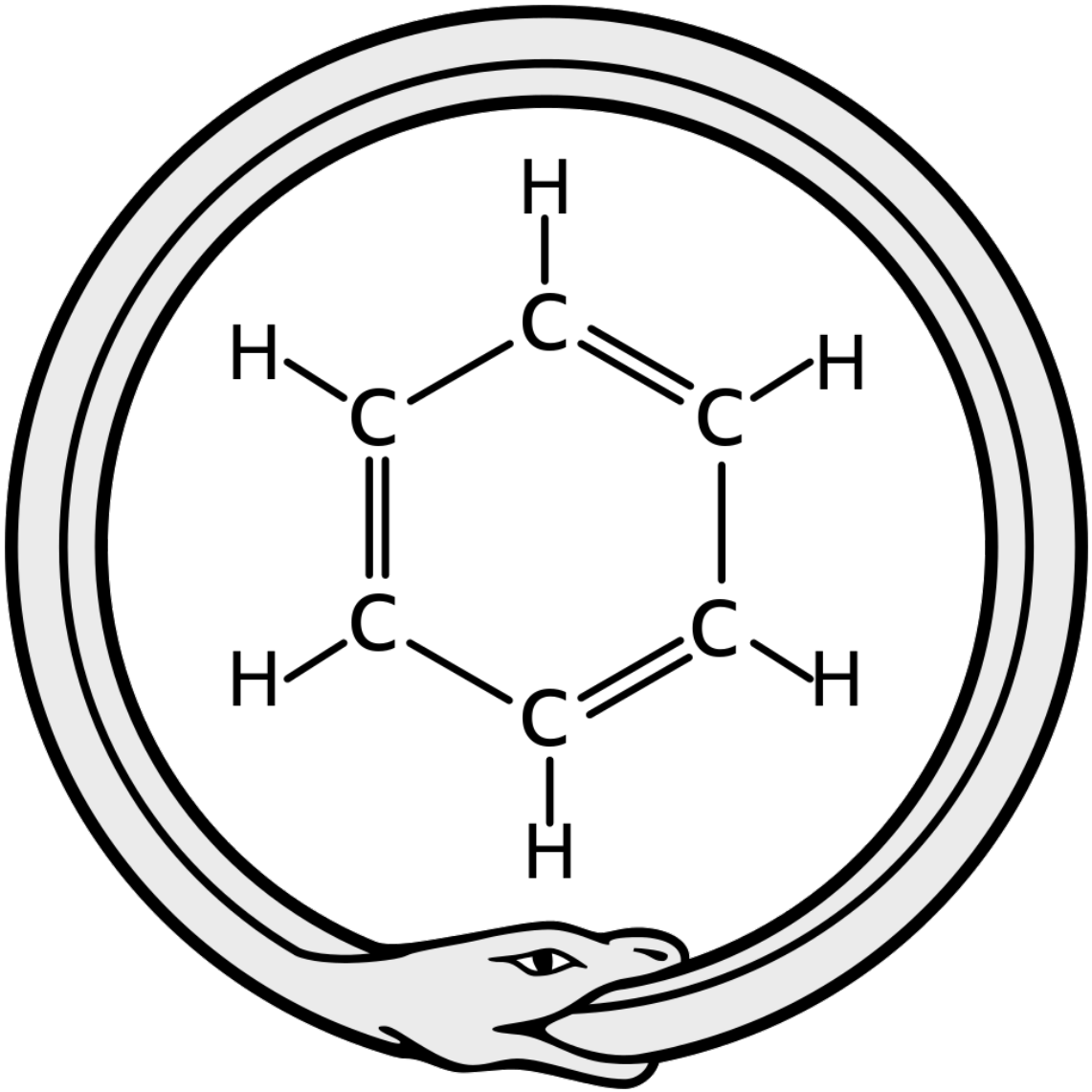
Special Sciences

- **Biology:** “Can the concepts of biology be defined on the basis of those concepts of physics” (reductionism)? “Can the laws of biology be derived from the physics of the inorganic” (vitalism)? (p. 18)
- **Psychology:** “Can the concepts of psychology be defined on the basis of the concepts of physics” (reductionism)? “Can the laws of psychology be derived from those of physics” (the problem of mind)? (p. 18)

Some Consequences

- Separation of the “context of discovery” and the “context of justification”
  - Entirely separated from the history of science
- Emphasis on structure of scientific arguments
  - Later in the course: formal structures of explanation
  - Confirmation, inductive logic
- Complete lack of attention to ethics and values in science
  - “Ethics” as a subset of “metaphysics”

Kekulé’s Benzene Ring



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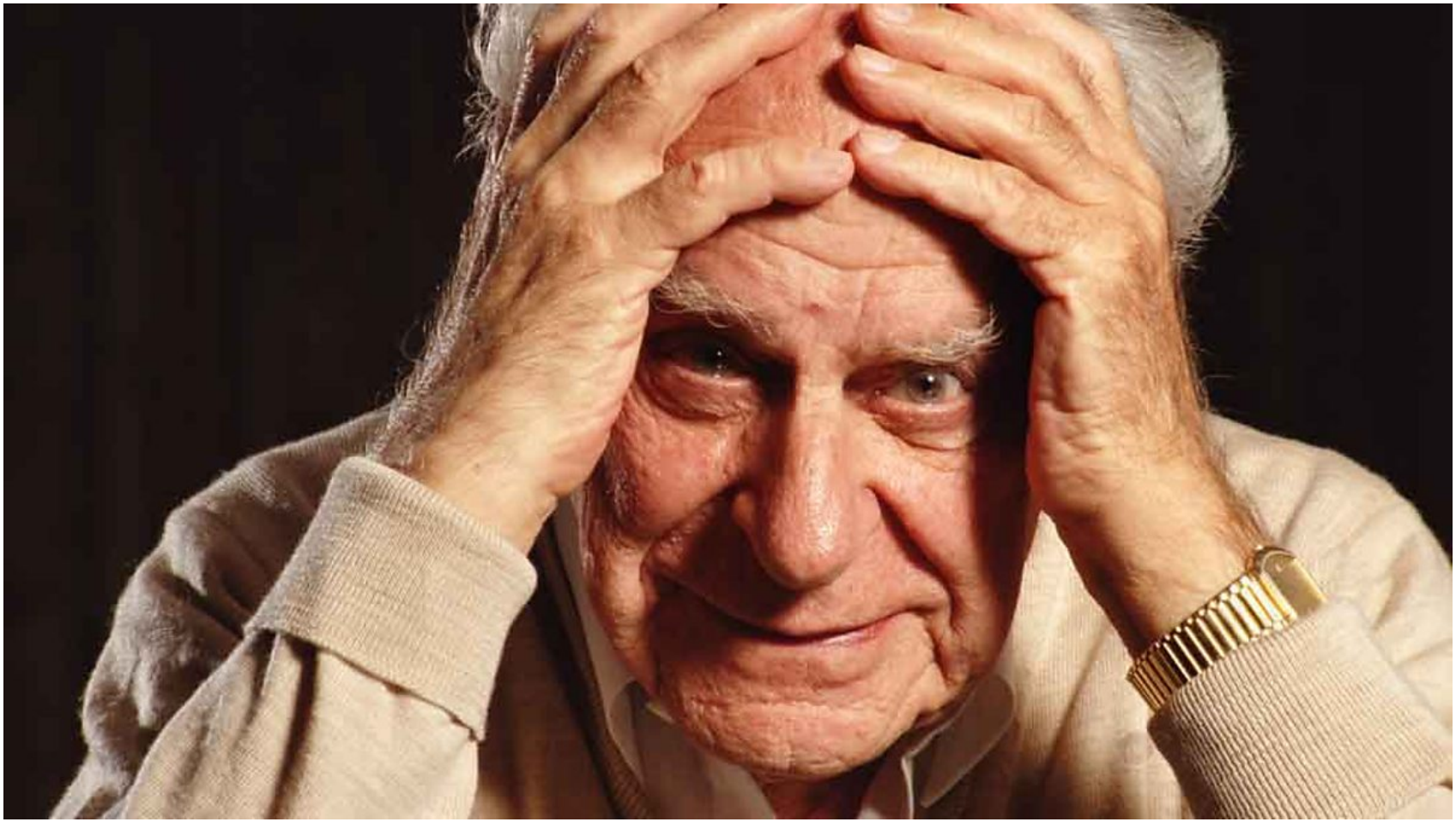
Karl Popper (1902–1994)



Demarcation

> “When should a theory be ranked as scientific?” or “Is there a criterion for the scientific character or status of a theory?” (3)

Demarcation

Some difficult cases:

- astrology
- alchemy
- for Popper:
  - the Marxist reading of history
  - Freudian psychoanalysis
  - Adler’s individualist psychology

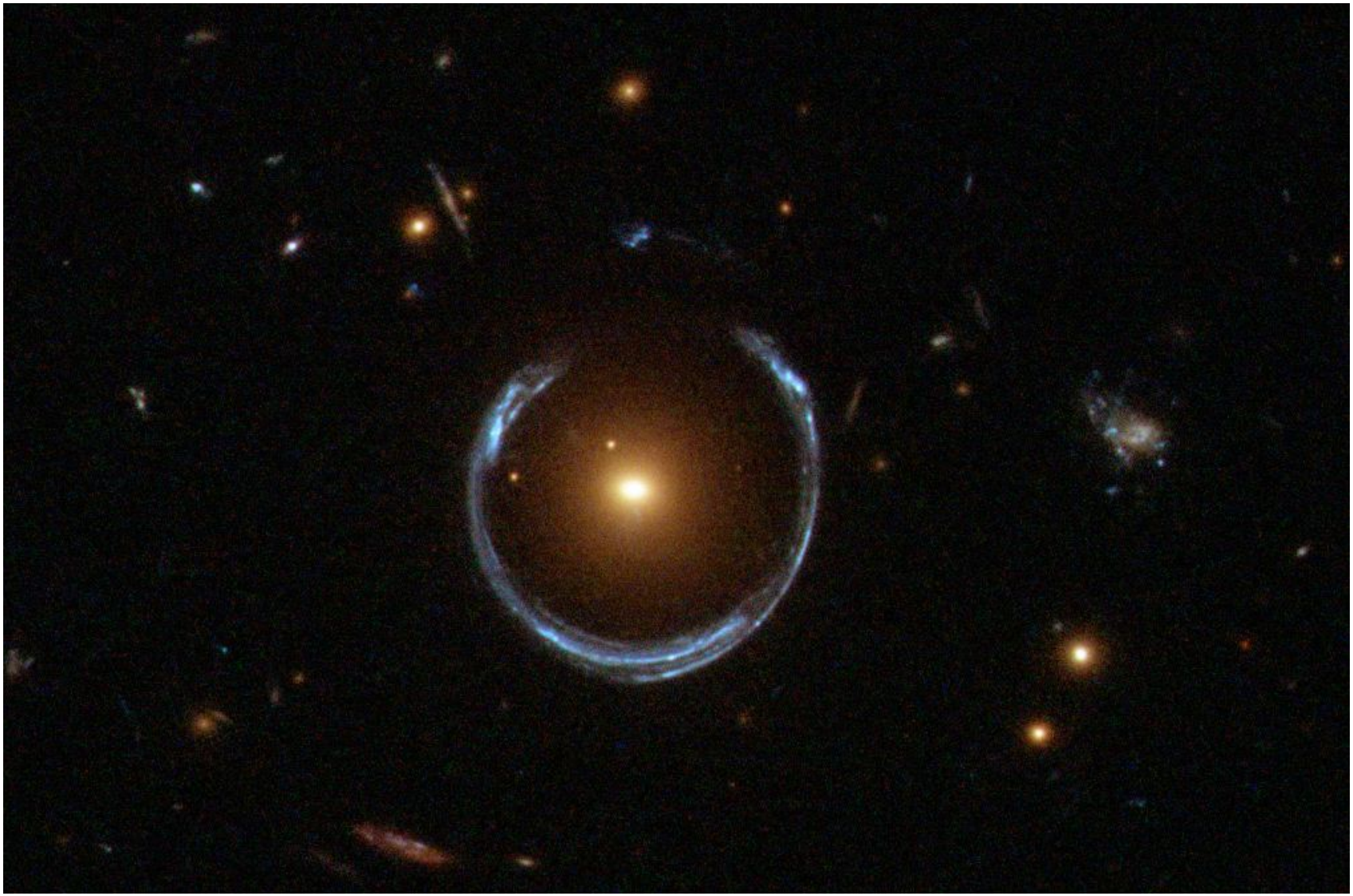
Classic responses

- an “inductive method”
- an “empirical approach”

The problem

> These theories appeared to be able to explain practically everything that happened within the fields to which they referred. The study of any of them seemed to have the effect of an intellectual conversion or revelation, opening your eyes to a new truth hidden from those not yet initiated. Once your eyes were thus opened you saw confirming instances everywhere: the world was full of *verifications* of the theory. (5)

A “crucial experiment”



A “crucial experiment”

Now the impressive thing about this case is the *risk* involved in a prediction of this kind. If observation shows that the predicted effect is definitely absent, then the theory is simply refuted. The theory is *incompatible with certain possible results of observation* – in fact with results which everybody before Einstein would have expected. (6-7)

Conjectures and Refutations

> This, I believe, is the true theory of knowledge (which I wish to submit for your criticism): the true description of a practice which arose in Ionia and which is incorporated in modern science (though there are many scientists who still believe in the Baconian myth of induction): the theory that knowledge proceeds by way of *conjectures and refutations*. (Popper 1963, 205)

Falsificationism

1 — It is easy to obtain confirmations, or verifications, for nearly every theory – if we look for confirmations.

Falsificationism

4 — A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice.

5 — Every genuine *test* of a theory is an attempt to falsify it, or to refute it. Testability is falsifiability; but there are degrees of testability: some theories are more testable, more exposed to refutation, than others; they take, as it were, greater risks. (7)

Falsificationism

7 — Some genuinely testable theories, when found to be false, are still upheld by their admirers – for example by introducing *ad hoc* some auxiliary assumption, or by re-interpreting the theory *ad hoc* in such a way that it escapes refutation. Such a procedure is always possible, but it rescues the theory from refutation only at the price of destroying, or at least lowering, its scientific status. (7)

Falsificationism

> One can sum up all this by saying that *the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.* (7)

A few other points

- non-scientific theories
- the choice between falsifiable theories
- epistemological foundations