

# 432018 PHILOSOPHY OF PHYSICS (2002)

## Instructions for Week 2

### Set-text

The set-text for this course is the book:

*Philosophy of Physics* by Lawrence Sklar (OUP, 1992, reprinted 1995) from the Dimensions in Philosophy Series.

Many of the readings for this course will be taken from this book and so you should try and get hold of a copy.

### Reading

**Reading for Lecture 1:** Sklar, Chapter 1 (pp. 1-10). We will discuss the relationship between philosophy and physics, and assess the need for a philosophy of physics.

**Reading for Lecture 2:** Sklar, the first part of Chapter 4 (pp. 157-164). We will briefly examine some aspects of the 'classical' view of the world and the experimental evidence that showed it to be at fault. We shall also look at some of the 'early' theories which were developed to account for these new phenomena.

### Seminar Preparation

As the audience for this course is composed of students doing philosophy or physics or both, I would like to spend the first seminar convincing you that philosophy is relevant to physics and vice versa. Having done the reading for the lecture and using your knowledge of philosophy and physics, I would like you all to attempt the following task.

We are going to create a *conceptual framework* for the philosophy of *classical* physics. This may sound a bit unorthodox, but this course will detail how the intuitively straightforward conceptual framework of pre-twentieth century physics was undermined by the development of quantum mechanics and relativity theory. Similarly, these developments in physics have profound implications for our philosophical view of the world. Indeed, we shall see in due course that, in many ways, the construction of a new conceptual framework for philosophy *and* physics is one of the main goals of the philosophy *of* physics.

Consider the following list of areas of philosophy (some of which you may have studied) and the associated words (some of which you may have encountered before):

- Metaphysics (E.g. ontology, substance, properties, determinism, universals and particulars.)
- Epistemology (E.g. knowledge, belief, certainty, verification.)
- Philosophical Logic (E.g. modality, reason, proof, induction, truth.)
- Philosophy of Science (E.g. theory, interpretation, theoretical entities, instrumentalism.)

and the following list of concepts from *classical* physics (some of which you may have encountered before):

- Particles, waves and fields.
- Newtonian mechanics, electromagnetism and optics.
- Space and time.
- Experimentation and measurement.
- Mass, charge, distance, velocity, acceleration, force and energy.

Now, using your philosophical and physical *intuitions*, attempt to do the following:

- On a sheet of paper, take some or all of the areas of philosophy and briefly explain what each of them is about and give a brief description of what some or all of the associated words mean. Using some sort of diagram (i.e. a mainly pictorial representation) indicate how these areas of philosophy and the associated words are related giving brief explanations of why you think this is the case.
- On another sheet of paper use a similar sort of diagram to indicate how some or all of the concepts from classical physics are related, again giving brief explanations of why you think this is the case.
- On a third sheet of paper use a similar sort of diagram to indicate what *you* consider to be the most important parts of the other two diagrams and indicate how *you* think that some or all of these parts are related.

We will discuss the diagrams that you have produced in the Week 2 seminar. (Obviously, the third diagram is going to be most important and so make sure that this is clearly set out.)

**Note:** Obviously, this is no simple task and your diagrams will presuppose a certain set of philosophical views. You are free to construct a conceptual framework for the areas of philosophy given above which: supports a philosophical view which you are sympathetic to; or one which you have heard about but don't really agree with; or one which you feel is intuitively correct but philosophically problematic. Indeed, if any objections to your philosophical framework (or to the resulting conceptual framework for philosophy and classical physics) spring to mind, you may like to make a note of them. (I am assuming that the conceptual framework for classical physics is relatively unproblematic. Is this really the case? Can you see any problems with it?)

**Note:** Also bear in mind that there is no right way of setting out any of these diagrams. We are creating them so that we have something to discuss in the seminar. Obviously, a correct conceptual framework would be much more detailed, if it is possible at all ...