

PHILOSOPHICAL IMPLICATIONS OF MODERN PHYSICS

FACILITATOR: BRIELIN BROWN

Qualifications and Interests

- **Courses Taken With Relevant Material**

- PHIL 245 – Philosophy of Science – The course spent a few weeks covering interpretations of quantum mechanics, specifically focusing on the Bell result, which will be a key issue in this course
- PHYS 355 – Quantum Mechanics I – The first part of an introduction to quantum mechanics covering many of the issues that are up for debate in modern philosophy of science.
- PHYS 551– Quantum Computing – The results of quantum mechanics play a heavy part in the construction of the mathematical methods of quantum computing. Both the philosophy of mathematics (computer science) and the philosophy of science have an important role here.

- **Interests**

- I became interested in the interpretations of modern physics early in high school when I watched a NOVA documentary about string theory and quantum mechanics. Explained at a level high enough for a high school student to understand, this was so gripping it compelled me to continue my studies in physics until I could reach the level where I could understand it at a low level as well. I have to say I am only beginning to touch this level in my studies, and it has already been rewarding.

Issue to be Addressed

- Modern physics has jumped far beyond the realm of classical physics; no longer does it simply discuss the motion of bodies or the flow of charge. These days, physics at the smallest level is riddled with issues that lie well beyond the boundaries of the definite and into places that require philosophical interpretation to fully comprehend. We are well beyond the time when equations were the key to understanding. True comprehension of modern physics requires both a rigorous mathematical foundation and a philosophically based interpretation of the result. In this course, I hope to explore the latter of the two in hopes of enlightening more people to the implications of modern physics that lie outside the realm of equation manipulation.

Timing

- I would like to gather everyone interested in taking the course and find a time that would suit all of us. I don't want to prevent anyone from taking this course that is interested based on time of day. We will meet for one hour a week.

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SYLLABUS

Timeline, Reading and Summary of Topics

- Week 1 – An introduction: Issues that led to Quantum Theory
Reading: Pending (most likely none)
- Week 2 – The Nature of Quantum Theory
View– What the Bleep Do We Know? part I
- Week 3 – Interpretation: Overview / Copenhagen
View– What the Bleep Do We Know? part II
- Week 4 – Interpretation: Many Worlds / Hidden Variable
Reading– Stanford Encyclopedia of Philosophy: Bell's Theorem parts 1,2,3,7
- Week 5 – The Bell Result
View– NOVA: The Elegant Universe
- Week 6 – String Theory
Reading– SEoP: Time Travel and Modern Physics
- Week 7 – Time Travel
- Week 8 – Catch Up and Further Discussions

Assignments

- There will be weekly reading or film-watching assignments that will be crucial to the successfulness of the course; it is imperative that students come to class prepared, and the weekly reading will be quite short. It would also aid discussion if the students would take a few moments to ponder the readings outside of class.

Instruction

- The course is as of now spaced to have a small amount of material in each session, such that the majority of the time can be spent in discussions. Once it becomes clear exactly how long will be necessary for each topic, the schedule may change; there are certainly many more topics to discuss. Thus, in each class I would like to spend a few minutes giving an overview the assigned reading or film, before proceeding to clarification questions which would lead to a discussion in which the instructor serves only as a guide in a Socratic style.

The texts and films I chose I like because they are lower level than most of the material on the subject (save for some formality in the Bell's Theorem SEoP entry which is touch to escape). There is a lot of material on this subject, but I feel that by having a facilitator to wade through the material and explain some finer details we will be able to get away with reading from higher level sources.