

Virtual entities in science: a virtual workshop

5-19 March 2021

Call for papers

Not only since the sudden increase of online communication due to the COVID-19 situation has the concept of the “virtual” made its way into everyday language. In this context, it mostly denotes a digital substitute of a real object or process. “Virtual reality” is perhaps the best known term in this respect.

With these digital connotations, “virtuality” has been used also in science and research: Chemists use virtual laboratories, biologists do virtual scanning of molecular structures, and geologists engage in virtual field trips.

But the concept of the “virtual” has a much longer tradition, dating back to long before the dawn of the digital age. Virtual displacements and virtual images were introduced in classical physics already in the 18th century. They represented auxiliary objects or processes without instantiation, with the purpose of efficiently describing specific physical systems. Through Heisenberg’s use of “potentia” in his late attempts to interpret quantum mechanics, the term “virtual” may even relate back to Aristotle.

In today’s physics, the term virtual is mostly associated with the quantum world, first and foremost with the “virtual particle” of quantum field theory. It has become such an integral part of modern high energy physics that its ontological character may be considered to go beyond the purely auxiliary, which is typically associated with the virtual. The various possibilities for a virtual particle to manifest itself in a measurement highlights, furthermore, how “potentiality” continues to be a characteristic feature of virtual entities.

In other disciplines, however, use of the term “virtual” without a digital connotation is much rarer. While concepts like “virtual adrenaline” in medicine and biochemistry arise in the 1940s, and the “virtual moon” figures quite prominently in some (English translations of) Babylonian calendar texts, these examples seem to be rather singular occurrences of entities that were explicitly called “virtual”. The basic idea behind the terminology of the virtual, however, could be much more common, even outside of physics. The “invisible hand” in economics, or the “vital force” in biology, for instance, do carry aspects of a virtual entity, even if they have not been called that way.

For this workshop we invite contributions that address the historical formation and philosophical interpretation of concepts of virtual entities in physics and other disciplines – in whatever terms they may come. The main goal of the workshop is to

bring to the fore similarities and differences in the meanings and functions of these concepts so as to be able to precisely characterize why certain entities are considered virtual in specific contexts, why a different terminology was often used in each individual case and in what sense the virtual entities relate to the real world. We are looking for contributions that address the role of these concepts in theoretical as well as experimental activities, and for investigations into the origins of the terminology of the virtual as it was applied to the various disciplines of natural science. Work that integrates philosophical and historical approaches is particularly welcome.

Among other things, contributions may focus on one of the following aspects which are usually associated with virtual entities, in particular if we think of the virtual particle of modern quantum field theory:

- The terminology of virtuality, including its etymology, and why it was applied to the entities in question: Why not other terms like “substitute” or “auxiliary”?
- The potentiality inherent in virtual entities to bring about certain effects, which may eventually be realized or not: How is this to be understood exactly?
- The ontology of virtual entities: How is it different from real entities, and how do we get epistemic access to virtual entities?

The workshop will be held online. Apart from the contributed talks, the program will feature a small number of keynotes. To contribute a paper, please send a title and an abstract (approx. 200 words) along with your name, affiliation and contact details to adrian.wuethrich@tu-berlin.de no later than 15 November 2020.