
About the virtual

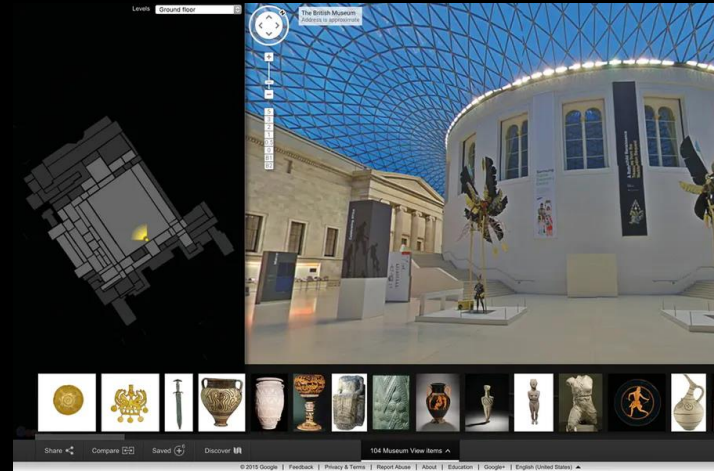
Introduction to
“Virtual entities in science: a virtual workshop”

5 March 2021
Friedrich Steinle





Virtual biology lab



Virtual museum



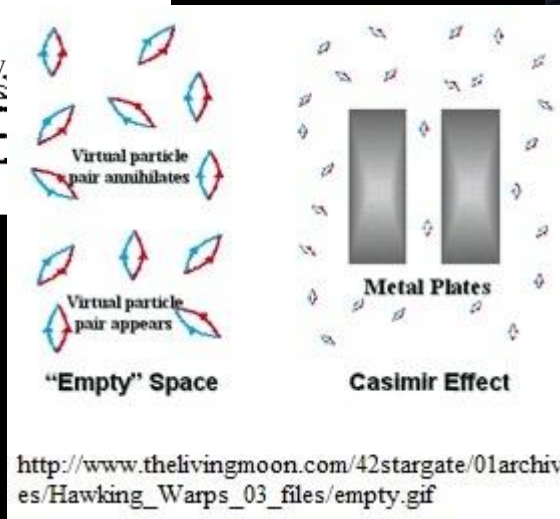
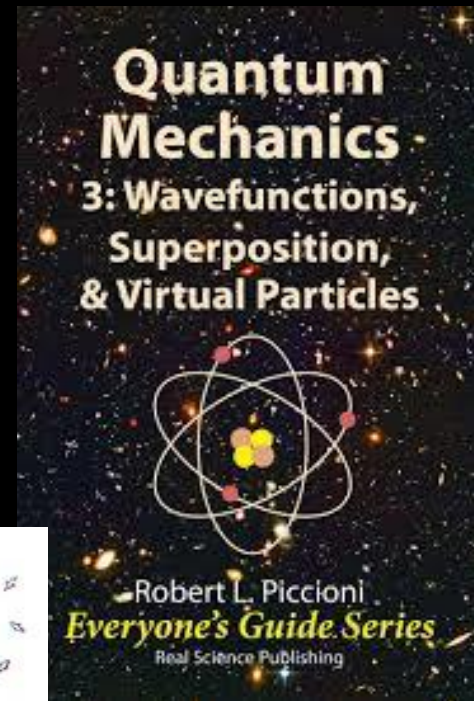
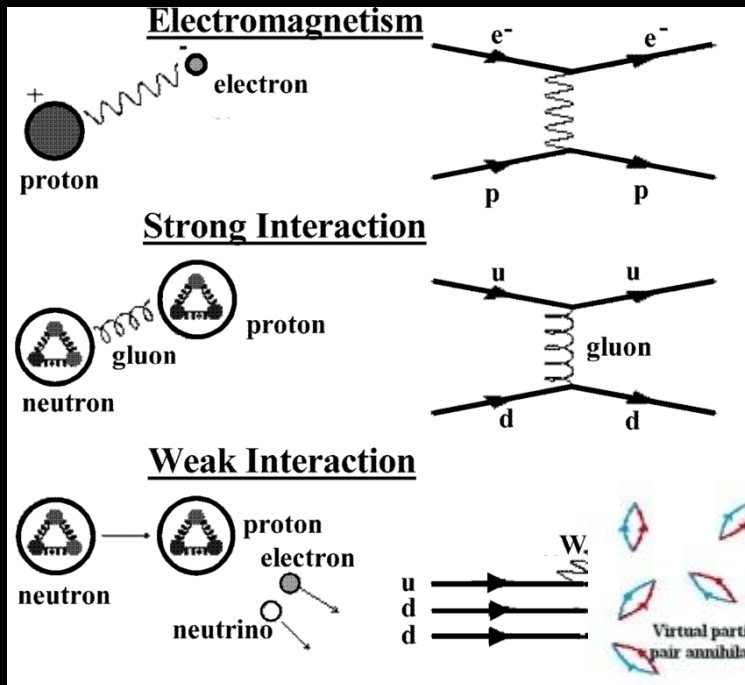
Virtual collaborations



Virtual reality for humans ...



... and other animals



Virtual particles in physics

„Virtus“: power of effecting something

Distinction: Virtus vs. potential

- Contrast notions: Potentia vs. actus
- Contrast notions: Virtus vs. essentia (substantia, forma)

C.S. Peirce (1902):

- (1) A virtual X (where X is a common noun) is something, not an X, which has the efficiency (virtus) of an X. This is the proper meaning of the word; but
- (2) it has been seriously confounded with potential, which is almost its contrary. For the potential X is of the nature of X, but is without actual efficiency.

C.S. Peirce (1902):

- “A **virtual velocity** is something not a velocity, but a displacement; but equivalent to a velocity in the formula, what is gained in velocity is lost in power.
- So **virtual representation** was the non-representation of the American colonies in the British Parliament, which was supposed to be replaced by something.
- So Milton asks whether the angels have **virtual or immediate touch**.
- So, too, the **sun** was said to be virtualiter on earth, that is, in its efficiency.”

C.S. Peirce: “Virtual” in: *Dictionary of Philosophy and Psychology*, ed. James Mark Baldwin, vol. II (1902), 763–764

Virtual entities in the sciences

- Virtual image (17th ct.)
- Virtual displacement (18th ct.)
- Virtual embryo (Przibram 1923)
- Gene before the 1930s.
- Virtual adrenaline (Devine 1936)
- Virtual oscillators, transitions, ... (1920s – 1930s)
- Virtual particle (1940s –)

About the virtual

C.S. Peirce (1902):

A virtual X (where X is a common noun) is something, not an X,
which has the efficiency (virtus) of an X.

Adapted from scholastic discussions to modern ontology and science!