

Quantum World

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Lecture 1: EPR and all that

20.04

- Einstein did not care as much about determinism as his “God does not play dice” might make you think.

Lecture 2: Measurement

22.04

- Polaroid filters experiment
- “Collapse” happens through Projection operators.
- When does collapse happen? At measurement or at the filters

EPR (Stern-Gerlach version)

EPR infers determinism from the experiment, but holds **locality** sacred [1].

a) either a signal is travelling faster than the speed of light between the two particles when one of them is measured or

b) some property, unmodelled in QM, determines the outcome. This is a “real” property because we know with certainty what it is before measuring it.

c) The act of measurement at A modifies the particle at B (this is basically (a))

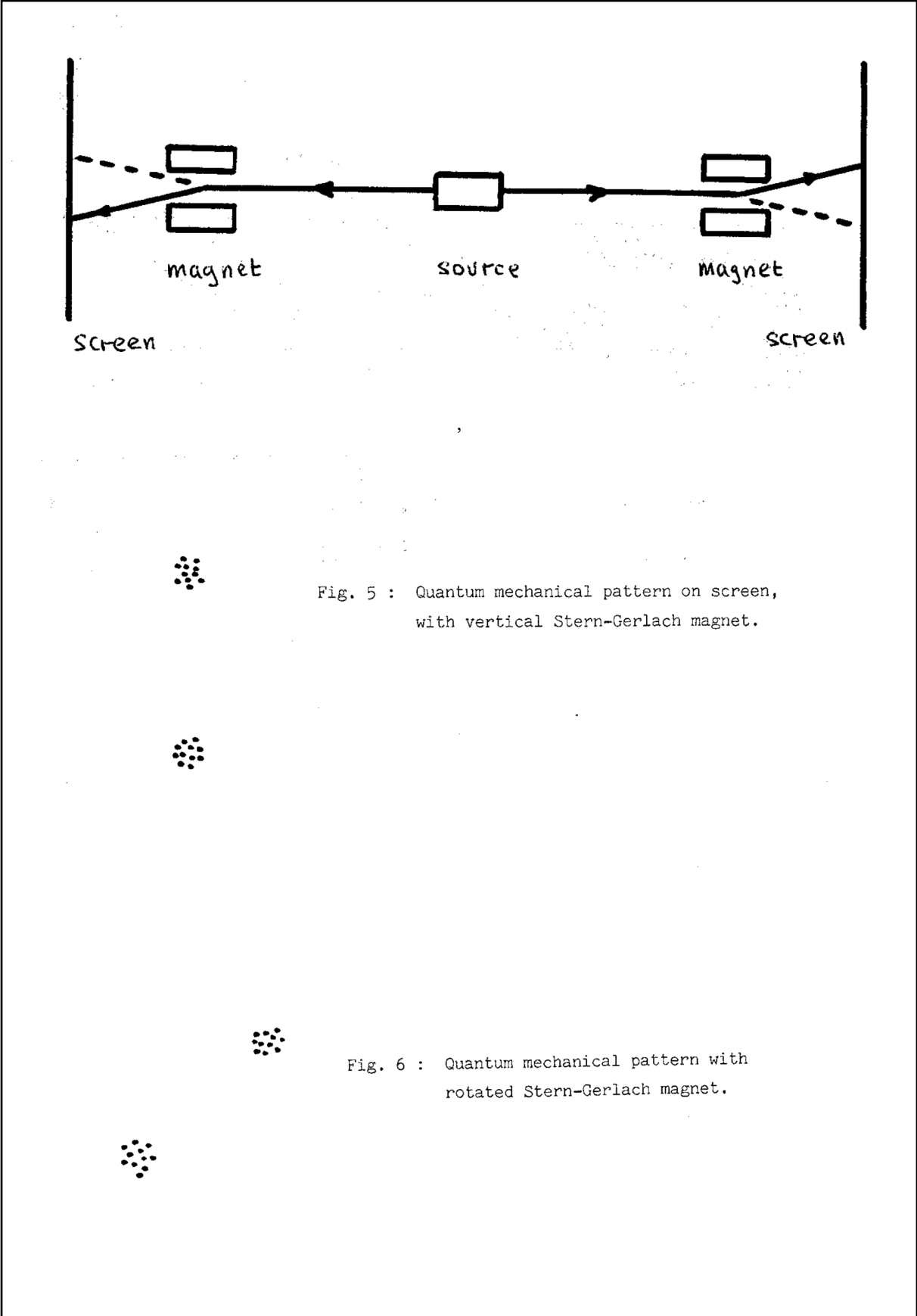


Fig. 5 : Quantum mechanical pattern on screen, with vertical Stern-Gerlach magnet.

Fig. 6 : Quantum mechanical pattern with rotated Stern-Gerlach magnet.

Figure 1: Figs taken from Bell's 1980 article [1]

EPR correlations of a singlet pair beg an explanation.

Bibliography

- [1] Bell, "Bertlman's Socks and the Nature of Reality," June 1980, [Online]. Available: <https://cds.cern.ch/record/142461/>