Quantum Connections 2023 - Physics Summer School

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Institute for Quantum Studies,
Schmid College,
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June 12th and 23rd at Högberga Gård, Lidingö

NSF

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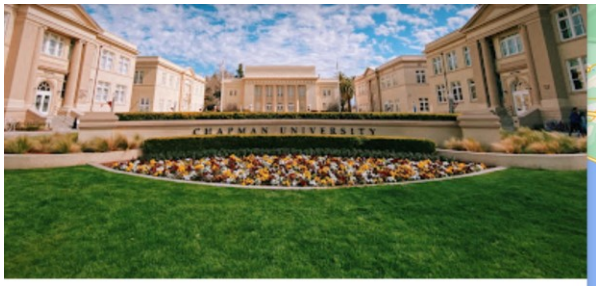

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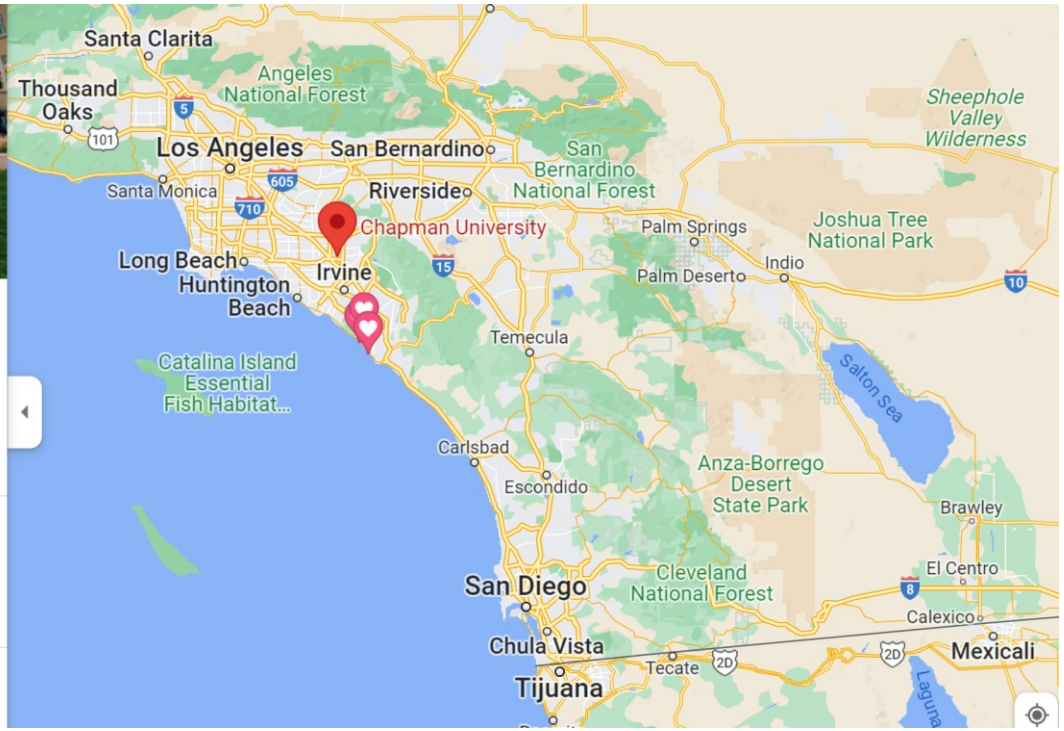

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Lectures based on my forthcoming book

Quantum Measurement:
Theory and Practice

Andrew N. Jordan & Irfan Siddiqi

Laguna Beach, CA May 13, 2022

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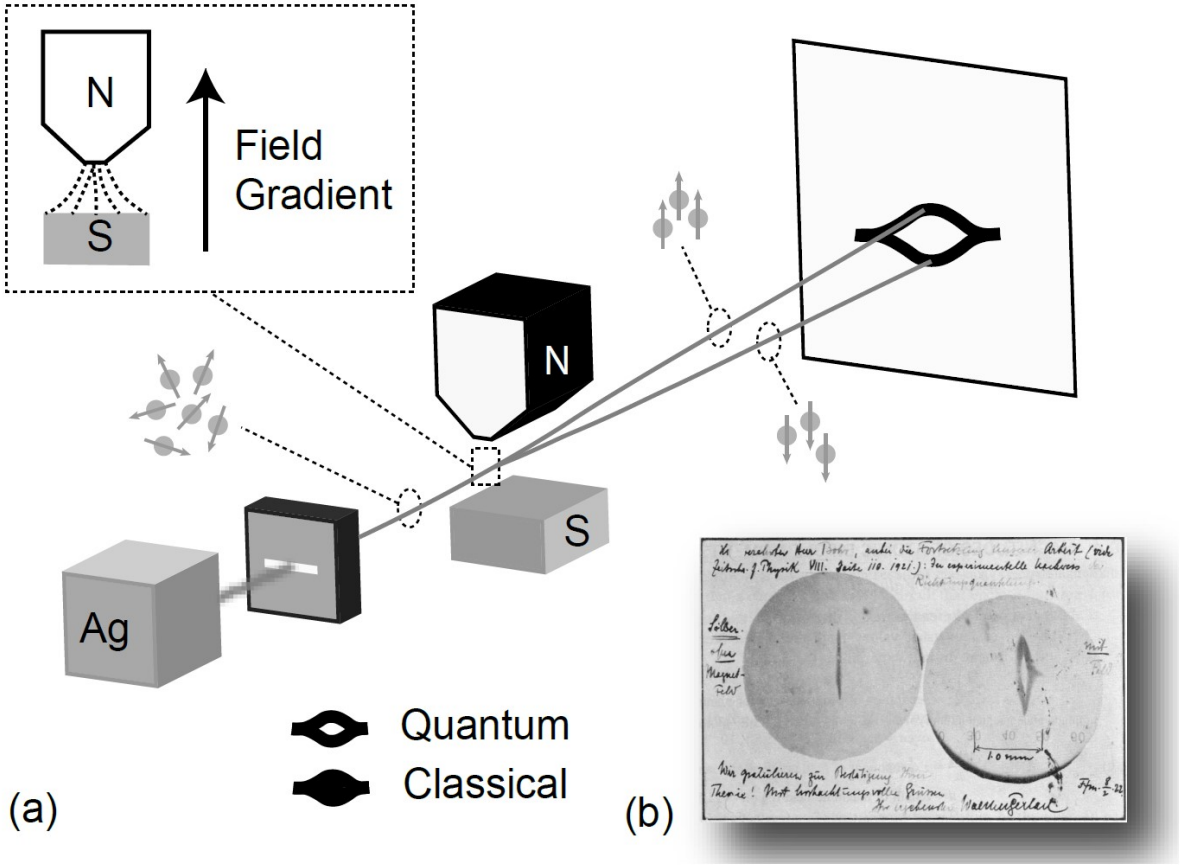
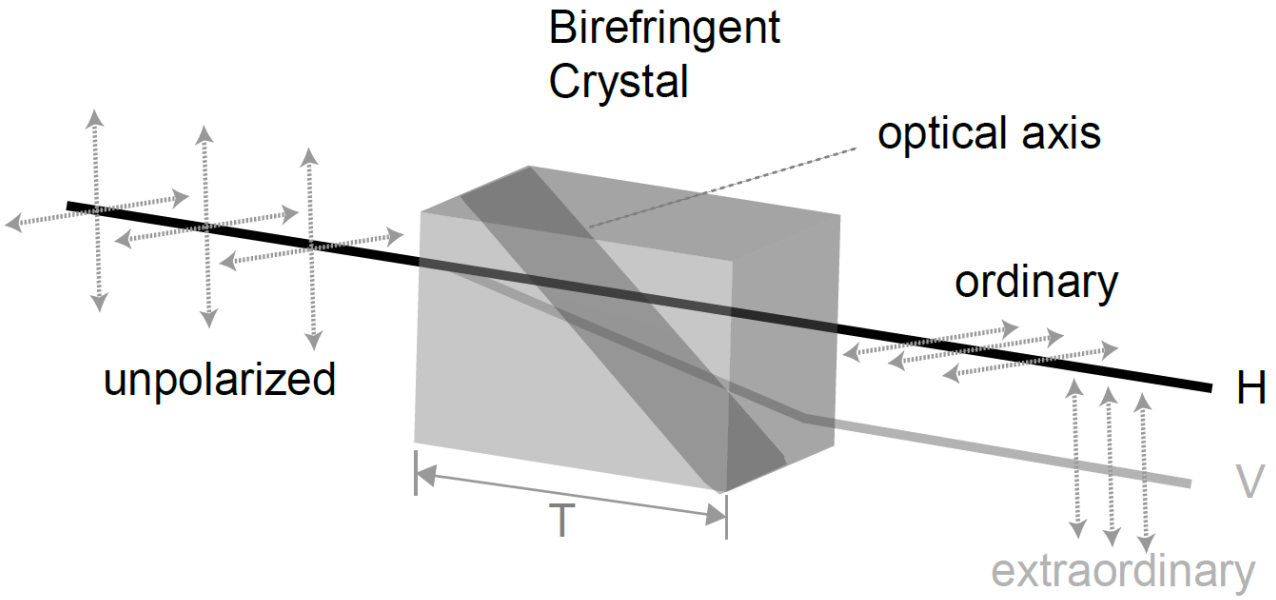
Lecture 1 - General Quantum Measurements

This survey series of lectures on quantum measurement starts with textbook quantum measurement followed by the von Neumann model for measurement as a physical process. The discussion will transition into the theory of weak measurement in the very weak coupling limit. Generalized measurement is then characterized by imperfect correlation between system and meter, and describable with positive operators. Motivating physical examples will be given.

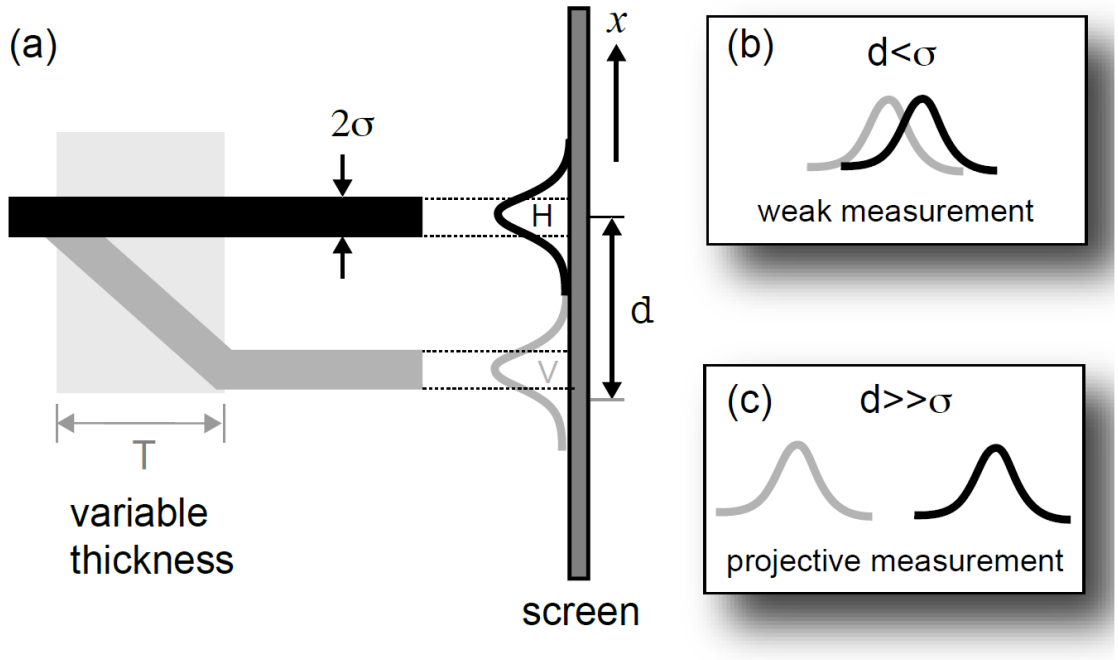
Lecture 1 - Figure 1



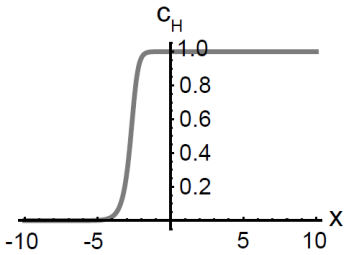
Lecture 1 - Figure 2



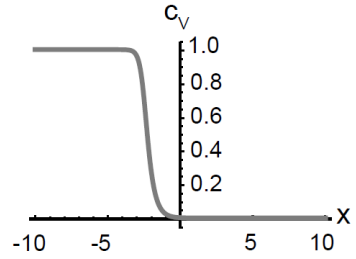
Lecture 1 - Figure 3



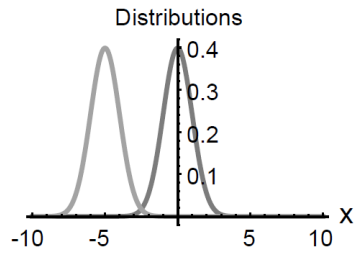
Lecture 1 - Figure 4



(a) The coefficient c_H plotted vs position of the slit.

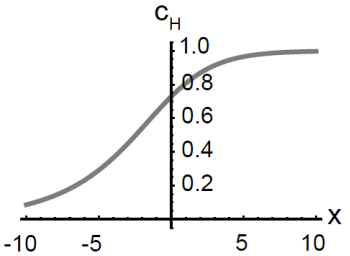


(b) The coefficient c_V plotted vs position of the slit.

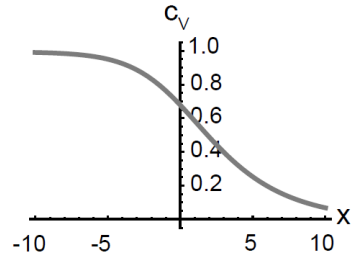


(c) The two distributions of V (left) and H (right). They are well separated.

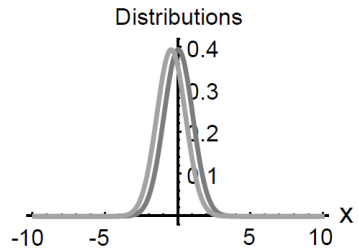
Figure 3.3 Plots for the case $d = 5$, $\sigma = 1$, where the distributions are well separated. Position is measured in units of σ. $a = b = 1/\sqrt{2}$.



(a) The coefficient c_H plotted vs position of the slit.



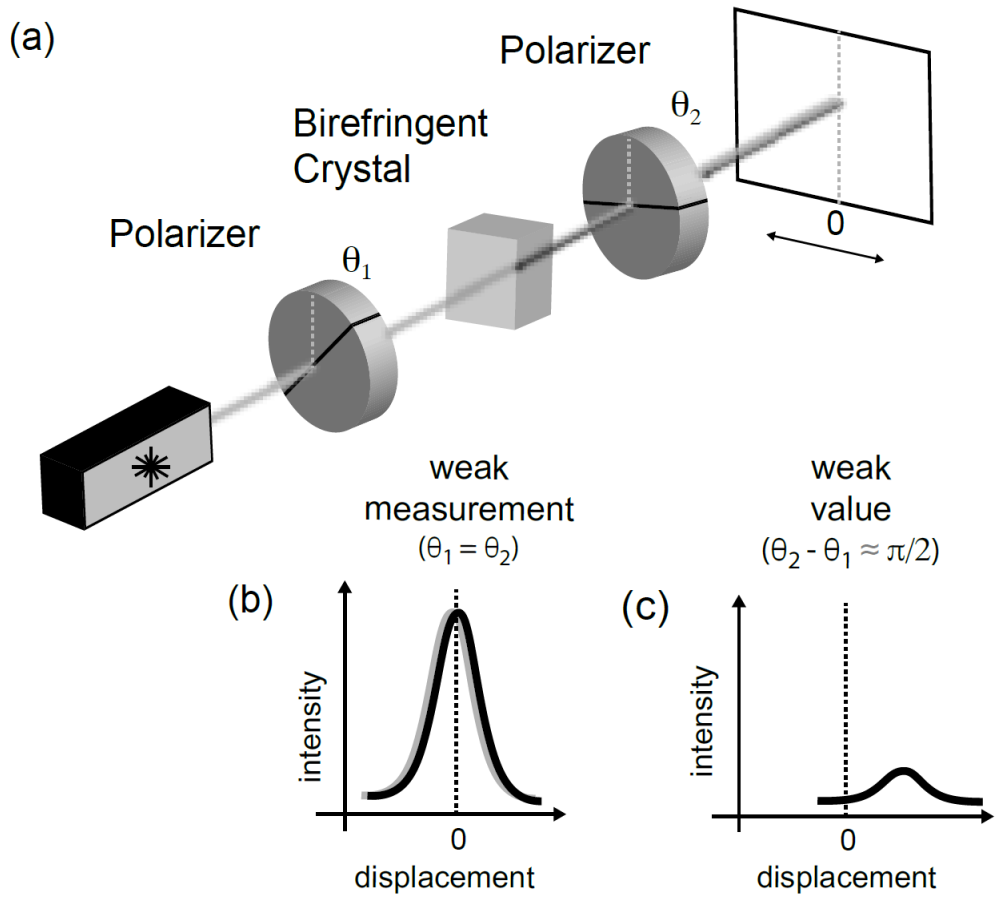
(b) The coefficient c_V plotted vs position of the slit.



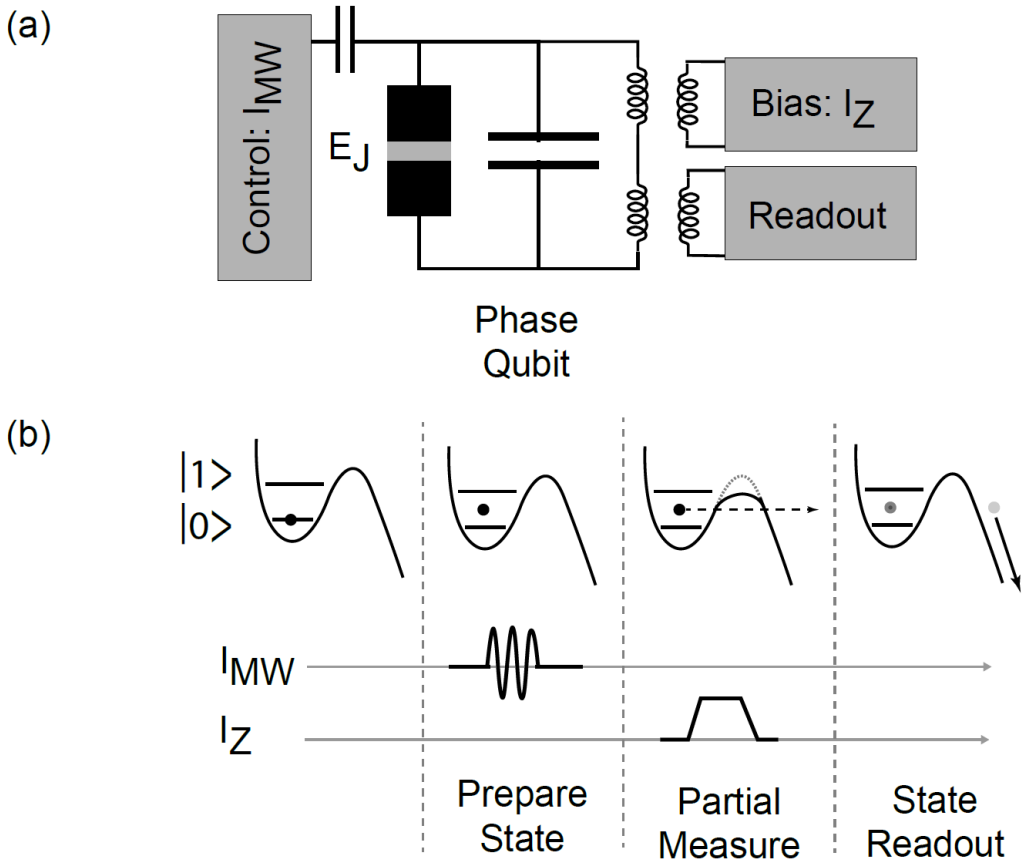
(c) The two distributions of V (left) and H (right). They are overlapping.

Figure 3.4 Plots of the state-coefficients and measurement distributions versus position for the case $d = 0.5$, $\sigma = 1$, where the distributions are well separated. Position is measured in units of σ. $a = b = 1/\sqrt{2}$.

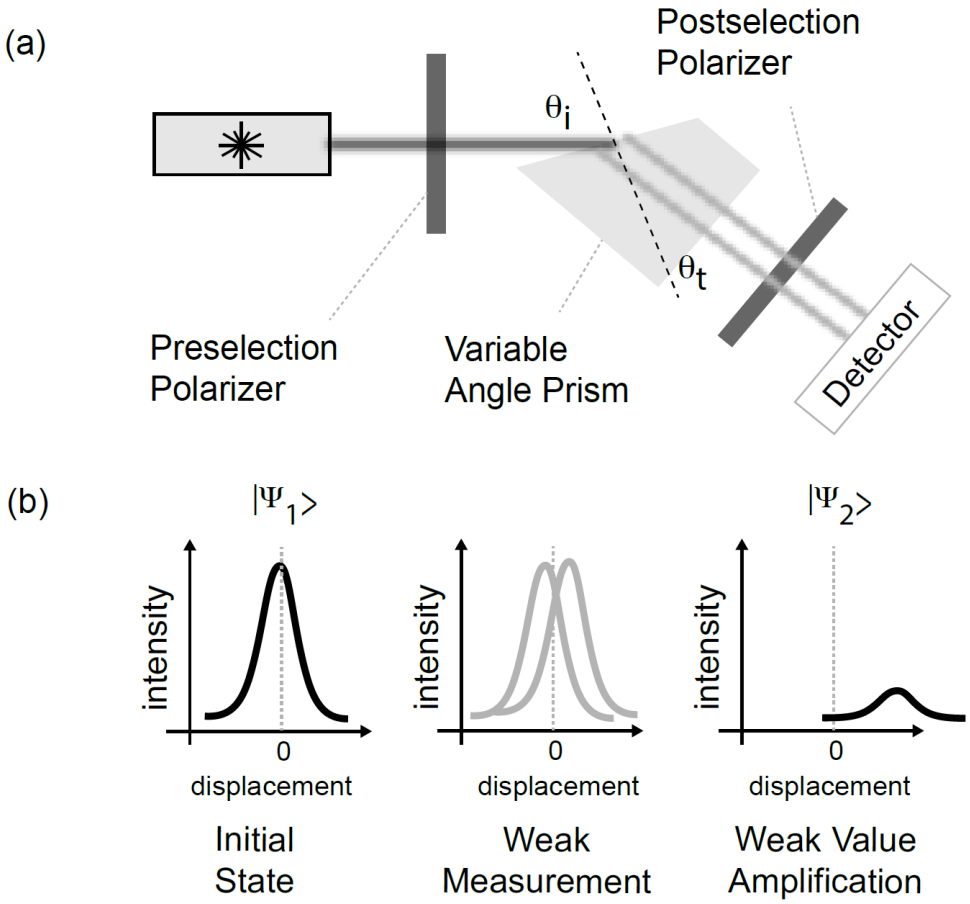
Lecture 1 - Figure 5



Lecture 1 - Figure 6



Lecture 1 - Figure 7



Lecture 1 - Figure 8