

Title: Quantum Life

Date: Nov 03, 2010 07:00 PM

URL: <http://pirsa.org/10110077>

Abstract: Recent experimental evidence suggests that living organisms are using quantum mechanics in a sophisticated fashion to enhance the efficiency of photosynthesis. Bacteria are essentially performing a quantum computation to extract energy from light. I will show how plants and bacteria perform quantum information processing, and will discuss how living creatures engage in all sorts of quantum hanky-panky in their efforts to survive and reproduce.

Quantum life

Quantum life

photosynthesis

Quantum life

photosynthesis

quantum

Quantum life

photosynthesis

quantum bird brains

Quantum life

photosynthesis

quantum bird brains

I smell a quantum

Quantum
hanky panky

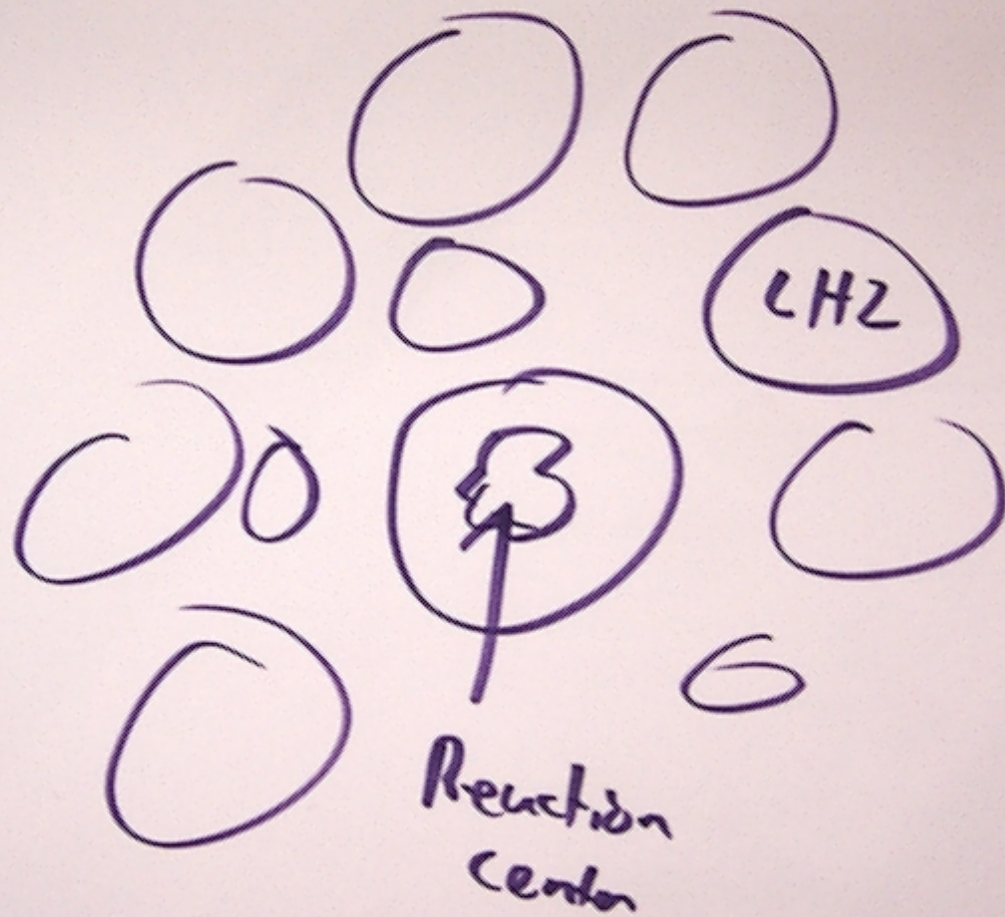
Quantum

hanky, funky

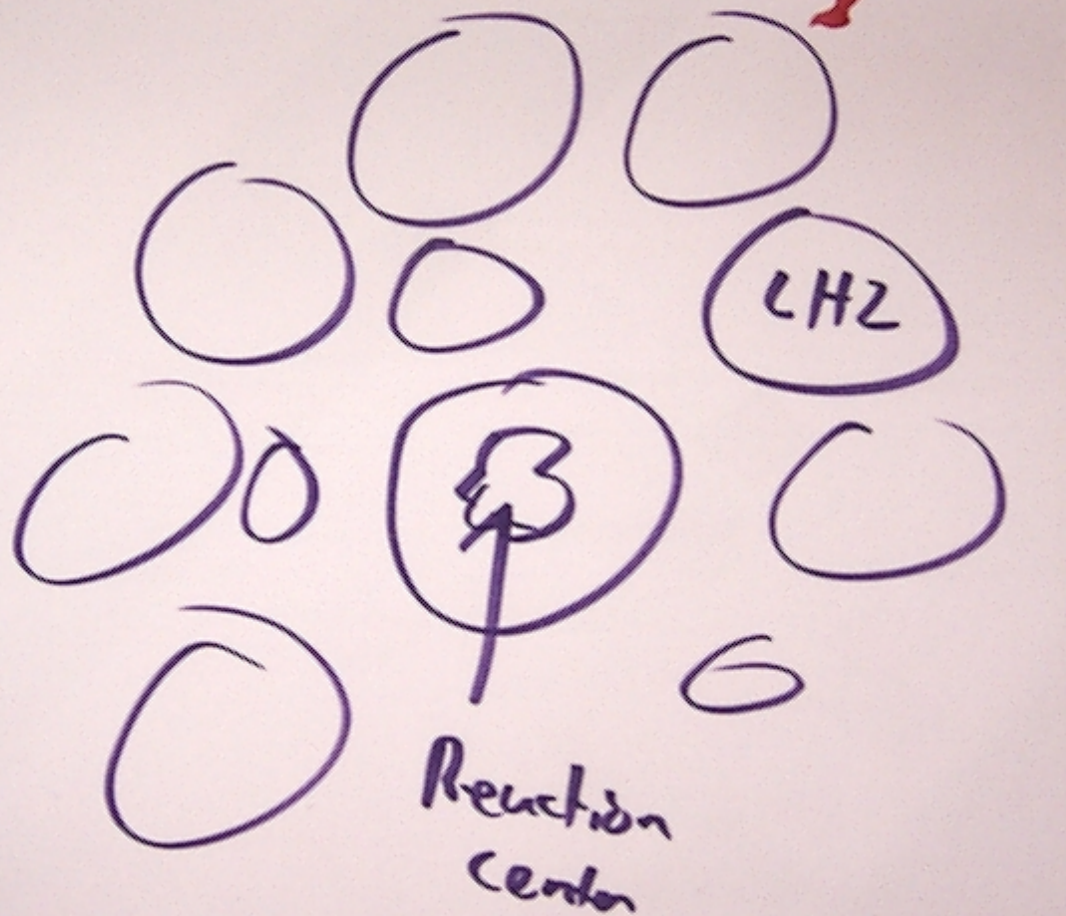
Quantum code

Photosynthesis -

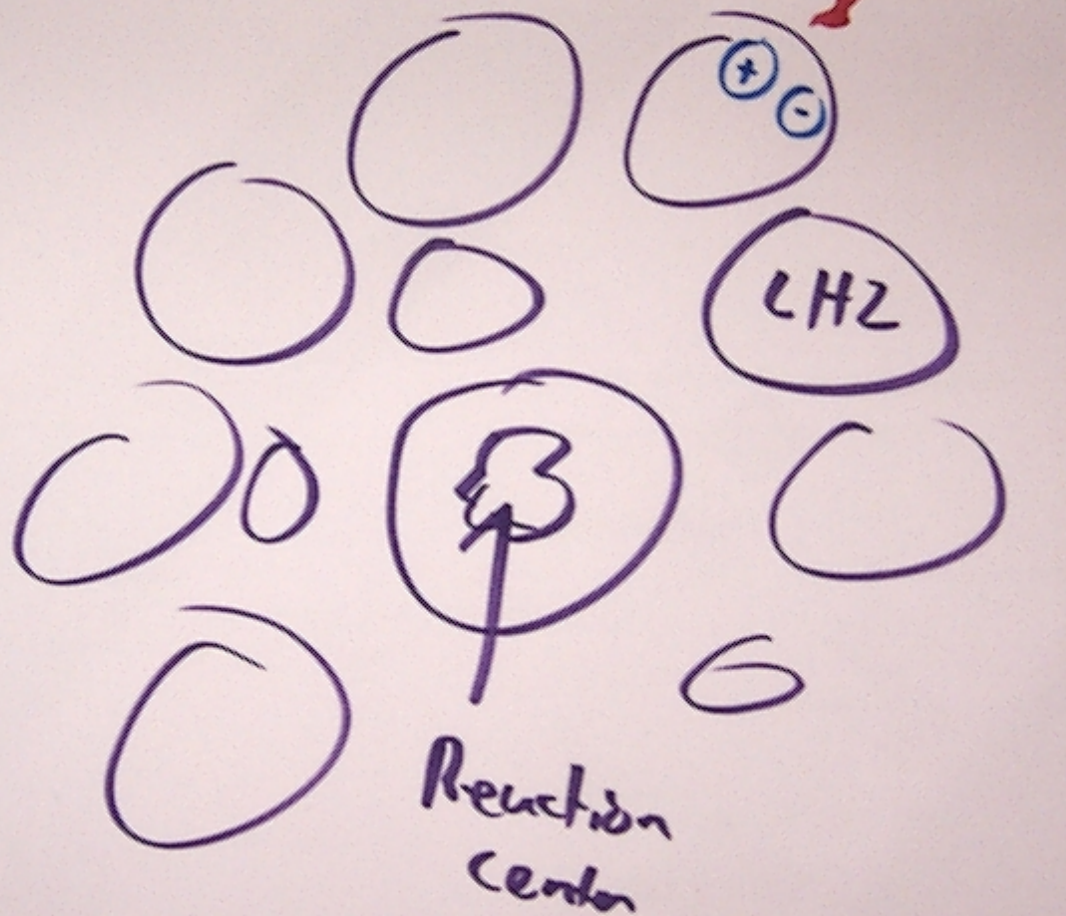
Photosynthesis -



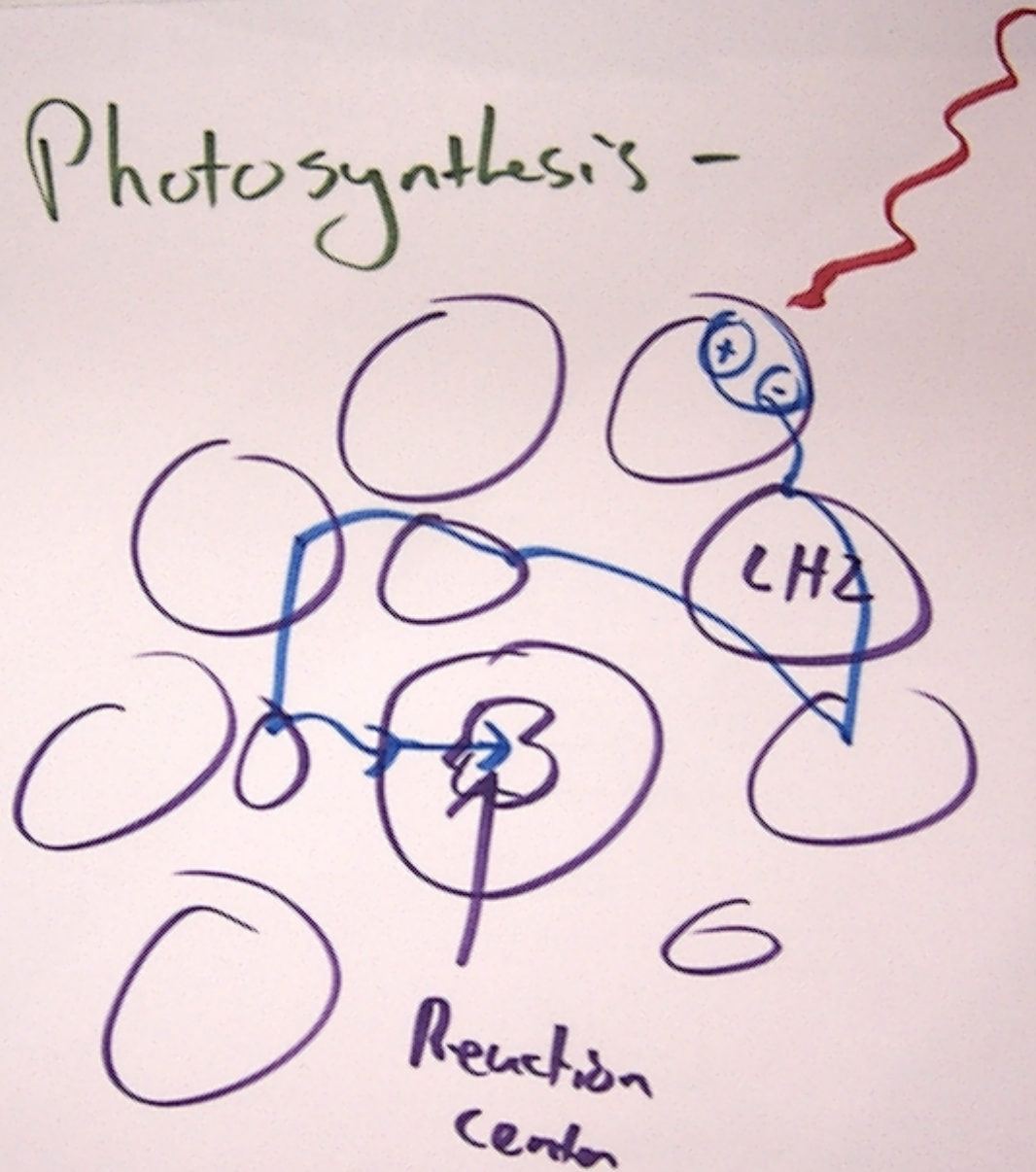
Photosynthesis -



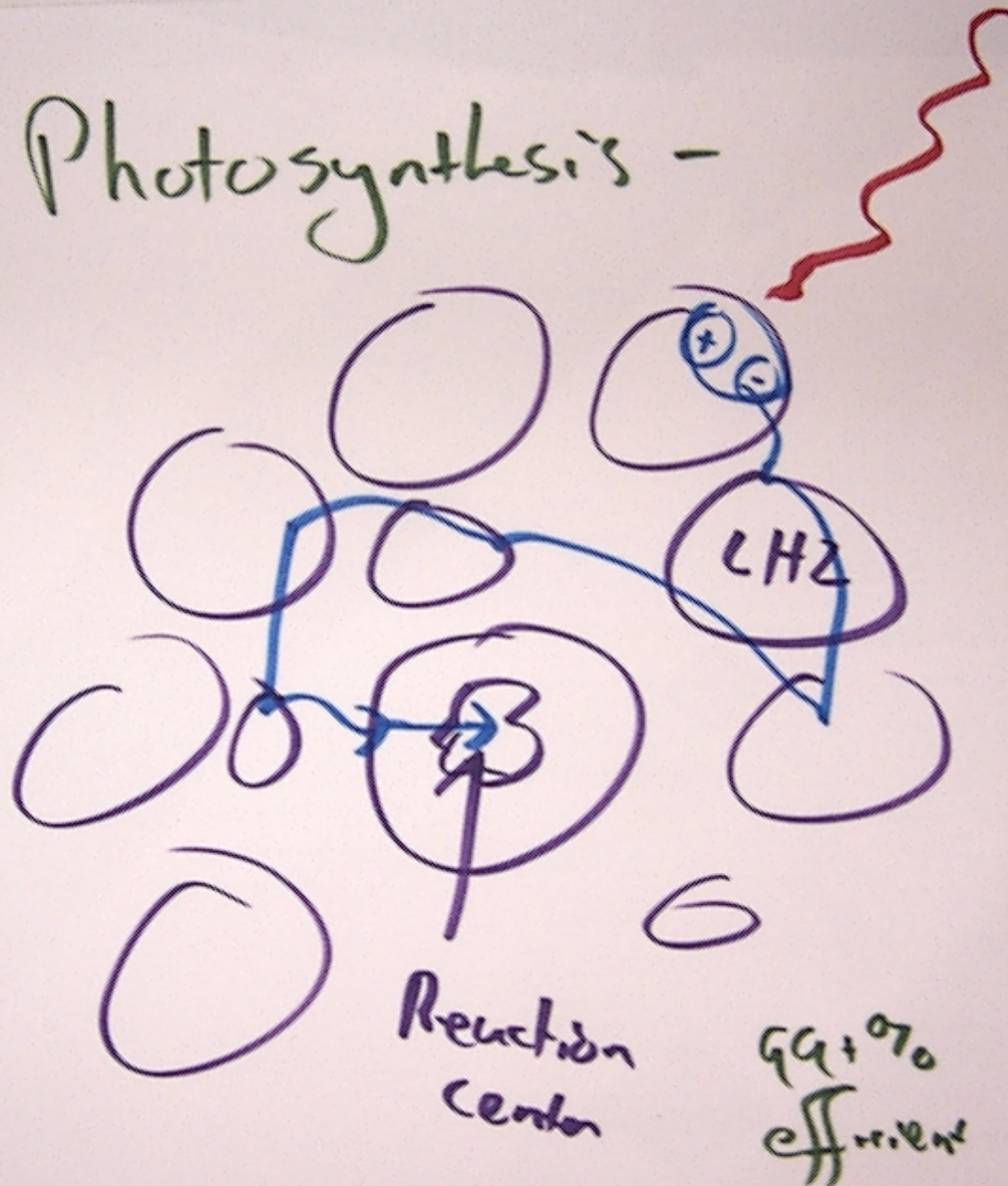
Photosynthesis -



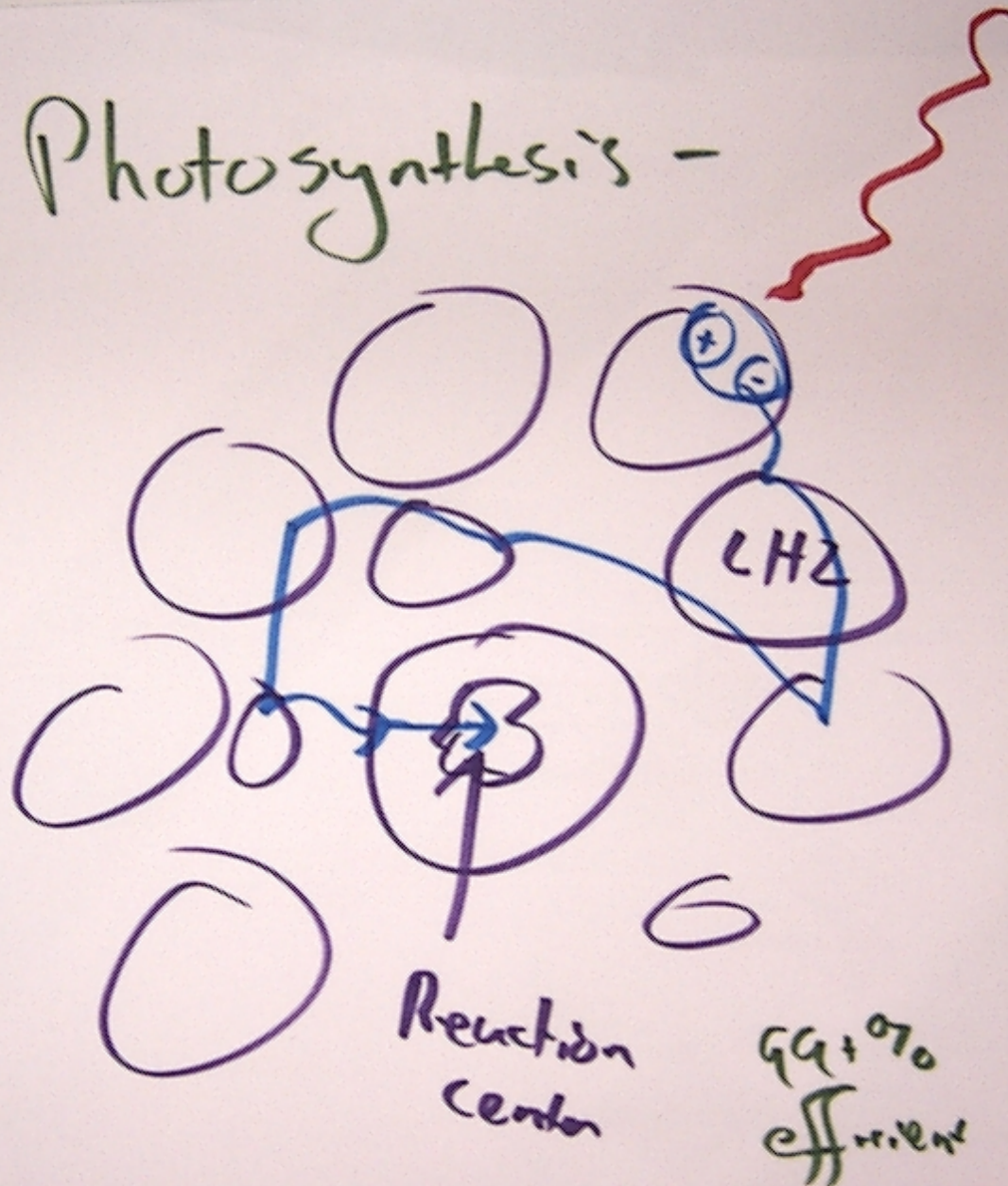
Photosynthesis -



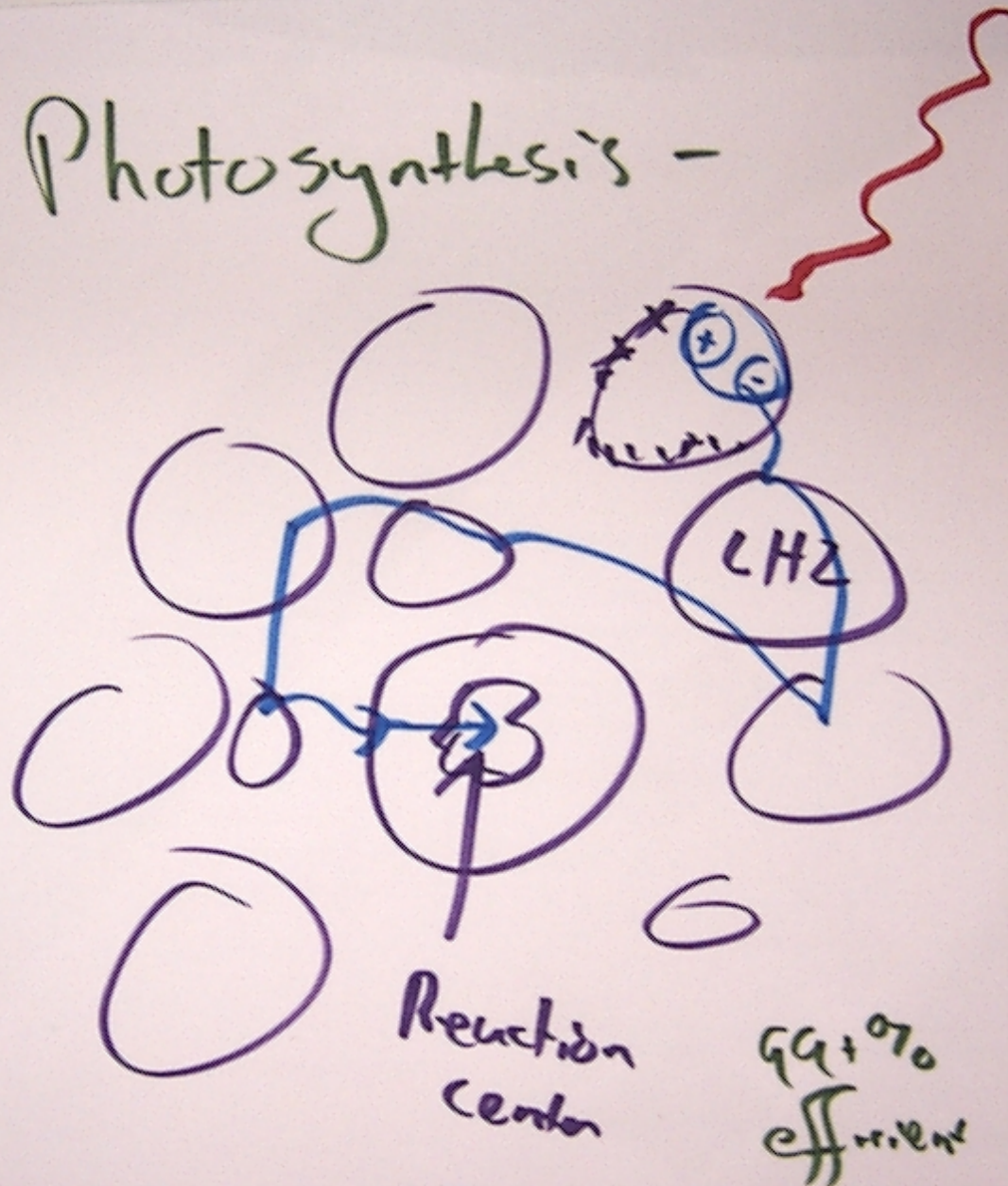
Photosynthesis -



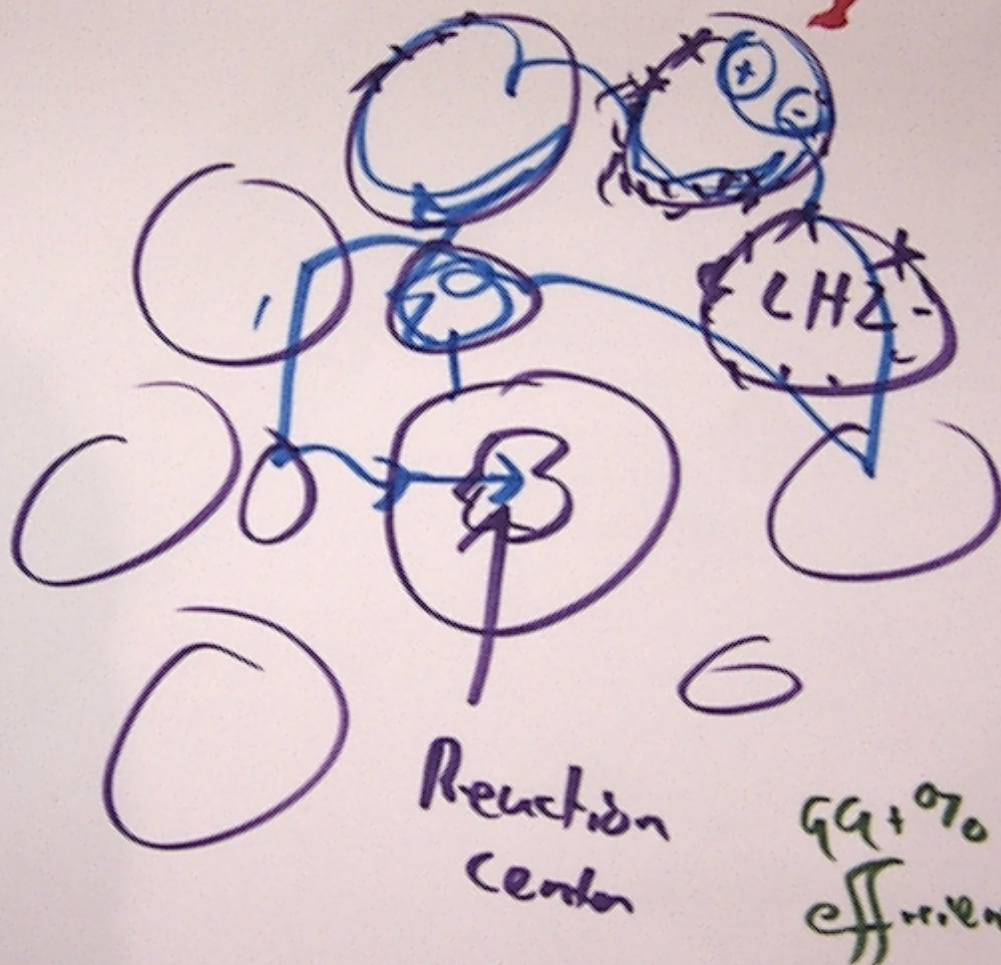
Photosynthesis -



Photosynthesis -



Photosynthesis -

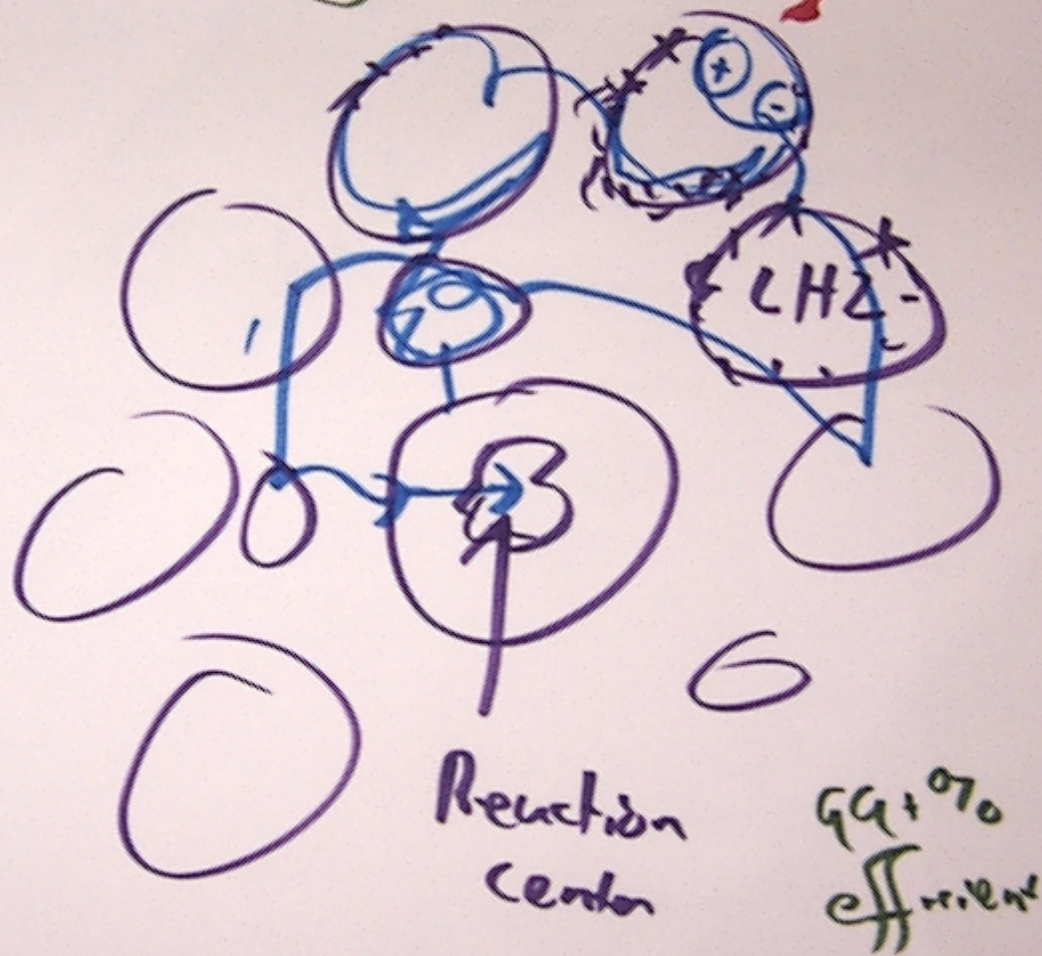


How can this transfer
process be so efficient.

quantum hanky panky.

Quantum Search

Photosynthesis -



Photosynthesis -



Reaction
Center

99+90
efficient

Quantum
random walk
is much more
efficient than
classical

Photosynthesis -



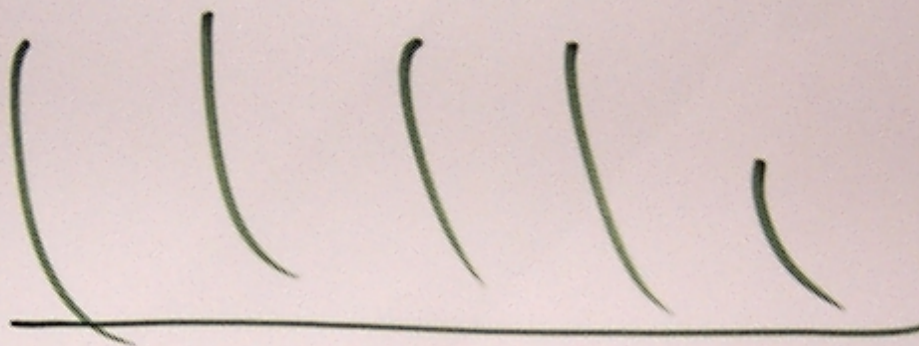
Reaction
Center

99+90
efficient

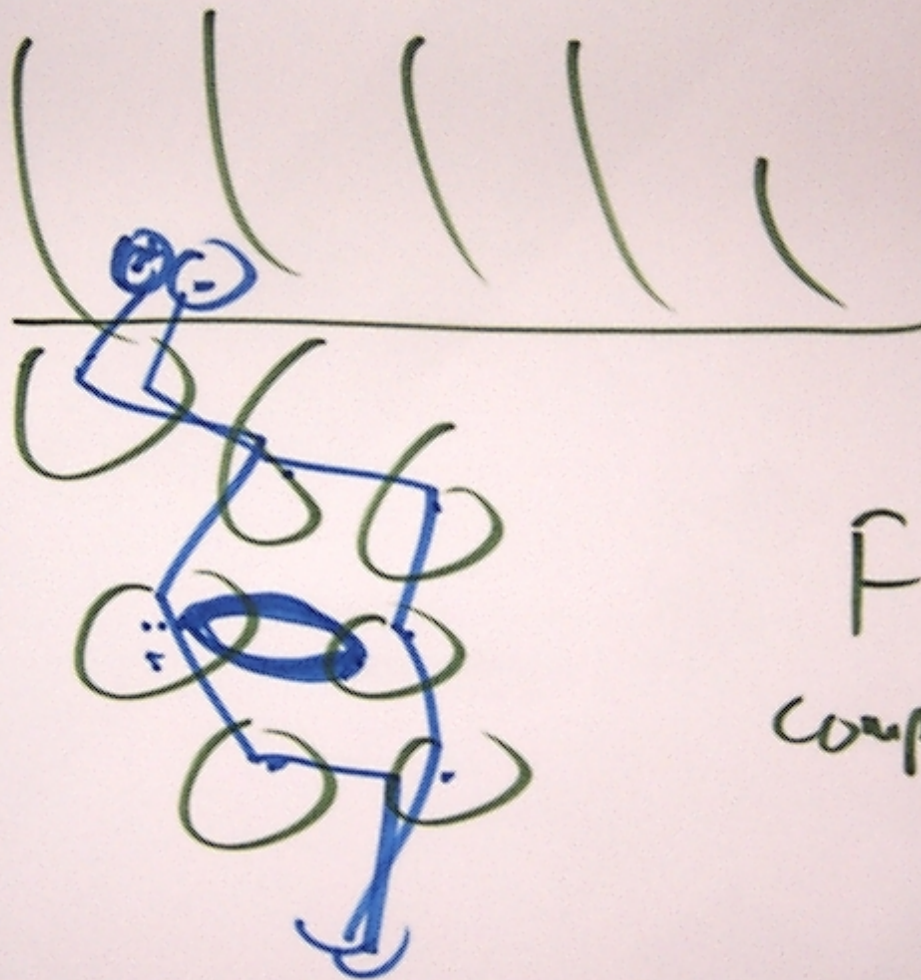
if quantum
walks to all

Green bacteria

Green bacteria



Green bacteria



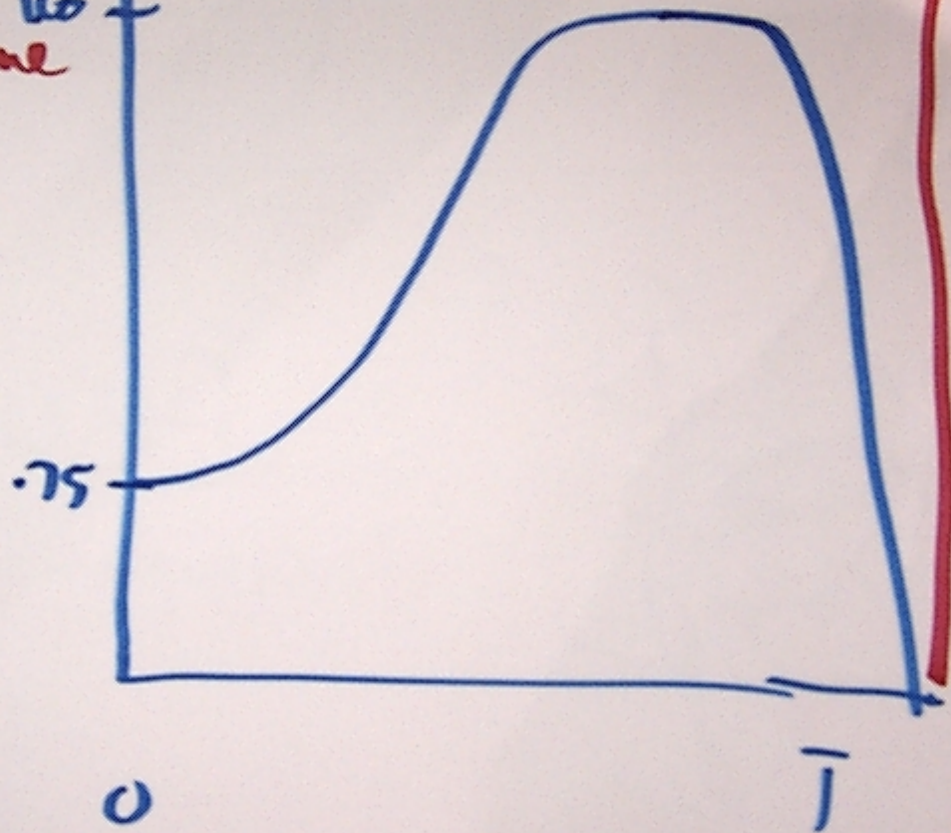
FMO
complex

effort
time

0

1

effort
time



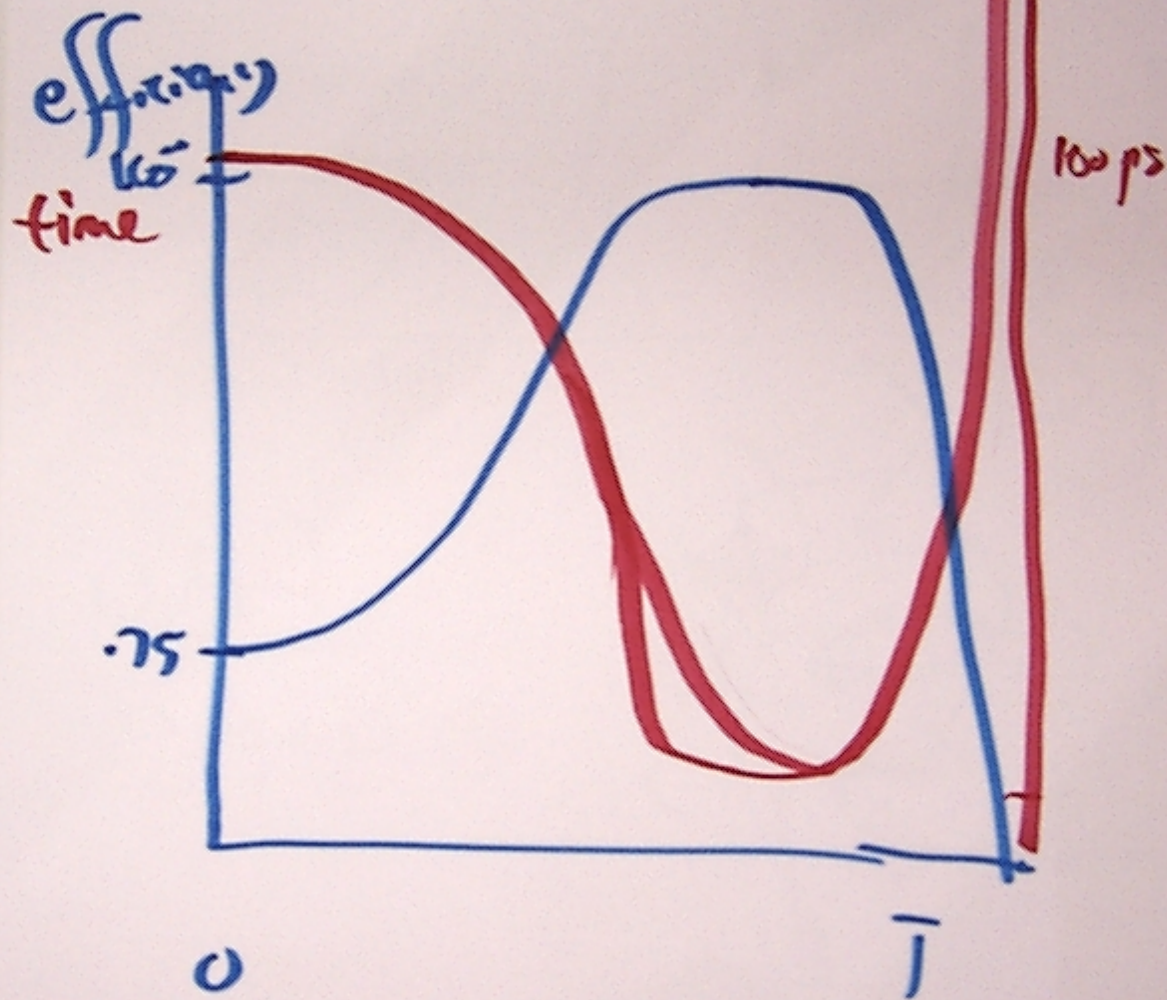
efficiency
time

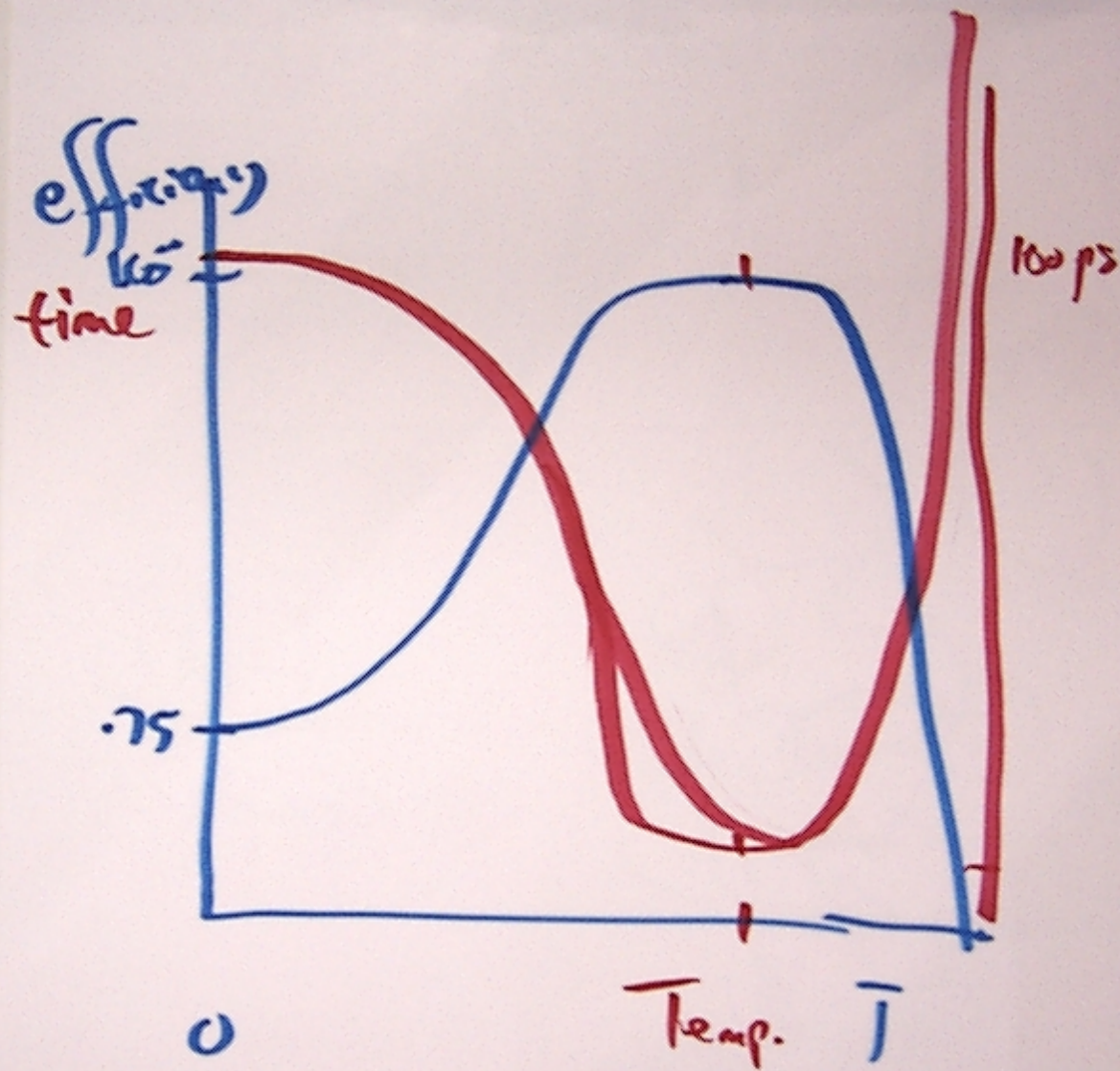
.75

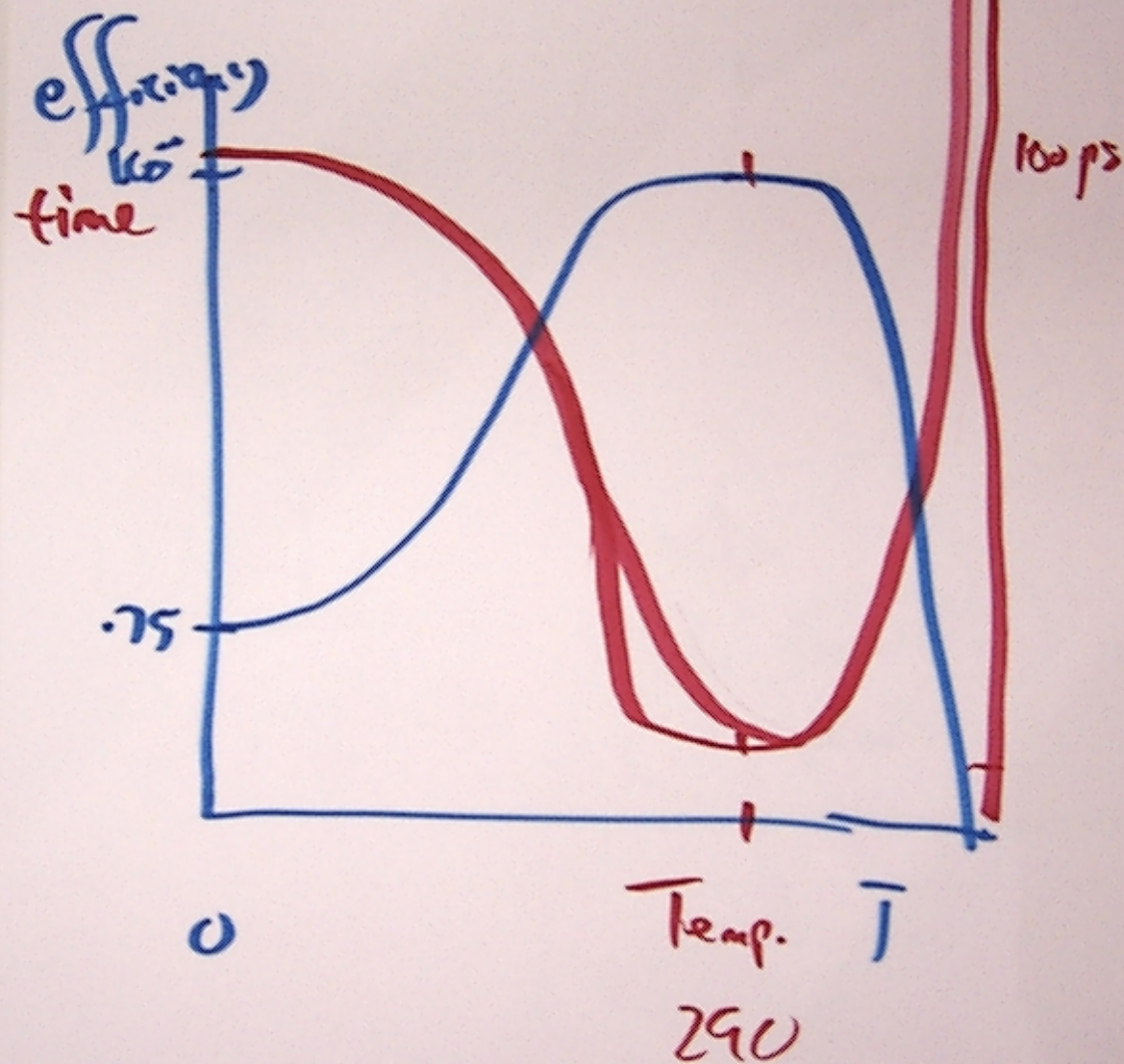
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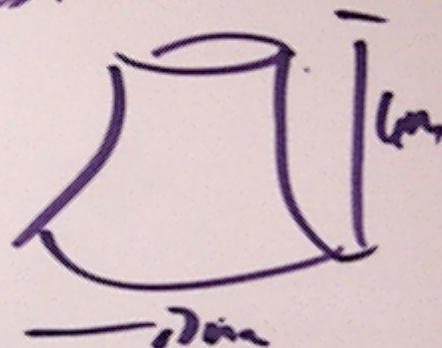
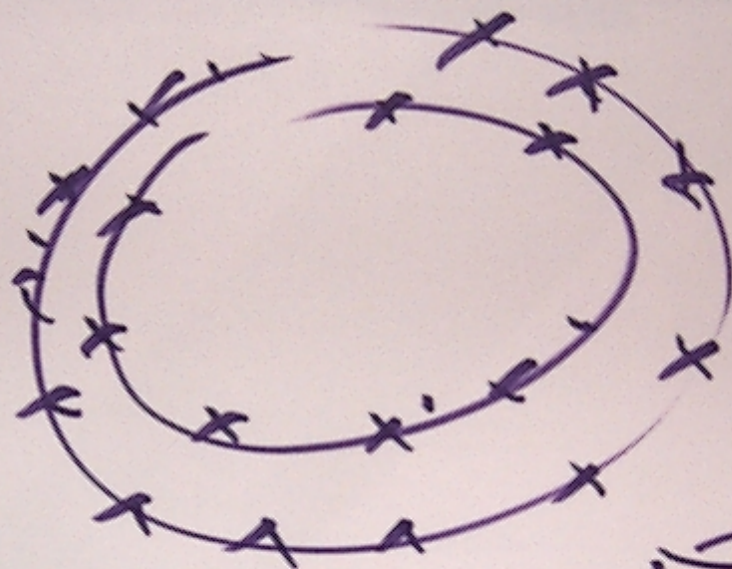
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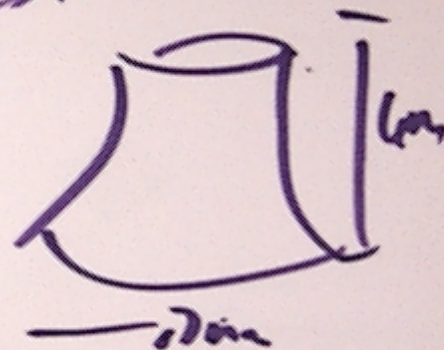
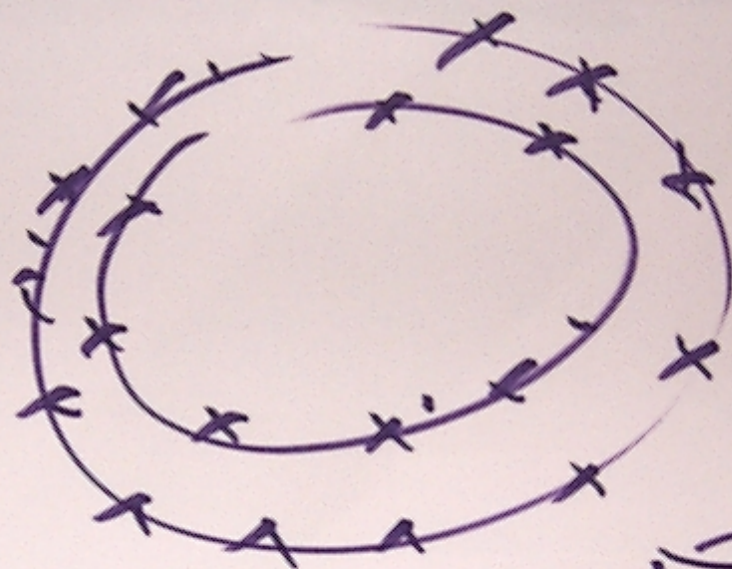
100 ps

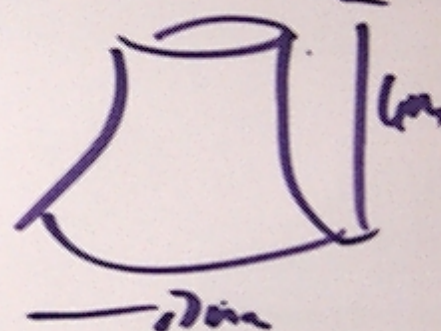
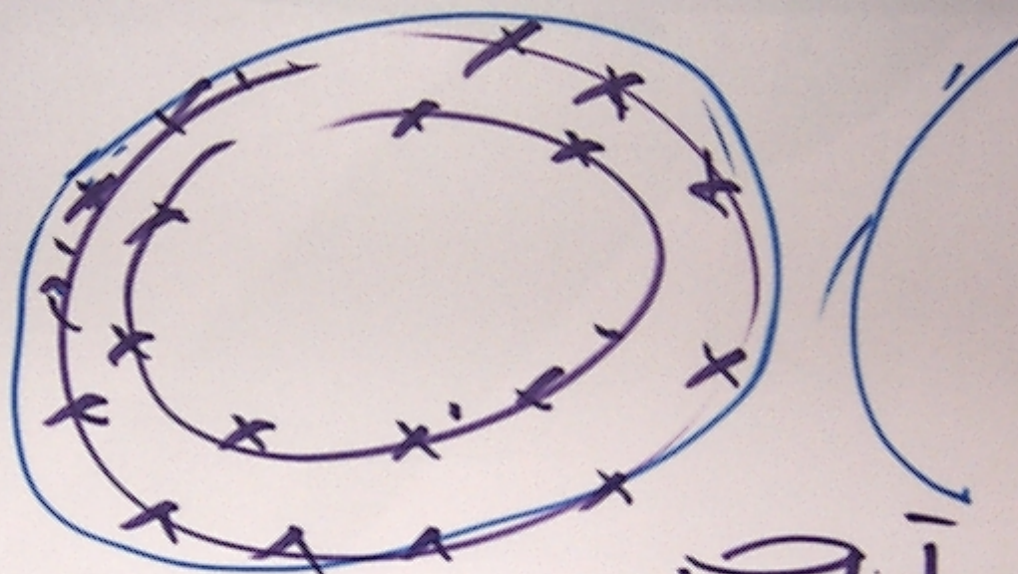


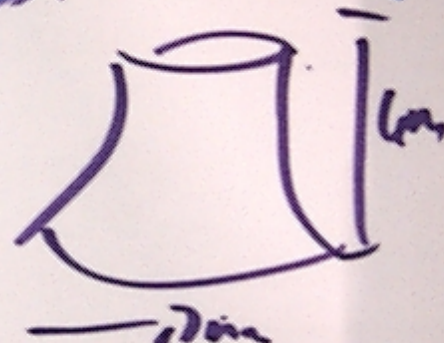
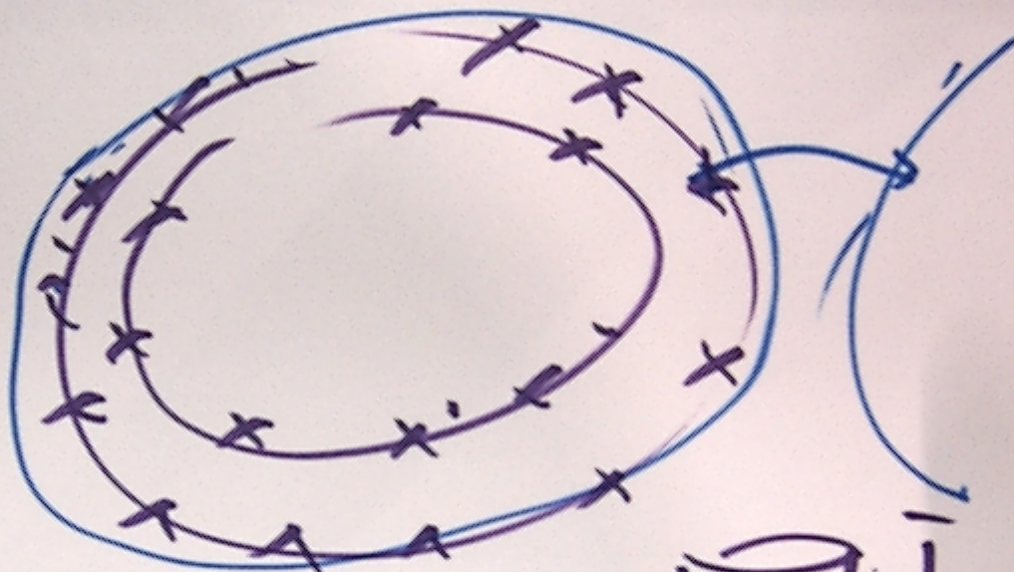


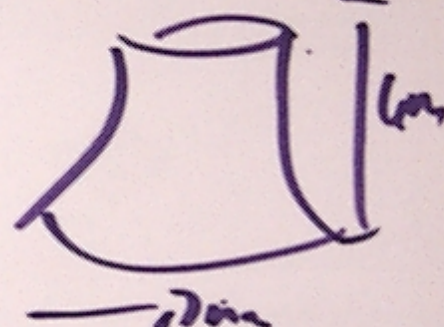
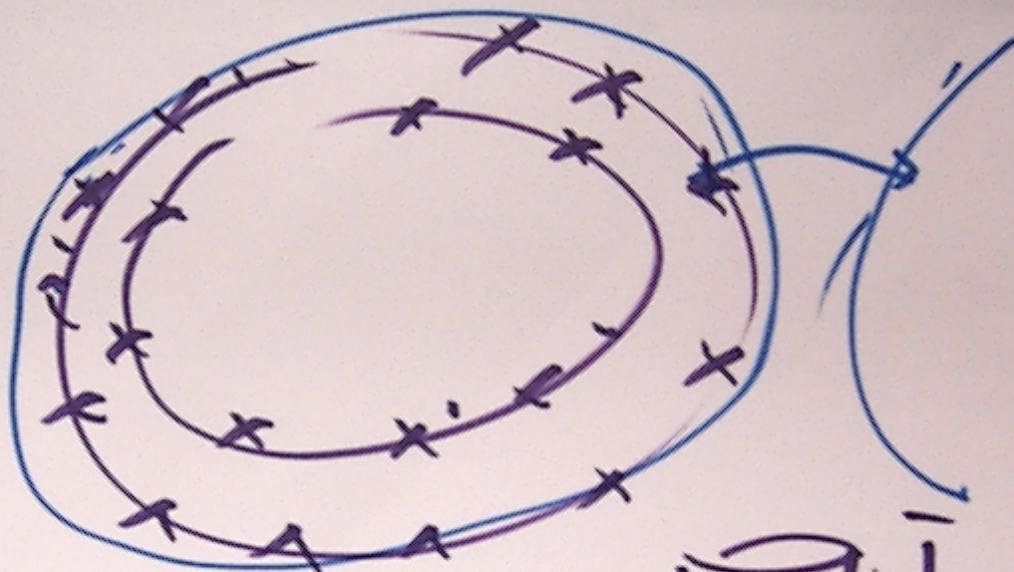






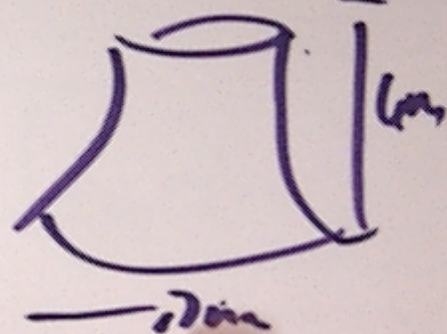
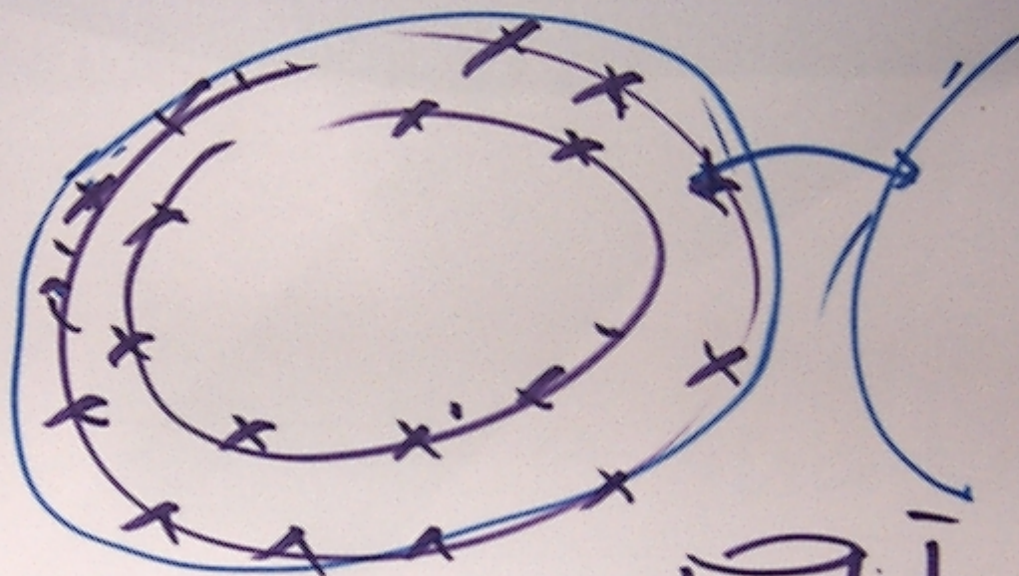






Concatenated
quantum
code

I smell a quantum
(Luca Turin)



Concealed
ant
gh

I smell a quantum
(Luca Turin)