

IA y Computación Cuántica: Una Alianza para la Revolución Tecnológica

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<https://neo.lcc.uma.es>



<https://quant.uma.es>

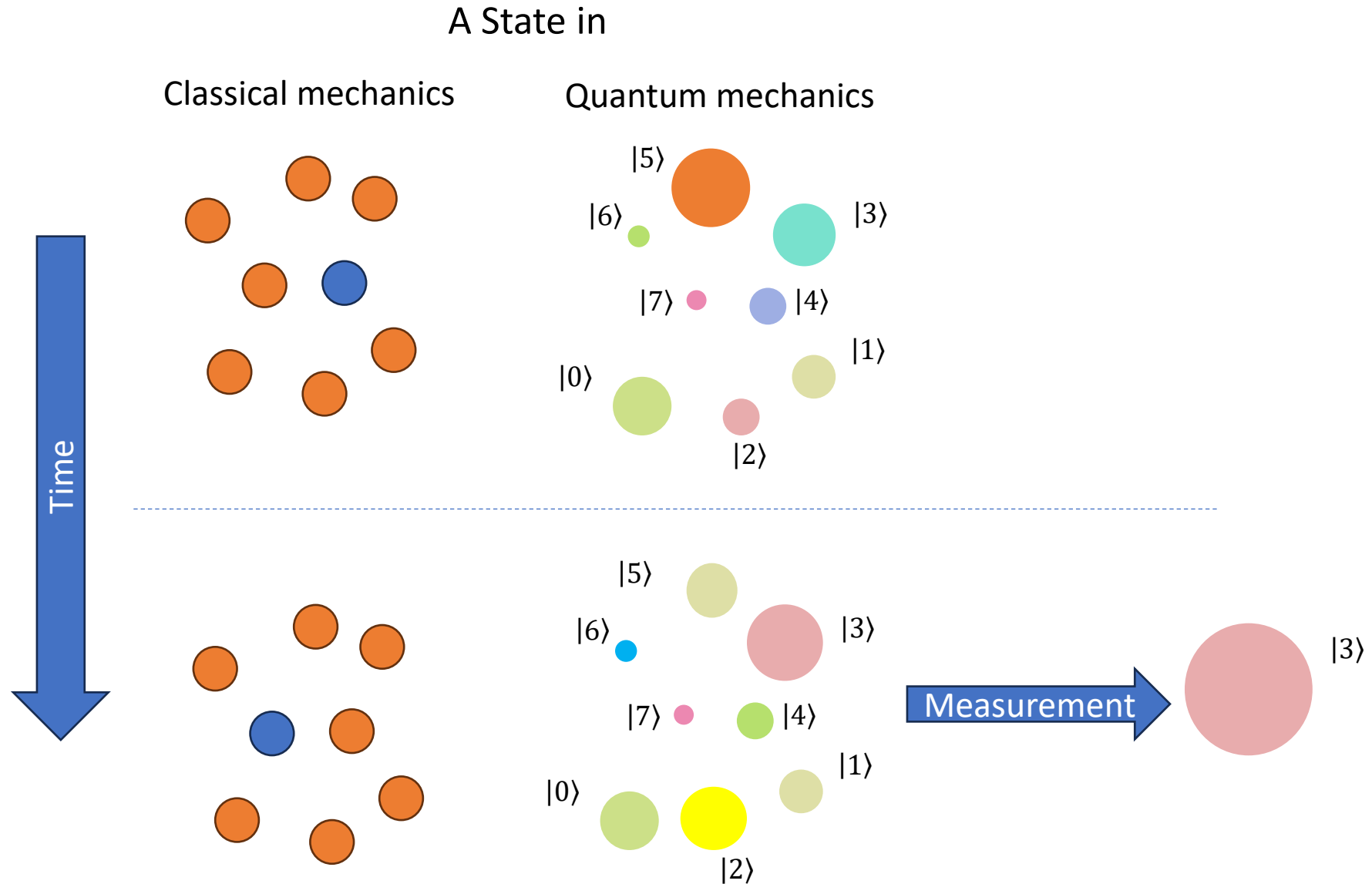


<https://itis.uma.es>



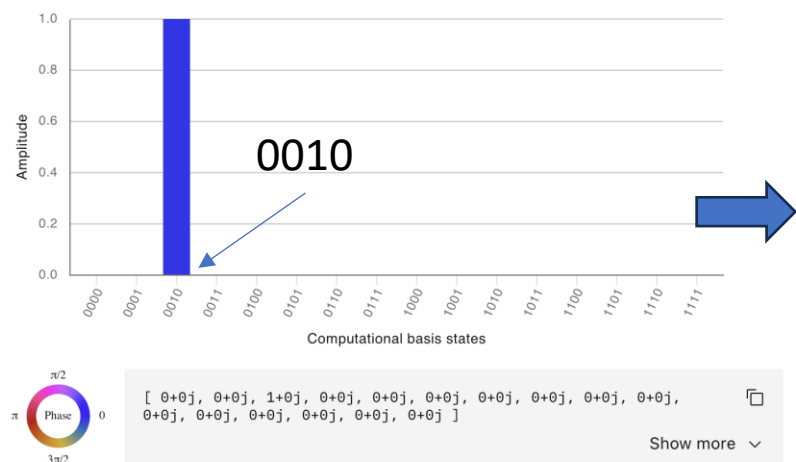
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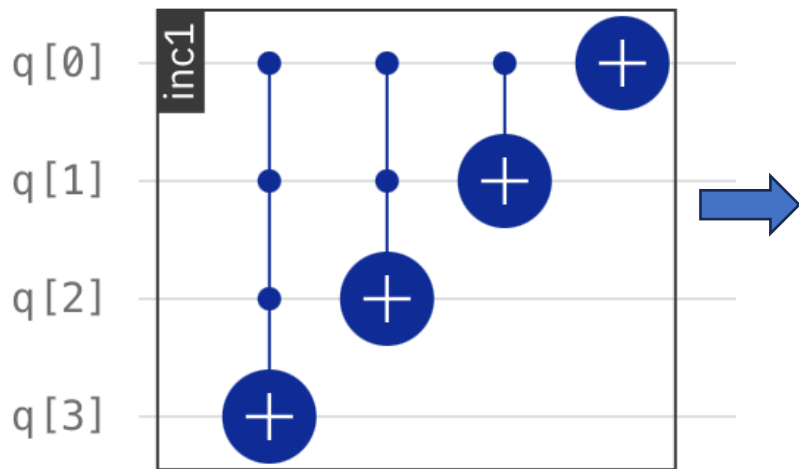


Quantum parallelism?

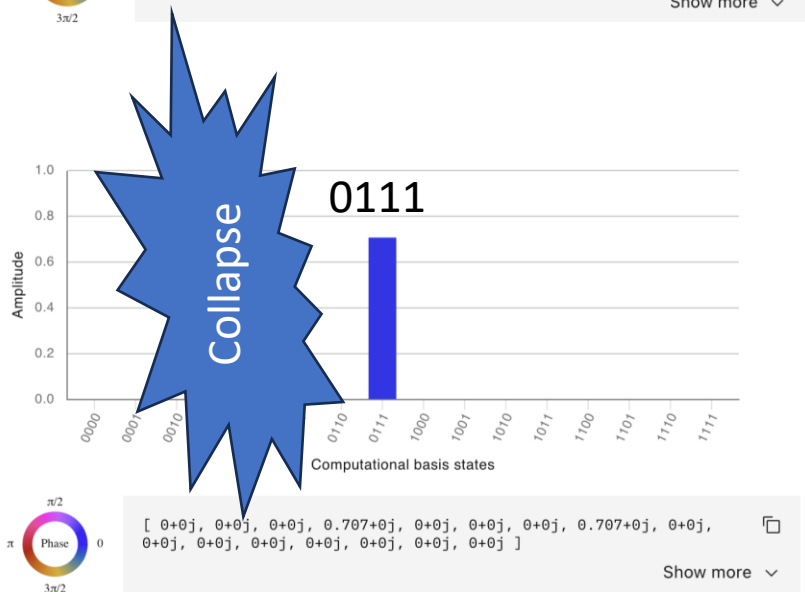
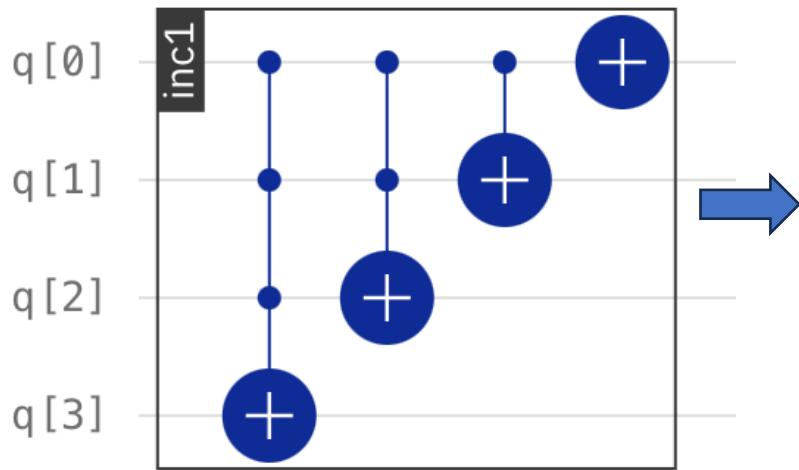
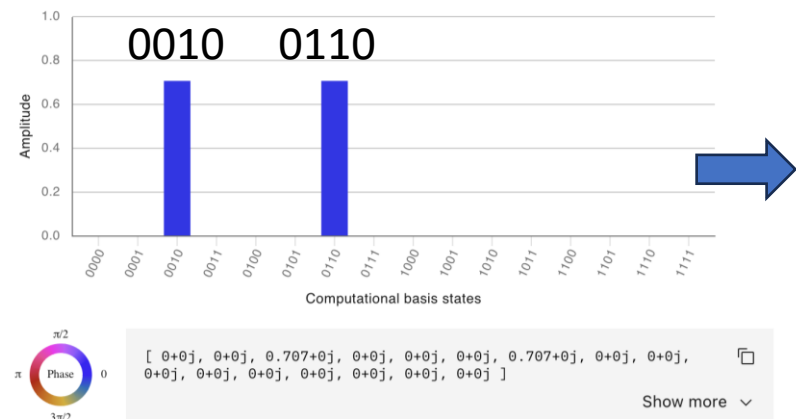
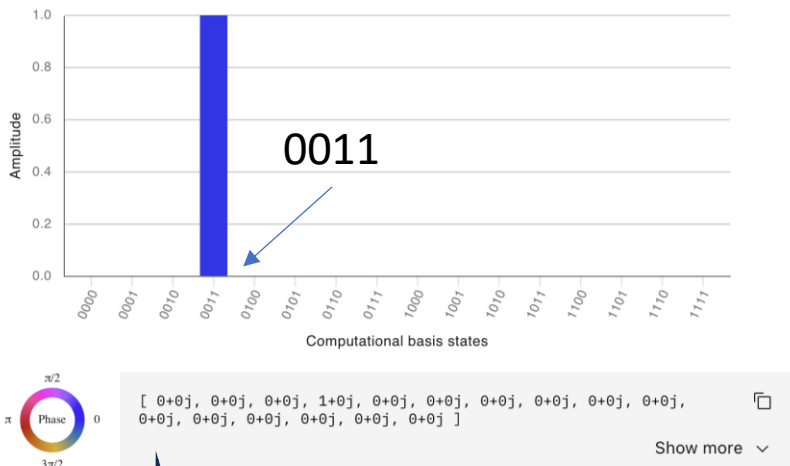
Input



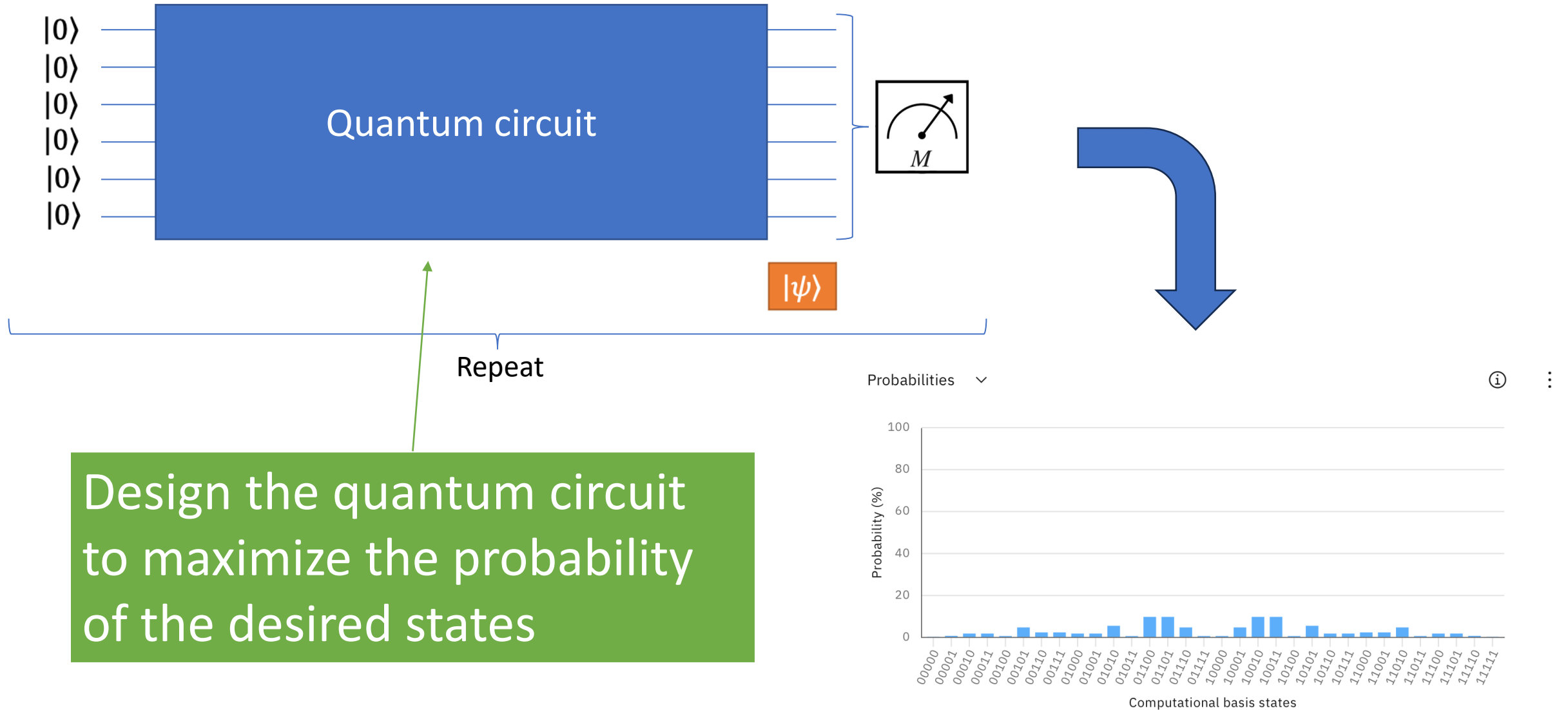
Quantum circuit



Output



“Programming” quantum computers



Design the quantum circuit to maximize the probability of the desired states

Artificial Intelligence, since...when?

BULLETIN OF
MATHEMATICAL BIOPHYSICS
VOLUME 5, 1943

A LOGICAL CA
IDEAS IMMANENT

WARREN S. MCCUI

FROM THE UNIVERSITY OF
DEPARTMENT OF PSYCHIATRY AT T
AND THE UN

Because of the "all-or-none
events and the relations among
sitional logic. It is found that th
in these terms, with the addition
nets containing circles; and the
certain conditions, one can find a

Intelligent Machinery

1948

A. M. Turing
[1912—1954]

Abstract

The possible ways in which machinery mi
behaviour are discussed. The analogy with
guiding principle. It is pointed out that

1956 Dartmouth Conference: The Founding Fathers of AI



John McCarthy



Marvin Minsky



Claude Shannon



Ray Solomonoff



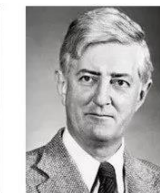
Alan Newell



Herbert Simon



Arthur Samuel



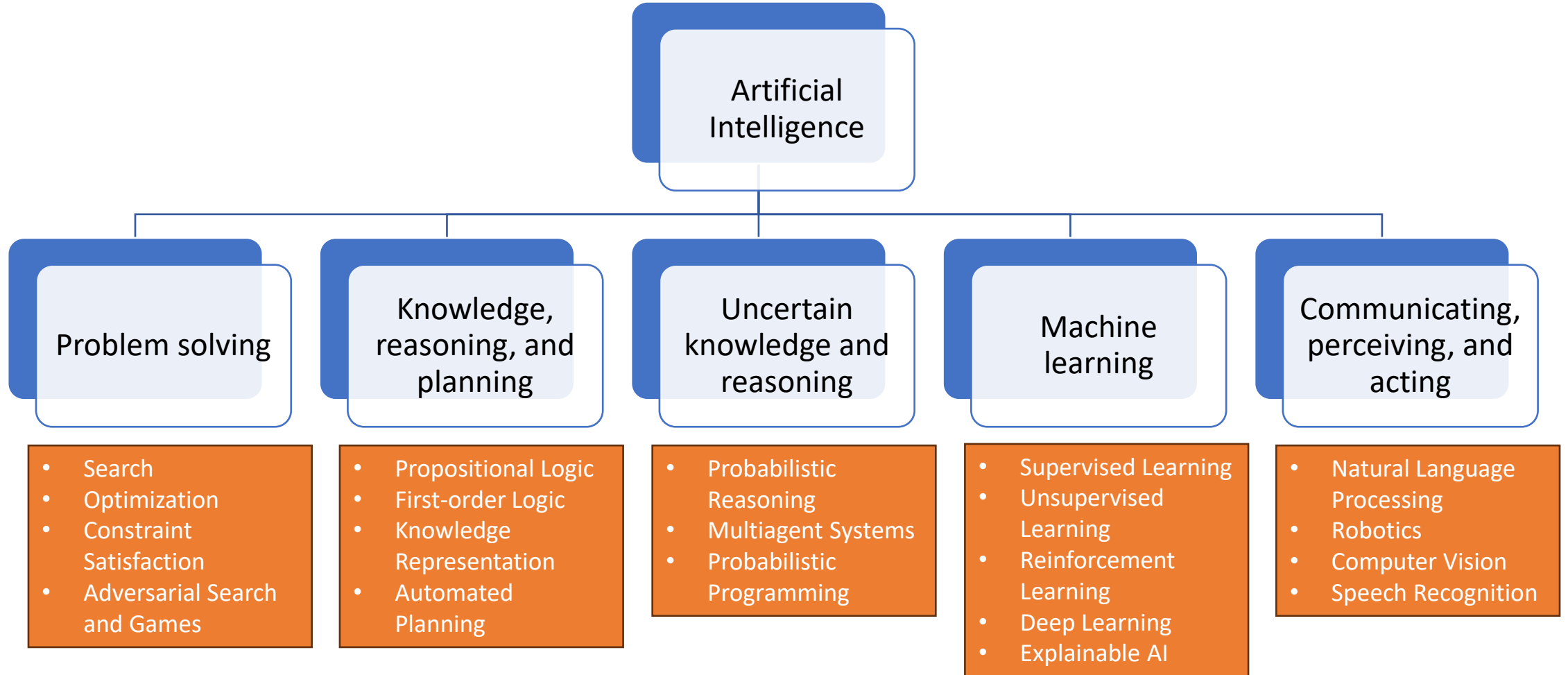
Oliver Selfridge



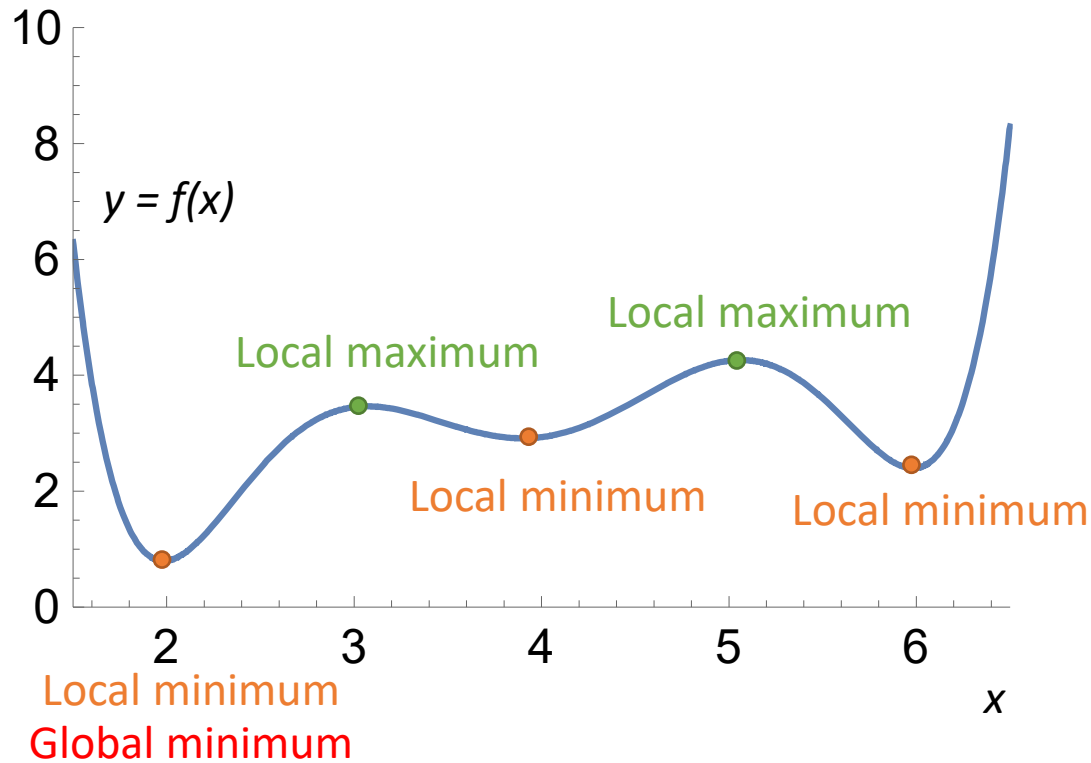
Nathaniel Rochester



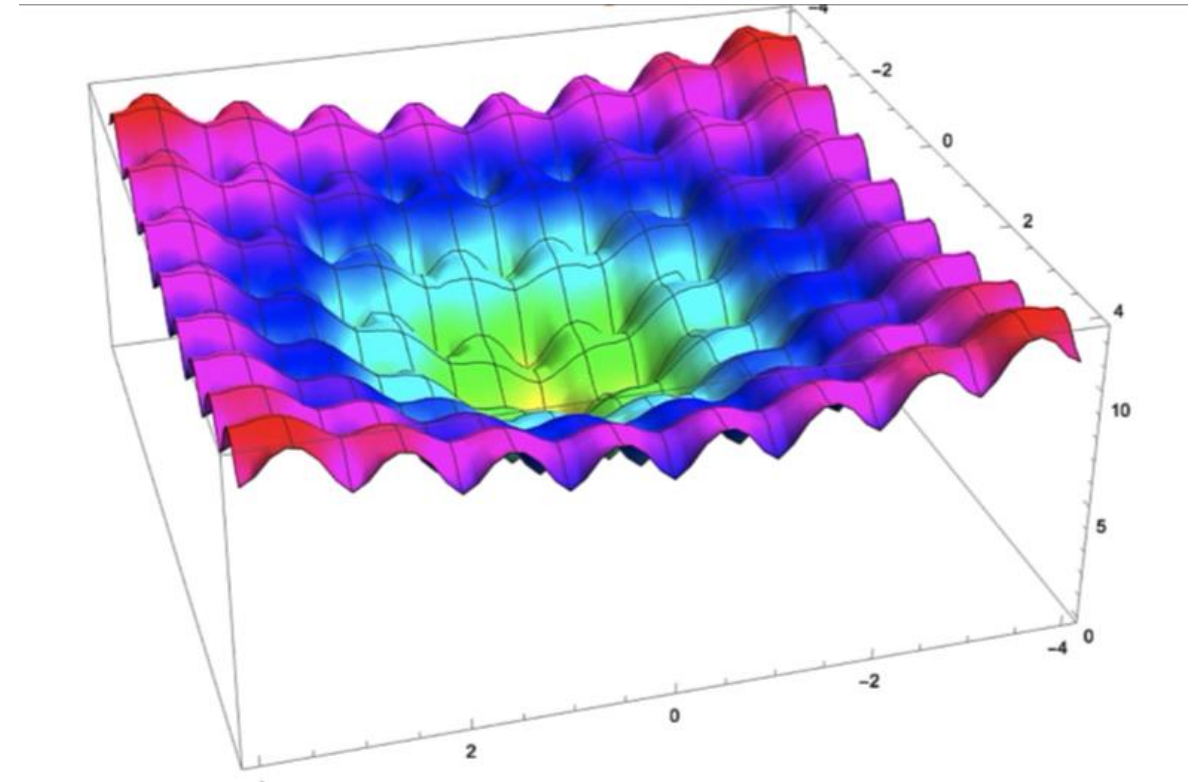
Trenchard More



What is optimization?



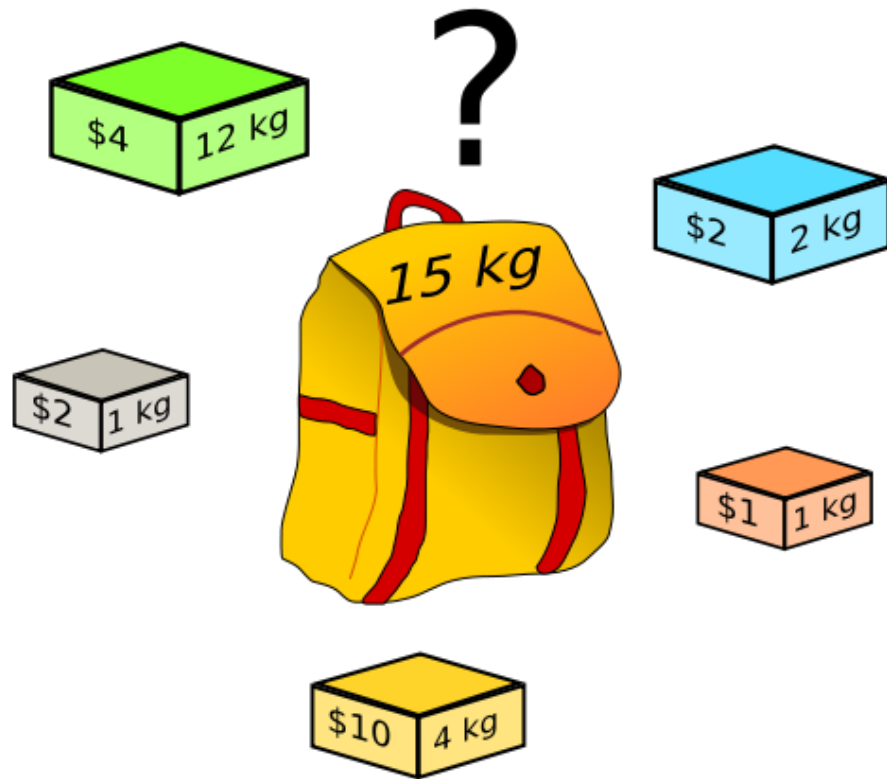
$$f(x) = \frac{x^6}{6} - 4x^5 + \frac{155x^4}{4} - \frac{580x^3}{3} + 522x^2 - 719.6x + 396$$



Ackley function

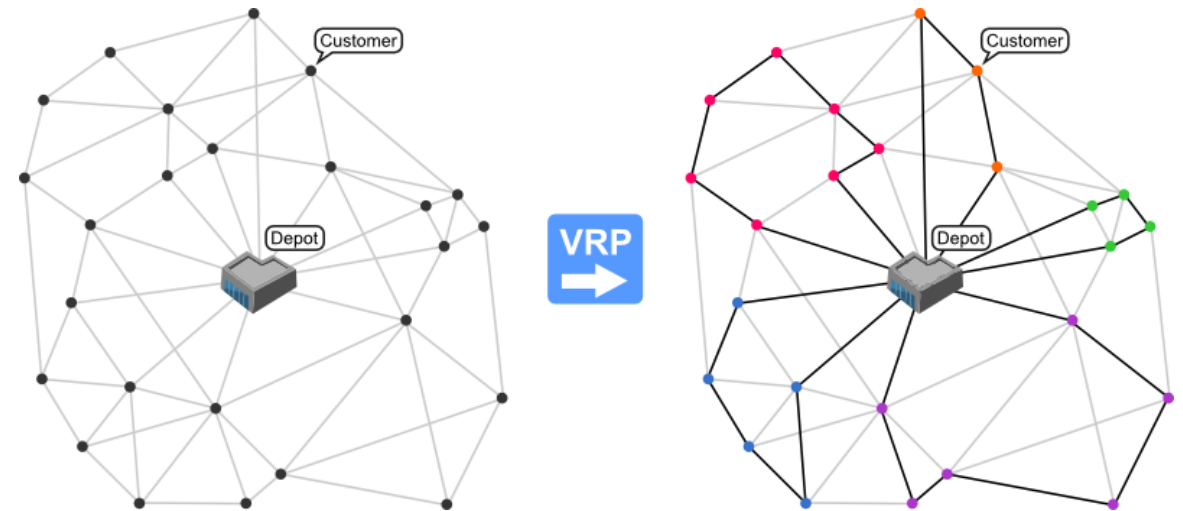
$$f(x, y) = -20 \exp\left(-0.2\sqrt{0.5(x^2 + y^2)}\right) - \exp(0.5(\cos(2\pi x) + \cos(2\pi y))) + e + 20$$

0-1 Knapsack Problem



Source: Wikimedia Commons

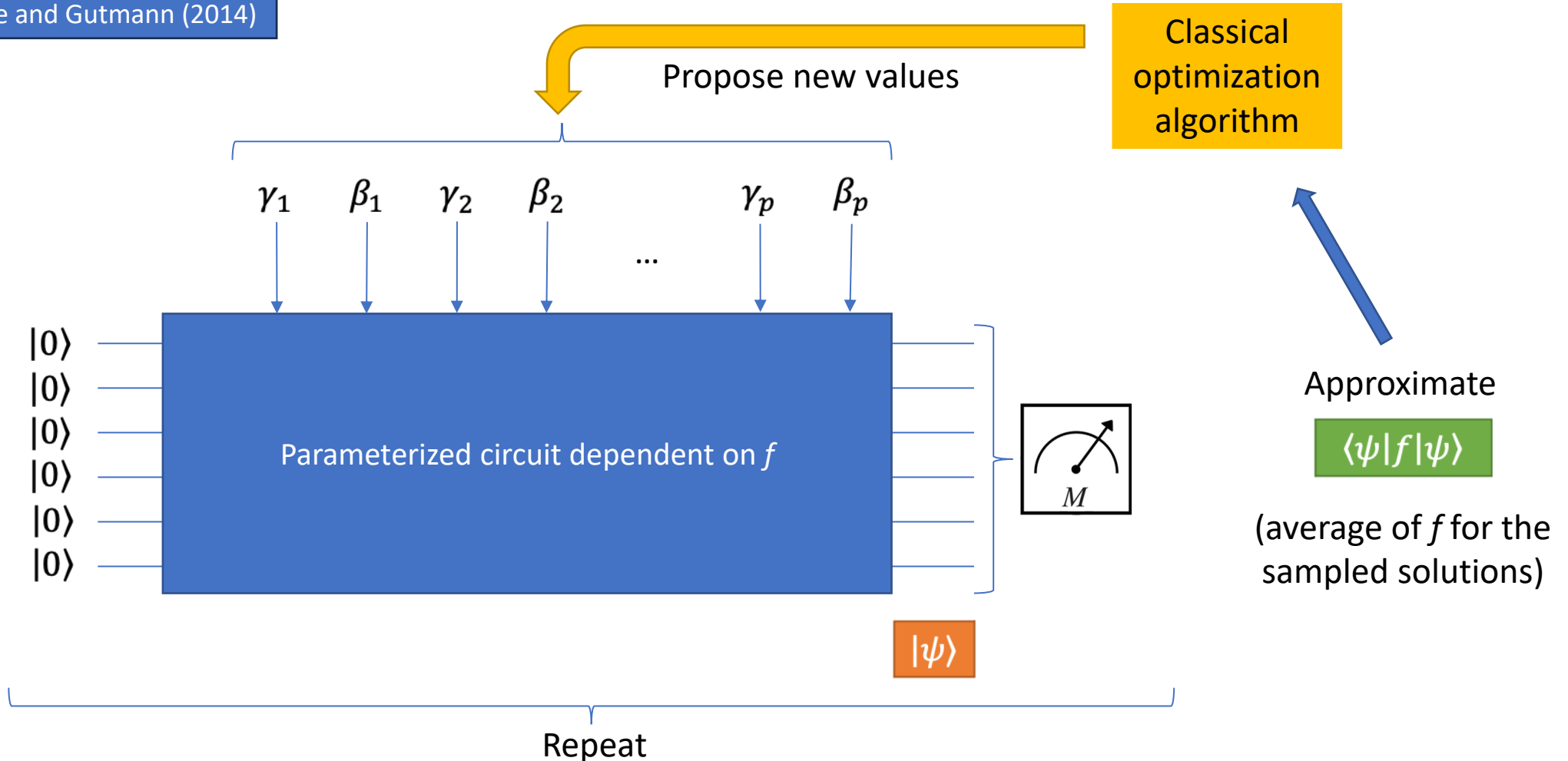
Vehicle Routing Problem

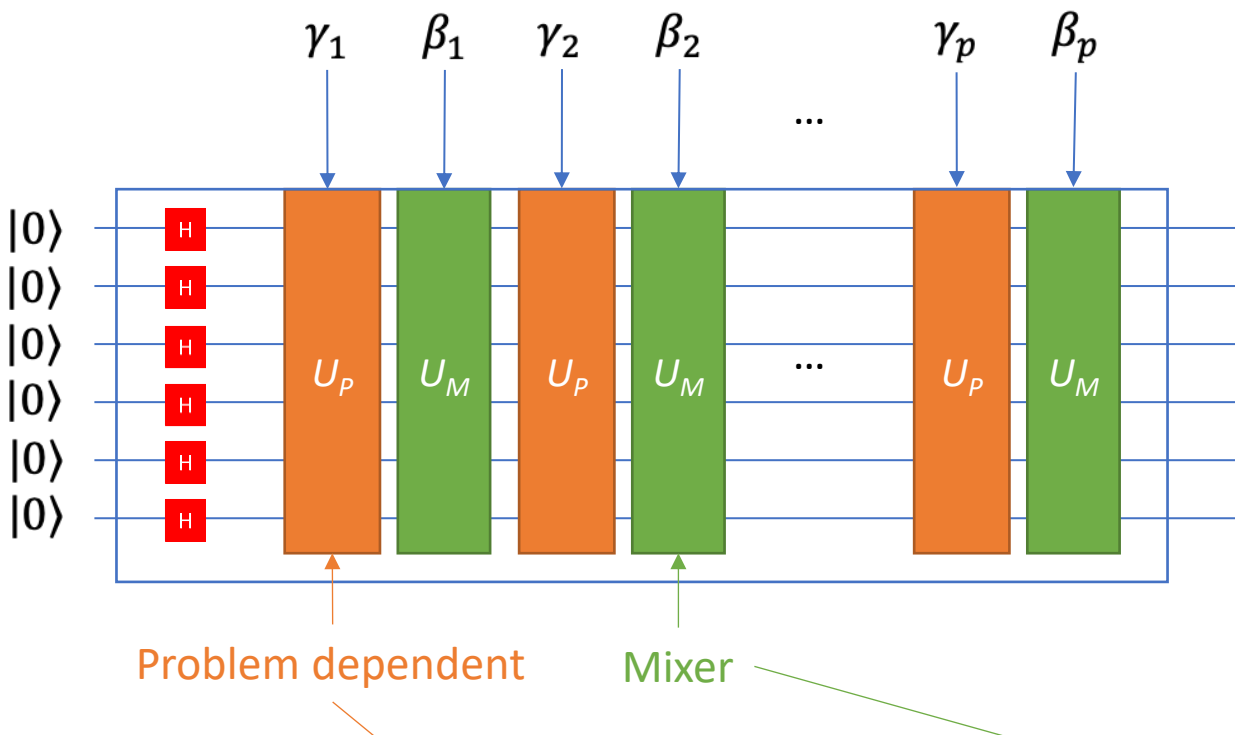


Source: <https://neo.lcc.uma.es/vrp>

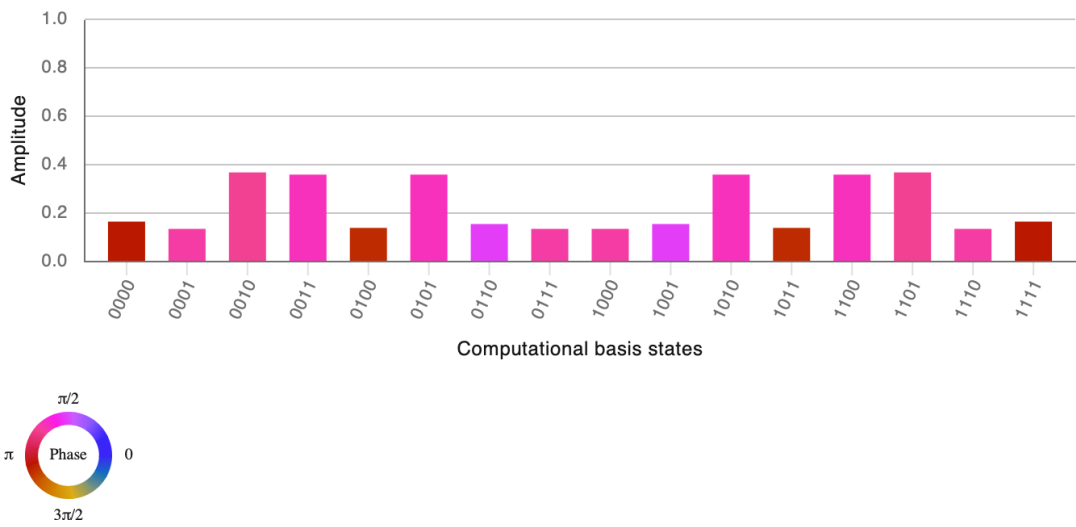
Quantum Approximate Optimization Algorithm (QAOA)

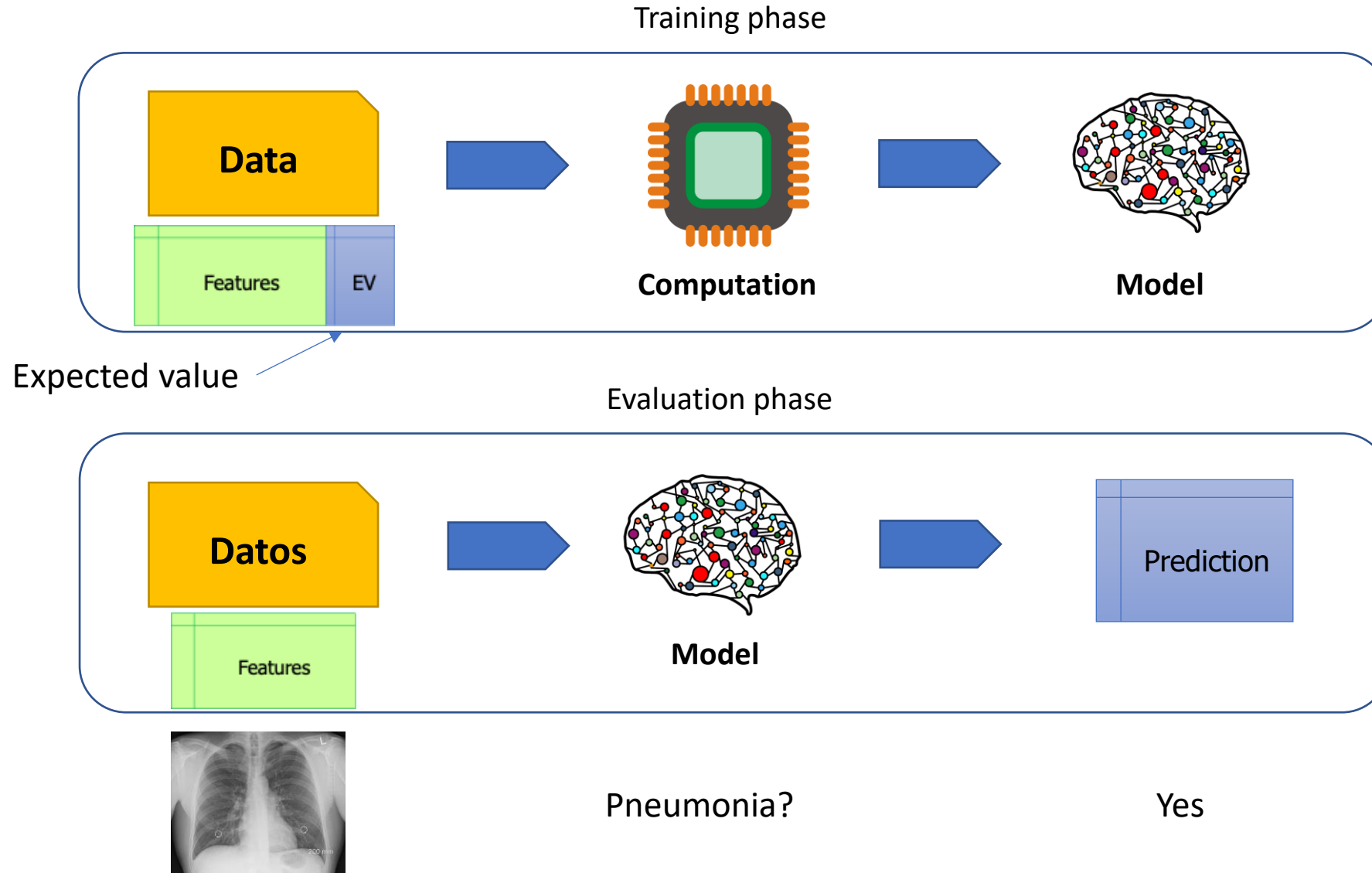
Farhi, Goldstone and Gutmann (2014)

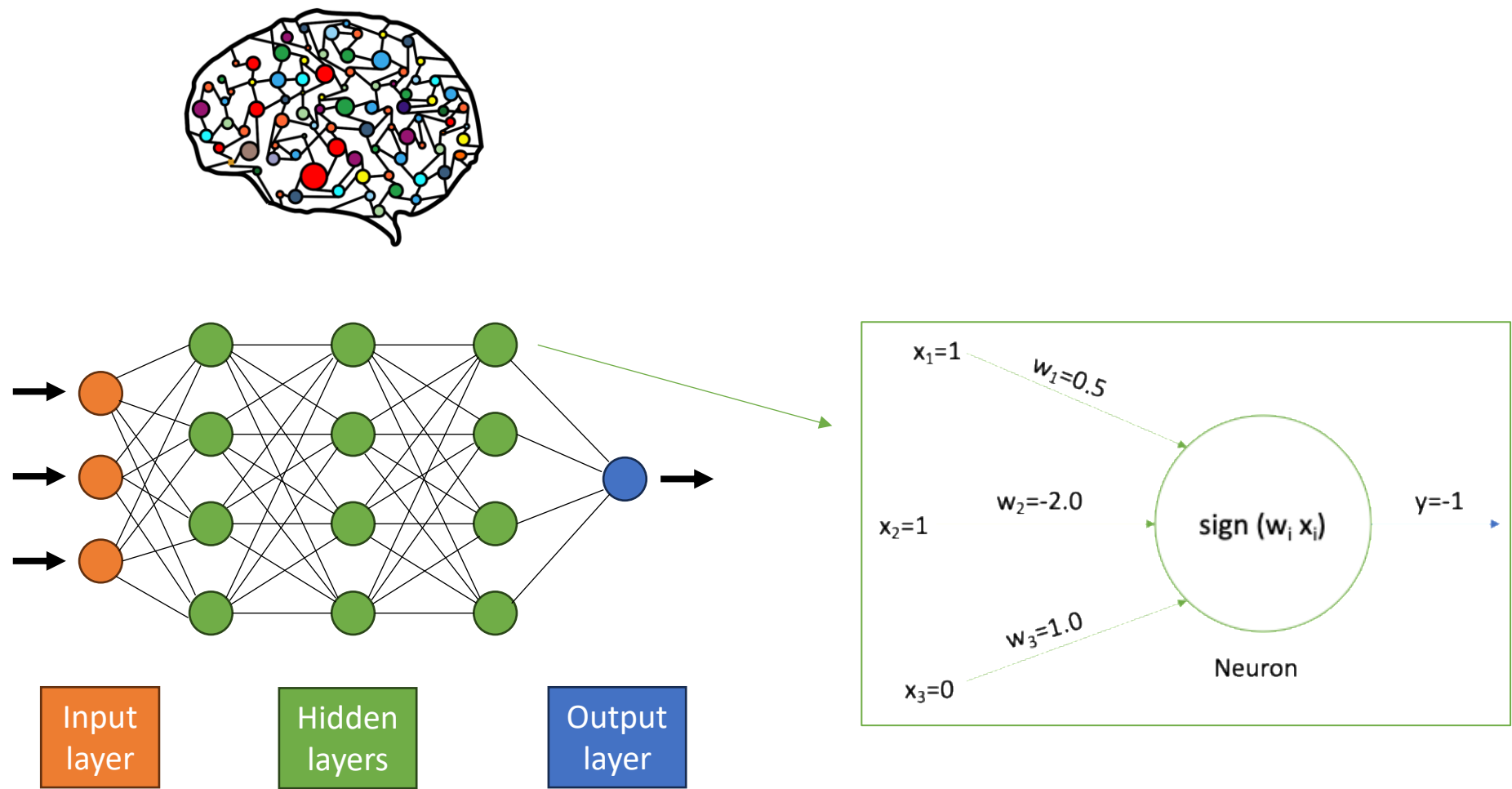




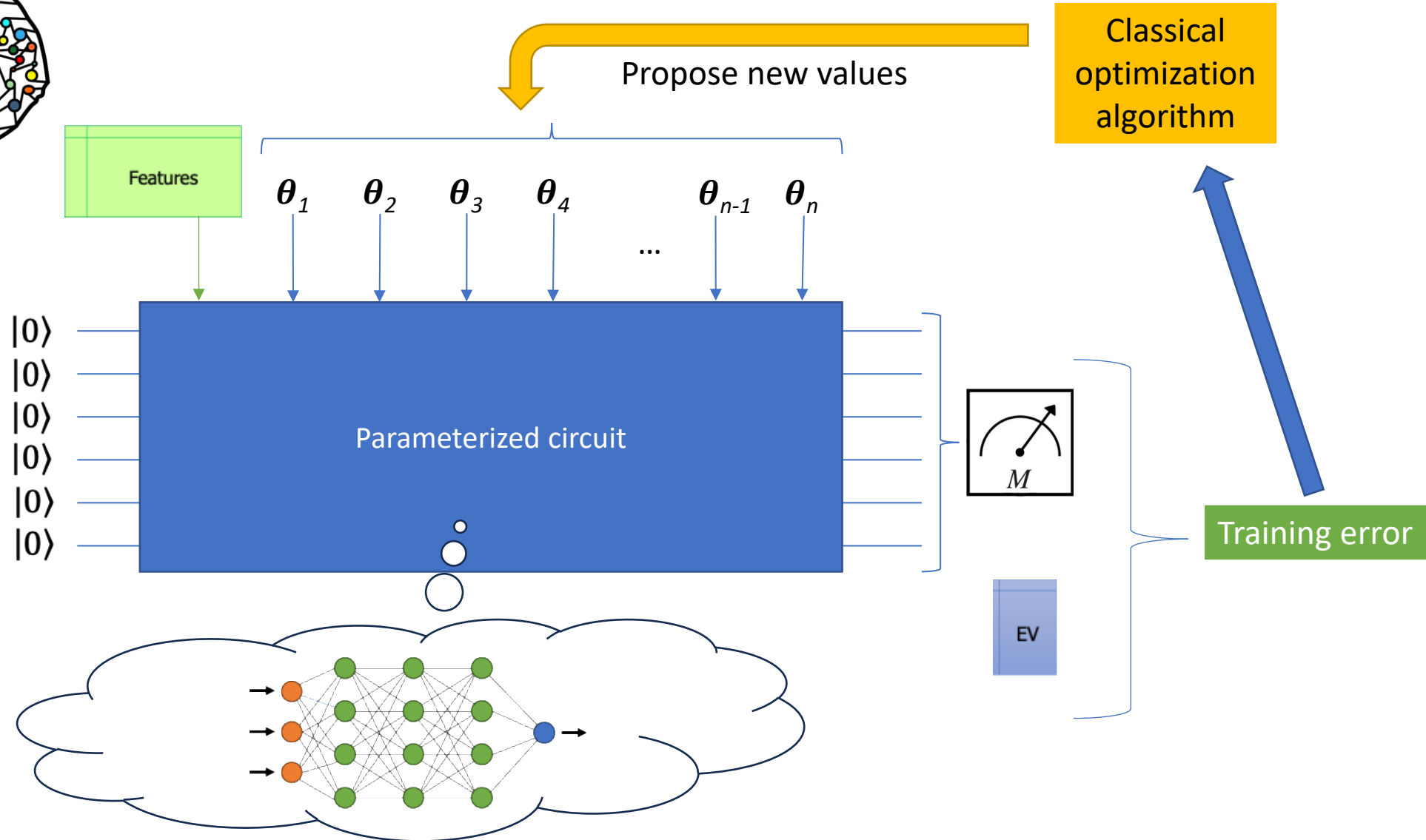
q[0] — H
q[1] — H
q[2] — H
q[3] — H







Quantum neural networks



Thank you for your attention!

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