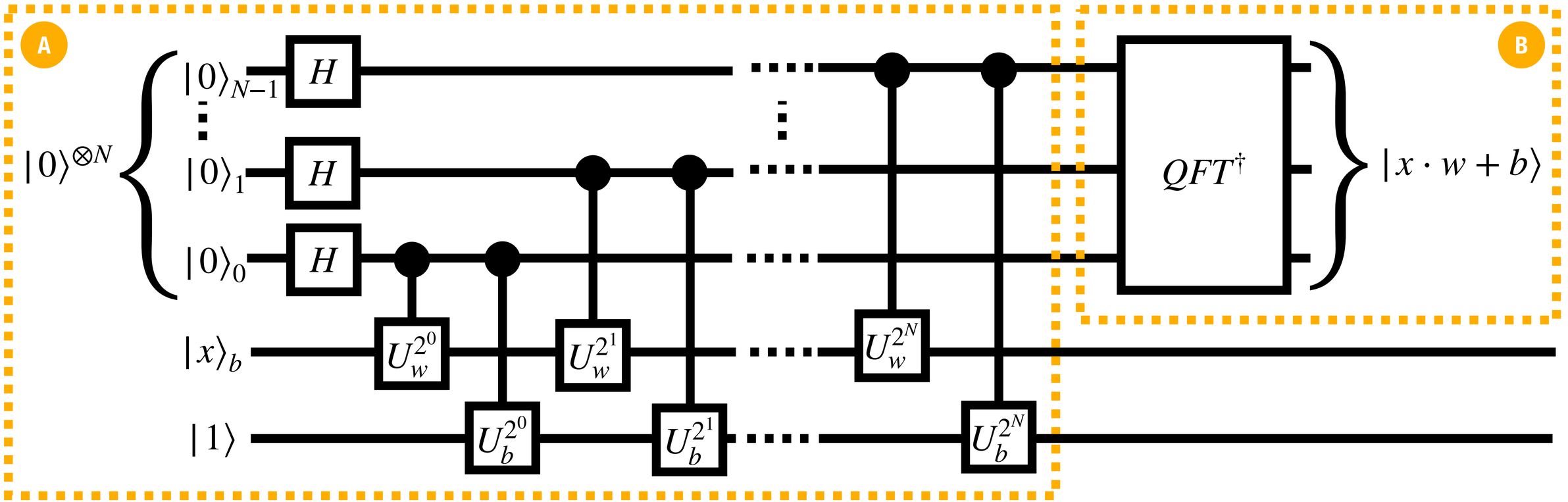
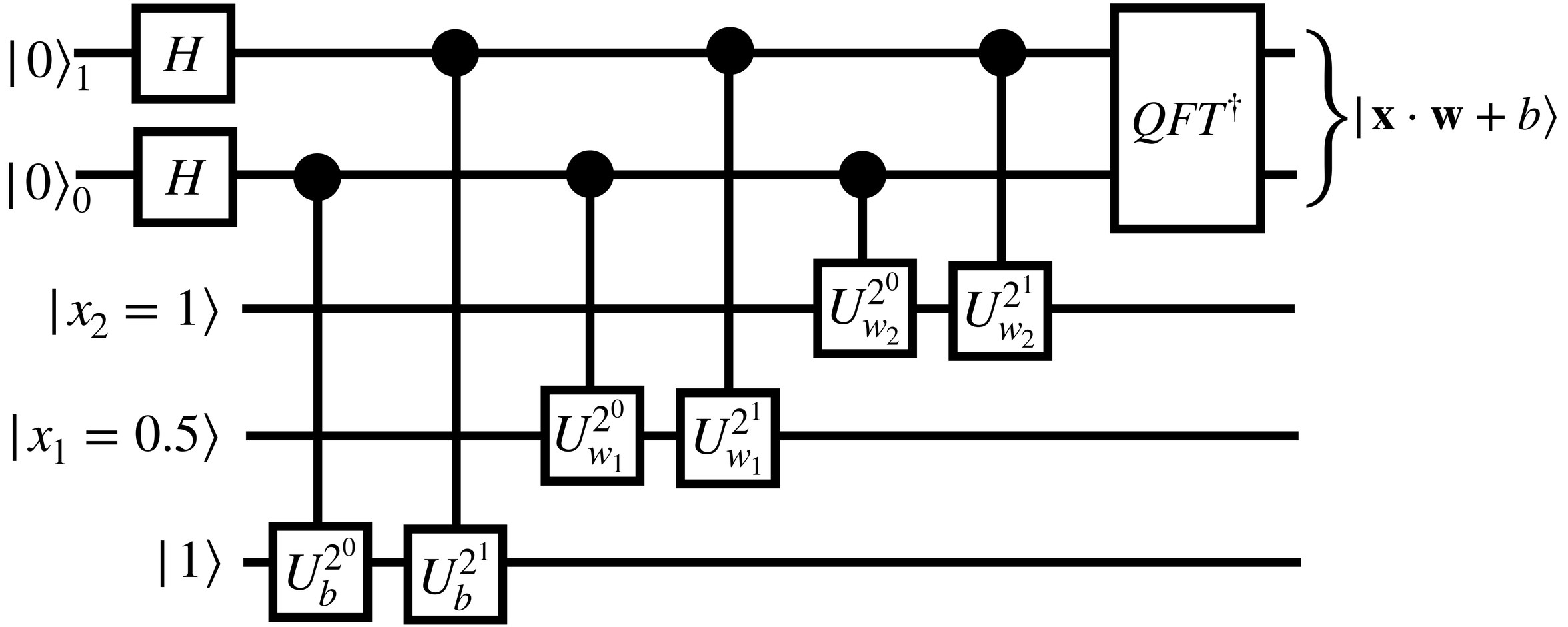
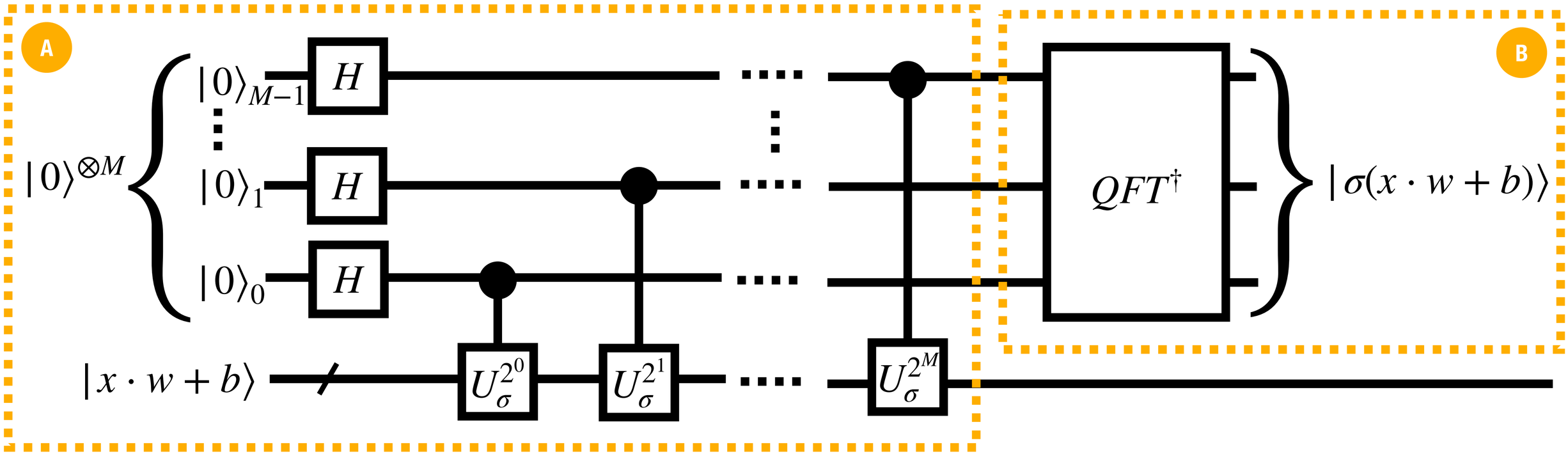
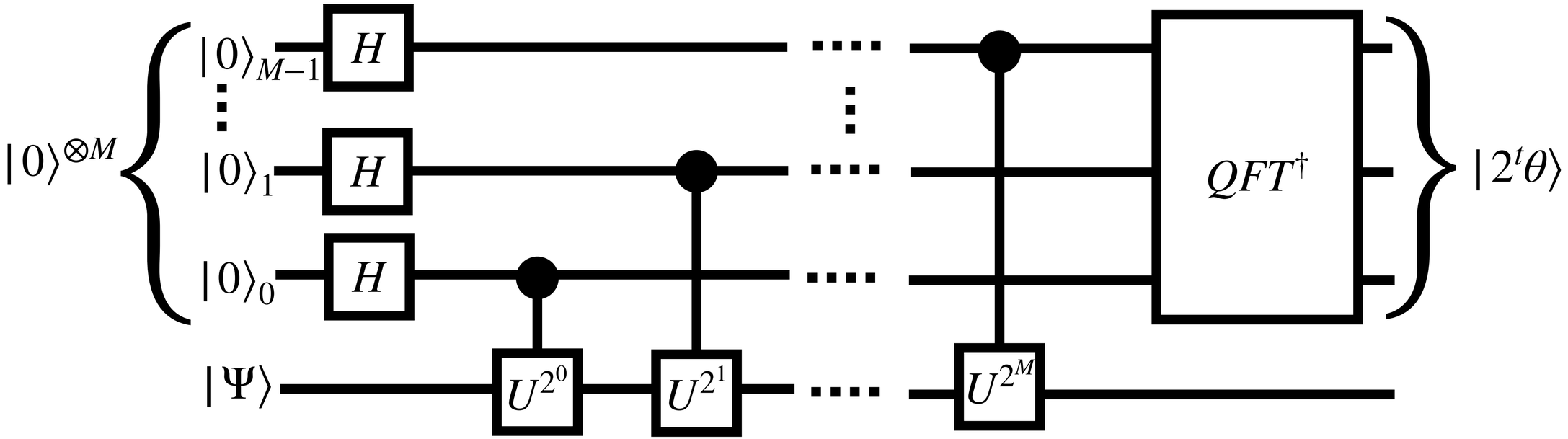
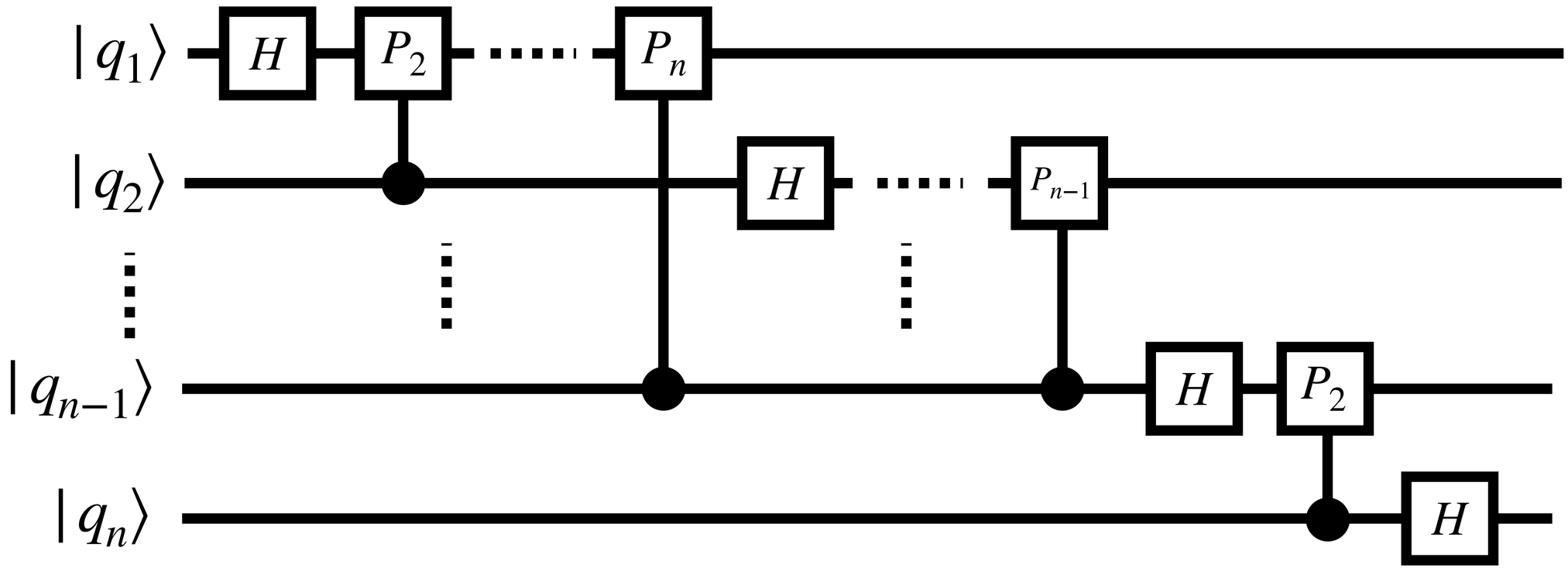
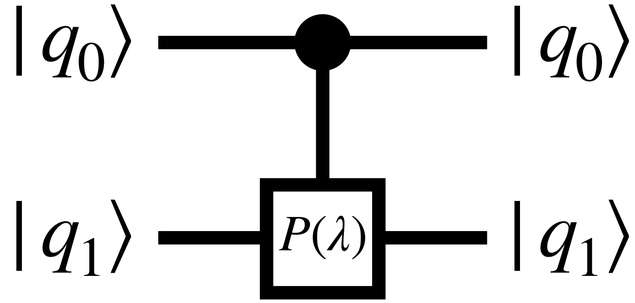

A
B
$|0\rangle^{\otimes N}$
$|0\rangle_{N-1}$
$|0\rangle_1$
$|0\rangle_0$
$|x\rangle_b$
$|1\rangle$
H
H
H
$U_w^{2^0}$
$U_w^{2^1}$
$U_w^{2^N}$
$U_b^{2^0}$
$U_b^{2^1}$
$U_b^{2^N}$
$QFT^\dagger$
$|x \cdot w + b\rangle$


$|0\rangle_1$
$|0\rangle_0$
$|x_2 = 1\rangle$
$|x_1 = 0.5\rangle$
$|1\rangle$
H
H
$U_b^{2^0}$
$U_b^{2^1}$
$U_{w_1}^{2^0}$
$U_{w_1}^{2^1}$
$U_{w_2}^{2^0}$
$U_{w_2}^{2^1}$
$QFT^\dagger$
$|\mathbf{x} \cdot \mathbf{w} + b\rangle$


A
B
$|0\rangle^{\otimes M}$
$|0\rangle_{M-1}$
$|0\rangle_1$
$|0\rangle_0$
$|x \cdot w + b\rangle$
H
H
H
$U_\sigma^{2^0}$
$U_\sigma^{2^1}$
$U_\sigma^{2^M}$
$QFT^\dagger$
$|\sigma(x \cdot w + b)\rangle$


$|0\rangle^{\otimes M}$
$|0\rangle_{M-1}$
$|0\rangle_1$
$|0\rangle_0$
$|\Psi\rangle$
H
H
H
U^{2^0}
U^{2^1}
U^{2^M}
$QFT^\dagger$
$|2^t\theta\rangle$


$|q_1\rangle$
$|q_2\rangle$
$|q_{n-1}\rangle$
$|q_n\rangle$
H
P_2
P_n
H
P_{n-1}
H
P_2
H


$|q_0\rangle$
$|q_1\rangle$
$P(\lambda)$
$|q_0\rangle$
$|q_1\rangle$

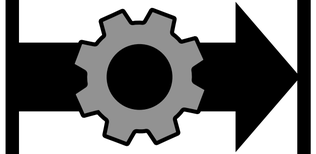
A

```
# Create Quantum
Circuit
num_of_qubits = 1
num_of_cbits = 1
qc =
QuantumCircuit(1,1)

# Apply Hadamard
qc.h(qubit=0)

# Measure
qc.measure(0, 0)
```

Quantum circuit is first written in Qiskit (Python) using high-level quantum gates.



B

```
OPENQASM 2.0;
include “qelib1.inc";
qreg q[1];
creg c[1];

rz(1.5707963267948966)
q[0];
sx q[0];
rz(1.5707963267948966)
q[0];
measure q[0] -> c[0];
```

Quantum circuit is then compiled into QASM and each gate is rewritten to match the basis gates of the desired backend (ibmq_armonk).

Execute

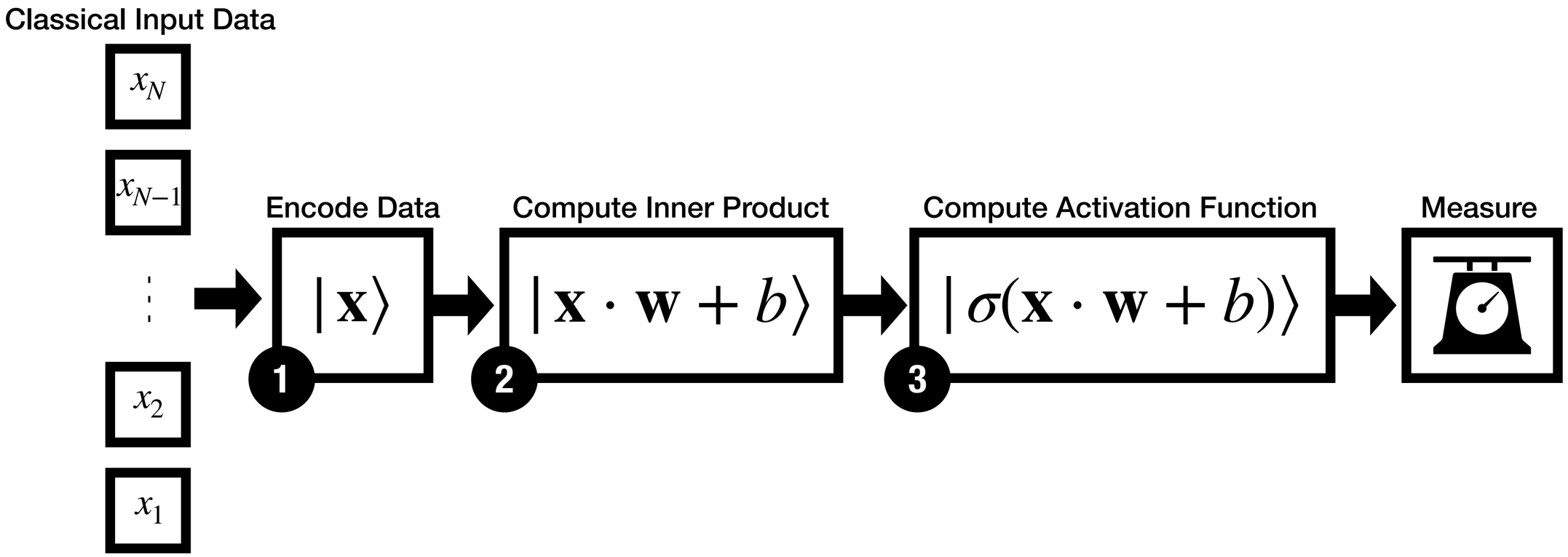
C

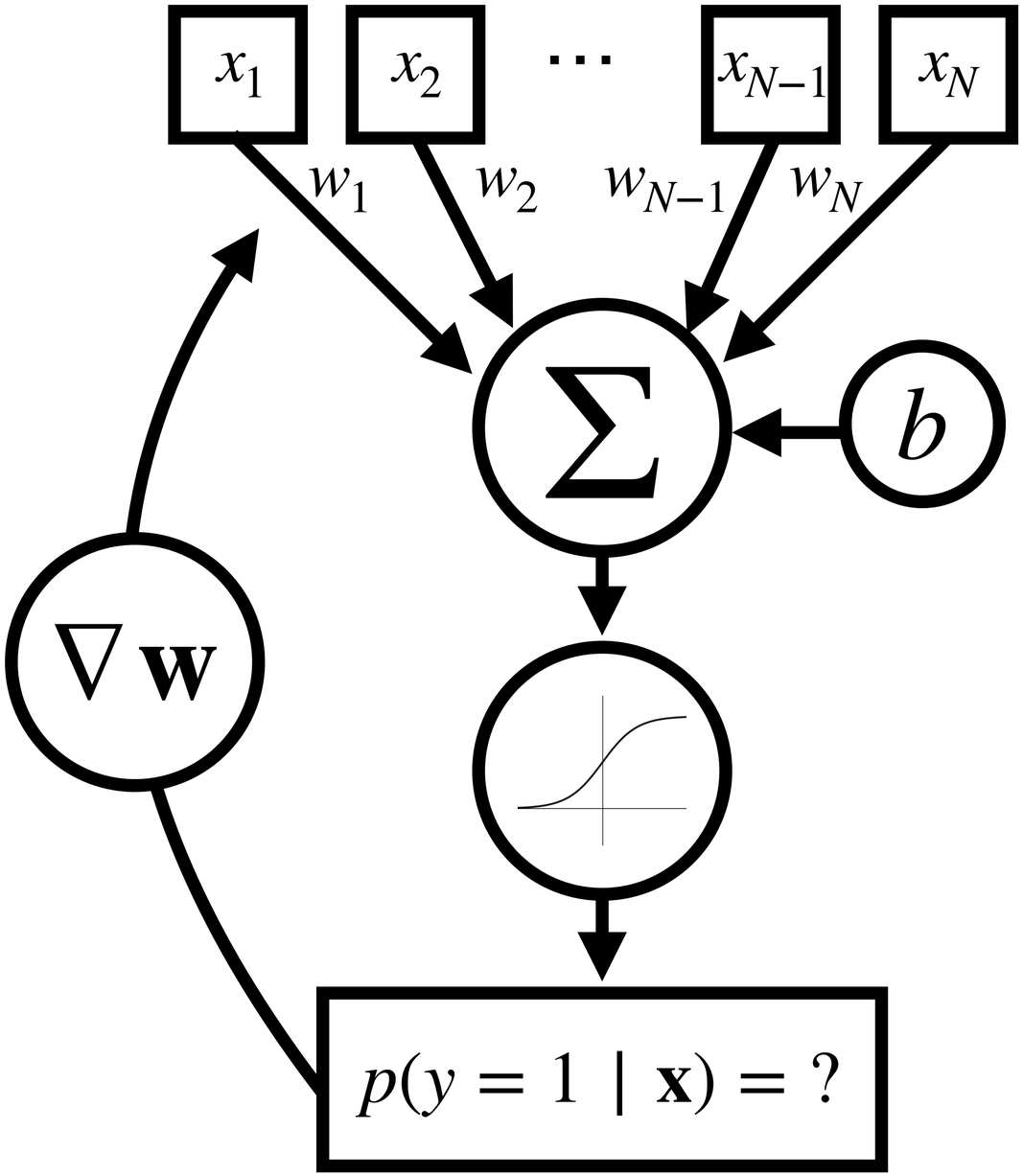
ibmq_**armonk**

System status	Online
Processor type	Canary r1.2

Qubit	QV
1	1

IBMQ backend of choice is selected and the QASM code is sent to be executed on the backend.


Classical Input Data
x_N
x_{N-1}
x_2
x_1
Encode Data
$|\mathbf{x}\rangle$
1
Compute Inner Product
$|\mathbf{x} \cdot \mathbf{w} + b\rangle$
2
Compute Activation Function
$|\sigma(\mathbf{x} \cdot \mathbf{w} + b)\rangle$
3
Measure


x_1
x_2
$\cdots$
x_{N-1}
x_N
w_1
w_2
w_{N-1}
w_N
Σ
b
$\nabla \mathbf{w}$
$p(y = 1 \mid \mathbf{x}) = ?$