# Table des matières

**1 Experiment 1 - State Vector - 1 qubit** **1**
1.1 State Vector - 1 Qubit . . . . . 1
1.1.1 Base H with full Z rotation . . . . . 1
1.1.2 Base H with no-full Z rotation . . . . . 2
1.1.3 Base 0 . . . . . 3
1.1.4 Base H and multiple loops . . . . . 4

Chapitre 1

# Experiment 1 - State Vector - 1 qubit

*On est trop souvent imprécis lorsqu'on fait une citation.*

Quelqu'un, un jour.

Full 1st experiment explanation

## 1.1 State Vector - 1 Qubit

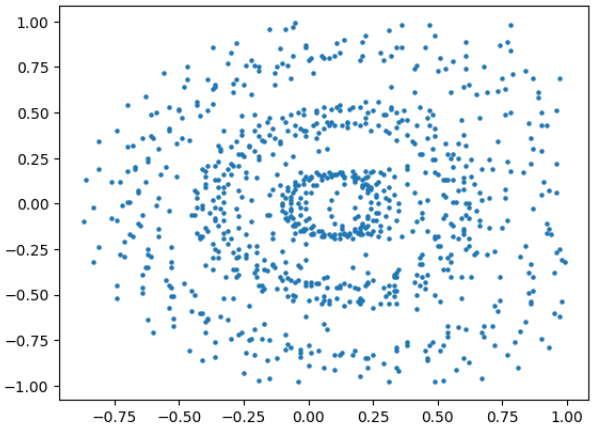
### 1.1.1 Base H with full Z rotation

**Code**

```
print("Launch!")
qc.h(init_q)
for w in range(max_shots):
    for i in range(shots):
        qc.rx(-pi/(shots-i), init_q)
        qc.rz(pi/(shots/8), init_q)
        z, z_north, z_south = complex_cal(qc, statevector_sim)
        if z != 0:
            if z_north != 0:
                tab_temp[0].append(z)
                tab_temp[1].append(z_north)
            if z_south != 0:
                tab_temp[0].append(z)
                tab_temp[2].append(z_south)
    qc.barrier()

    if (w + 1) % 5 == 0:
        print("Full circuit bloch :", w+1, "/", max_shots)

print("Done!")
```

**Run 1 full circuit block only**

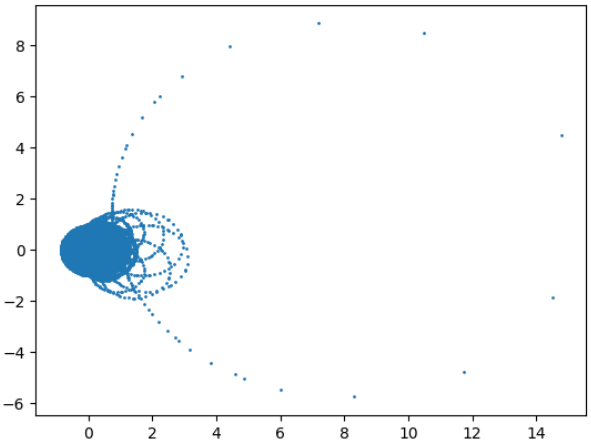
**Run 10 full circuit block only**



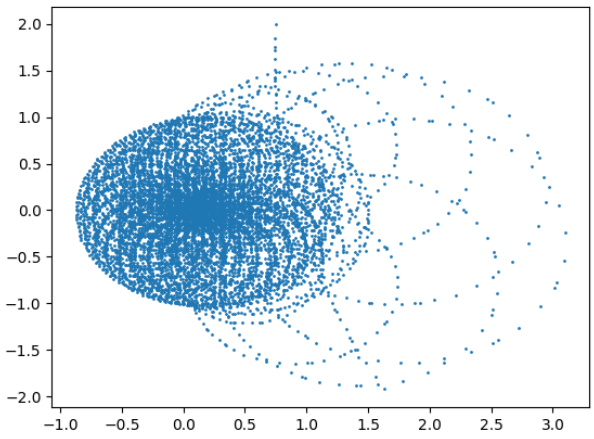

(a) Graph with zoom of [[-1 :1][-1 :1]]

FIGURE 1.1 – Resulting of 1000 data statevector

**Run 100 full circuit block only**




(a) Graph from 10000 data statevector without zoom




(b) Graph with zoom of [[-1 :2][-1 :1]]

FIGURE 1.2 – Resulting of 10000 data statevector

### 1.1.2 Base H with no-full Z rotation

**Code**

```
print("Launch!")
qc.h(init_q)
```

```
for w in range(max_shots):
    for i in range(shots):
        qc.rx(-pi/(shots-i), init_q)
        qc.rz(pi/(shots/8), init_q)
        z, z_north, z_south = complex_cal(qc, statevector_sim)
        if z != 0:
            if z_north != 0:
                tab_temp[0].append(z)
                tab_temp[1].append(z_north)
            if z_south != 0:
                tab_temp[0].append(z)
                tab_temp[2].append(z_south)
    qc.barrier()

    if (w + 1) % 5 == 0:
        print("Full circuit bloch :", w+1, "/", max_shots)

print("Done!")
```

**Run 1 full circuit block only**

**Run 10 full circuit block only**

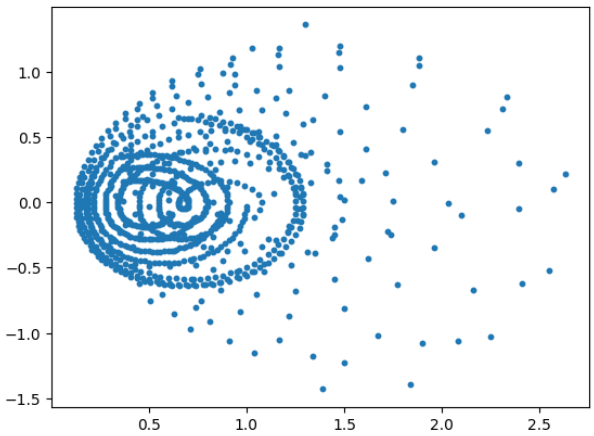



FIGURE 1.3 – Resulting of 1000 data statevector

**Run 100 full circuit block only**

### 1.1.3 Base 0

**Code**

```
print("Launch!")
for w in range(max_shots):
    for i in range(shots):
        qc.rx(-pi/(shots-i), init_q)
```

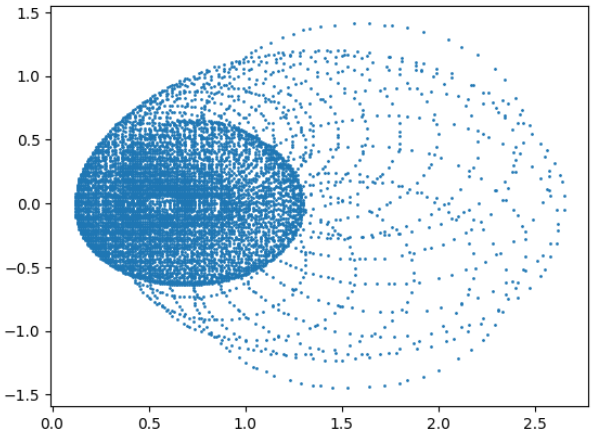



FIGURE 1.4 – Resulting of 1000 data statevector

```
5           qc.rz(pi/(shots/8), init_q)
6           z, z_north, z_south = complex_cal(qc, statevector_sim)
7           if z != 0:
8               if z_north != 0:
9                   tab_temp[0].append(z)
10                  tab_temp[1].append(z_north)
11              if z_south != 0:
12                  tab_temp[0].append(z)
13                  tab_temp[2].append(z_south)
14      qc.barrier()
15
16      if (w + 1) % 5 == 0:
17          print("Full circuit bloch :", w+1, "/", max_shots)
18
19  print("Done!")
```

Totototo

**Run 10 full circuit block only**

**Run 100 full circuit block only**

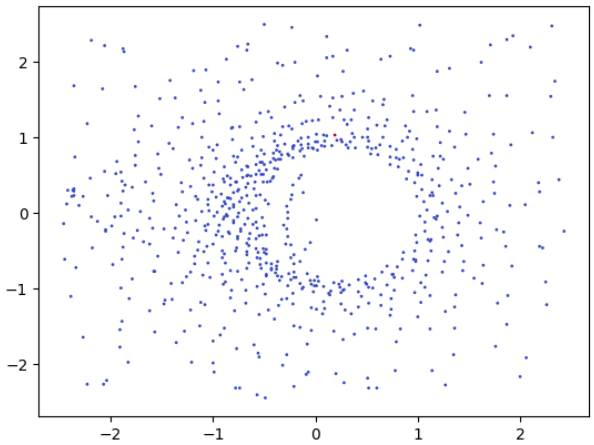
totototo

### 1.1.4 Base H and multiple loops

totototo

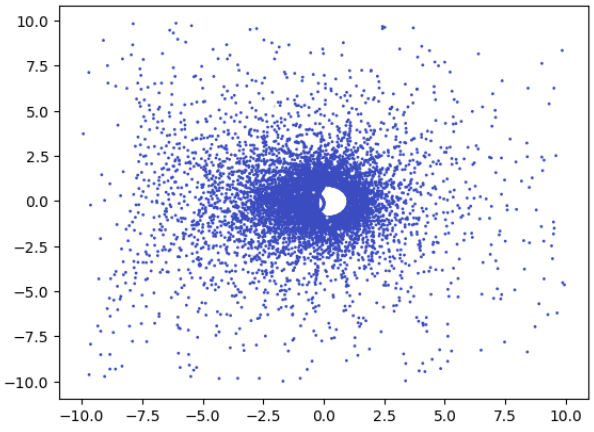
**Code**

```
1  #Launch
2  qc.h(init_q)
3  for w in range(max_shots):
4      for i in range(shots):
5          if (0 <= i < shots/4) or ((shots - shots/4) < i <= shots):
```

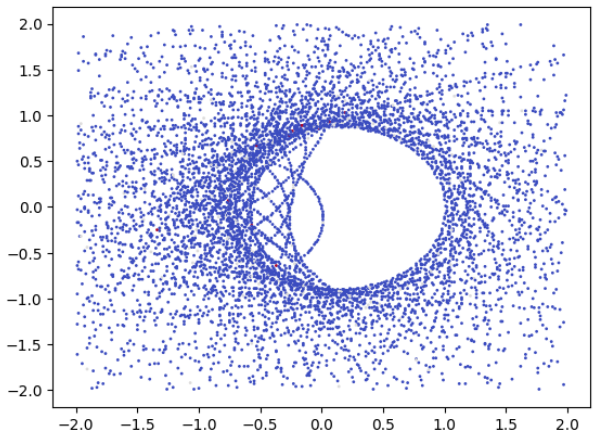



(a) Graph with zoom of [[-2 :2][-2 :2]]

FIGURE 1.5 – Resulting of 1000 data statevector




(a) Graph from 10000 data statevector without zoom




(b) Graph with zoom of [[-2 :2][-2 :2]]

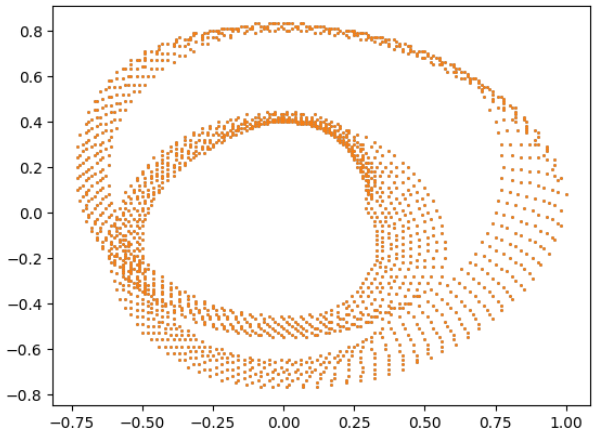
FIGURE 1.6 – Resulting of 10000 data statevector

```
            qc.ry(pi/(2*shots), init_q)
        else:
            qc.ry(-pi/(2*shots), init_q)
        qc.rz(2 * pi / shots, init_q)

        z = complex_cal(qc, statevector_sim)
        if z != 0:
            tab_temp.append(z)
    qc.barrier()

    for i in range(shots):
        if (0 <= i < shots/4) or ((shots - shots/4) < i <= shots):
            qc.ry(-pi/(2*shots), init_q)
        else:
            qc.ry(pi/(2*shots), init_q)
        qc.rz(2 * pi / shots, init_q)
```

```
22
23          z = complex_cal(qc, statevector_sim)
24          if z != 0:
25              tab_temp.append(z)
26      qc.barrier()
27
28      if (w + 1) % 5 == 0:
29          print("Full circuit bloch :", w+1, "/", max_shots)
30
31  print("Fini!")
```

**Run 1 full circuit block only**

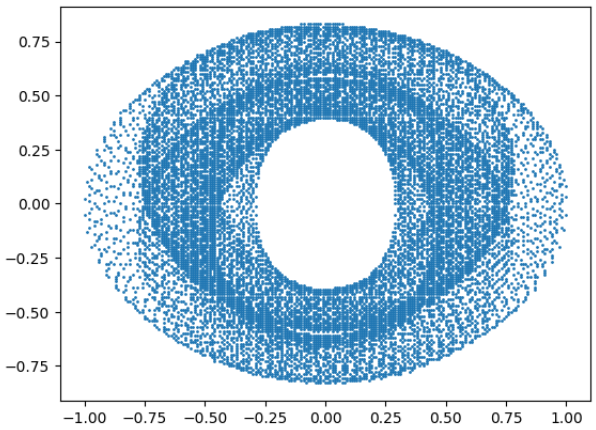
**Run 10 full circuit block only**




(a) Graph without zoom

FIGURE 1.7 – Resulting of 1000 data statevector

**Run 100 full circuit block only**




(a) Graph without zoom

FIGURE 1.8 – Resulting of 10000 data statevector