Identity Gate new 50 to 2000

October 24, 2021

[2]:
```
import numpy as np

# Importing standard Qiskit libraries
from qiskit import QuantumCircuit, transpile, Aer, IBMQ
from qiskit.tools.jupyter import *
from qiskit.visualization import *
from ibm_quantum_widgets import *
from qiskit.providers.aer import QasmSimulator

# Loading your IBM Quantum account(s)
provider = IBMQ.load_account()
```

[3]:
```
from qiskit.tools.monitor import backend_monitor
from qiskit import *
from qiskit.visualization import plot_histogram
from random import randrange, seed, sample
from random import choice
n=40
m=0
for i in range(n):
    m=m+50
    print("No of identity Gate:",m)
    qc= QuantumCircuit(1,1)
    qc.x(0)
    qc.barrier()
    #m = int(input('Enter the length of Identity Gate Between Quantum Channel:␣
 ↪'))

    for j in range(m):
        qc.id(0)
        qc.barrier()
    qc.measure(range(1), range(1))
    #%matplotlib inline
    #qc.draw(output='mpl')
    #print(qc)
    from qiskit.tools.monitor import backend_monitor
    #IBMQ.load_account()
```

```
    provider = IBMQ.get_provider(hub='ibm-q')
    device = provider.get_backend('ibmq_armonk')
    job = execute(qc, backend=device, shots=1000)
    #print(job.job_id())
    from qiskit.tools.monitor import job_monitor
    job_monitor(job)
    result = job.result()
    #plot_histogram(device_result.get_counts(qc))
    counts = result.get_counts(qc)
    #plot_histogram(counts)
    bits = (result.get_counts(qc))
    print(bits)
```

```
No of identity Gate: 50
Job Status: job has successfully run
{'0': 81, '1': 919}
No of identity Gate: 100
Job Status: job has successfully run
{'0': 79, '1': 921}
No of identity Gate: 150
Job Status: job has successfully run
{'0': 97, '1': 903}
No of identity Gate: 200
Job Status: job has successfully run
{'0': 86, '1': 914}
No of identity Gate: 250
Job Status: job has successfully run
{'0': 111, '1': 889}
No of identity Gate: 300
Job Status: job has successfully run
{'0': 90, '1': 910}
No of identity Gate: 350
Job Status: job has successfully run
{'0': 72, '1': 928}
No of identity Gate: 400
Job Status: job has successfully run
{'0': 73, '1': 927}
No of identity Gate: 450
Job Status: job has successfully run
{'0': 96, '1': 904}
No of identity Gate: 500
Job Status: job has successfully run
{'0': 94, '1': 906}
No of identity Gate: 550
Job Status: job has successfully run
{'0': 83, '1': 917}
No of identity Gate: 600
```

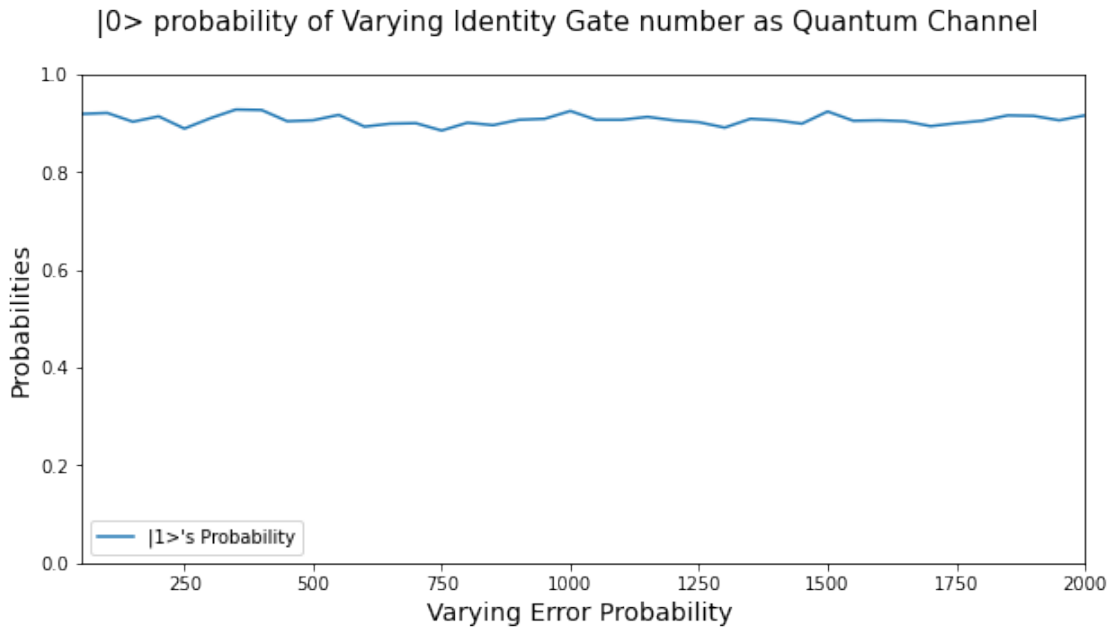
```
Job Status: job has successfully run
{'0': 107, '1': 893}
No of identity Gate: 650
Job Status: job has successfully run
{'0': 101, '1': 899}
No of identity Gate: 700
Job Status: job has successfully run
{'0': 100, '1': 900}
No of identity Gate: 750
Job Status: job has successfully run
{'0': 115, '1': 885}
No of identity Gate: 800
Job Status: job has successfully run
{'0': 99, '1': 901}
No of identity Gate: 850
Job Status: job has successfully run
{'0': 104, '1': 896}
No of identity Gate: 900
Job Status: job has successfully run
{'0': 93, '1': 907}
No of identity Gate: 950
Job Status: job has successfully run
{'0': 91, '1': 909}
No of identity Gate: 1000
Job Status: job has successfully run
{'0': 75, '1': 925}
No of identity Gate: 1050
Job Status: job has successfully run
{'0': 93, '1': 907}
No of identity Gate: 1100
Job Status: job has successfully run
{'0': 93, '1': 907}
No of identity Gate: 1150
Job Status: job has successfully run
{'0': 87, '1': 913}
No of identity Gate: 1200
Job Status: job has successfully run
{'0': 94, '1': 906}
No of identity Gate: 1250
Job Status: job has successfully run
{'0': 98, '1': 902}
No of identity Gate: 1300
Job Status: job has successfully run
{'0': 109, '1': 891}
No of identity Gate: 1350
Job Status: job has successfully run
{'0': 91, '1': 909}
No of identity Gate: 1400
```

```
Job Status: job has successfully run
{'0': 94, '1': 906}
No of identity Gate: 1450
Job Status: job has successfully run
{'0': 101, '1': 899}
No of identity Gate: 1500
Job Status: job has successfully run
{'0': 76, '1': 924}
No of identity Gate: 1550
Job Status: job has successfully run
{'0': 95, '1': 905}
No of identity Gate: 1600
Job Status: job has successfully run
{'0': 94, '1': 906}
No of identity Gate: 1650
Job Status: job has successfully run
{'0': 96, '1': 904}
No of identity Gate: 1700
Job Status: job has successfully run
{'0': 106, '1': 894}
No of identity Gate: 1750
Job Status: job has successfully run
{'0': 100, '1': 900}
No of identity Gate: 1800
Job Status: job has successfully run
{'0': 95, '1': 905}
No of identity Gate: 1850
Job Status: job has successfully run
{'0': 84, '1': 916}
No of identity Gate: 1900
Job Status: job has successfully run
{'0': 85, '1': 915}
No of identity Gate: 1950
Job Status: job has successfully run
{'0': 94, '1': 906}
No of identity Gate: 2000
Job Status: job has successfully run
{'0': 84, '1': 916}
```

[3]:
```
import matplotlib.pyplot as plt
from matplotlib.ticker import (AutoMinorLocator, MultipleLocator)
fig, ax = plt.subplots(figsize=(10, 5))
fig.suptitle('|0> probability of Varying Identity Gate number as Quantum␣
 ↪Channel',fontsize=15)
# naming the x axis
plt.xlabel('Varying Error Probability ',fontsize=14)
# naming the y axis
```

```
plt.ylabel('Probabilities',fontsize=14)
# giving a title to my graph
# Set axis ranges; by default this will put major ticks every 25.
#ax.set_xlim(0, 300)
#ax.set_ylim(0, 1)
ax.set_xlim(50,2000)
ax.set_ylim(0, 1)
fig = plt.figure(figsize=(8,5))
# line 2 points
y2 = [0.919,0.921,0.903,0.914,0.889,0.910,0.928,0.927,0.904,0.906,0.917,0.893,0.
 ↪899,0.900,0.885,0.901,0.896,0.907,0.909,0.925,0.907,0.907,0.913,0.906,0.
 ↪902,0.891,0.909,0.906,0.899,0.924,0.905,0.906,0.904,0.894,0.900,0.905,0.
 ↪916,0.915,0.906,0.916]
x2 =␣
 ↪[50,100,150,200,250,300,350,400,450,500,550,600,650,700,750,800,850,900,950,1000,1050,1100,
# plotting the line 2 points
ax.plot(x2, y2, label = "|1>'s Probability")
#ax.axes.xaxis.set_ticks([])
# show a legend on the plot
ax.legend()
```

[3]: <matplotlib.legend.Legend at 0x7fe6304123a0>



<Figure size 576x360 with 0 Axes>

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