In [1]:
```
!pip install qiskit-ignis
```

```
Collecting qiskit-ignis
  Downloading qiskit_ignis-0.7.1-py3-none-any.whl (198 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 198.7/198.7 kB 127.3 kB/s eta 0:00:0000:01
Requirement already satisfied: qiskit-terra>=0.15.1 in /opt/conda/lib/python3.10/site
-packages (from qiskit-ignis) (0.25.1)
Requirement already satisfied: numpy>=1.13 in /opt/conda/lib/python3.10/site-packages
(from qiskit-ignis) (1.23.5)
Requirement already satisfied: retworkx>=0.8.0 in /opt/conda/lib/python3.10/site-pack
ages (from qiskit-ignis) (0.13.0)
Requirement already satisfied: scipy!=0.19.1,>=0.19 in /opt/conda/lib/python3.10/site
-packages (from qiskit-ignis) (1.9.3)
Requirement already satisfied: setuptools>=40.1.0 in /opt/conda/lib/python3.10/site-p
ackages (from qiskit-ignis) (67.7.2)
Requirement already satisfied: symengine<0.10,>=0.9 in /opt/conda/lib/python3.10/site
-packages (from qiskit-terra>=0.15.1->qiskit-ignis) (0.9.2)
Requirement already satisfied: typing-extensions in /opt/conda/lib/python3.10/site-pa
ckages (from qiskit-terra>=0.15.1->qiskit-ignis) (4.5.0)
Requirement already satisfied: rustworkx>=0.13.0 in /opt/conda/lib/python3.10/site-pa
ckages (from qiskit-terra>=0.15.1->qiskit-ignis) (0.13.0)
Requirement already satisfied: python-dateutil>=2.8.0 in /opt/conda/lib/python3.10/si
te-packages (from qiskit-terra>=0.15.1->qiskit-ignis) (2.8.2)
Requirement already satisfied: sympy>=1.3 in /opt/conda/lib/python3.10/site-packages
(from qiskit-terra>=0.15.1->qiskit-ignis) (1.11.1)
Requirement already satisfied: stevedore>=3.0.0 in /opt/conda/lib/python3.10/site-pac
kages (from qiskit-terra>=0.15.1->qiskit-ignis) (4.1.1)
Requirement already satisfied: dill>=0.3 in /opt/conda/lib/python3.10/site-packages
(from qiskit-terra>=0.15.1->qiskit-ignis) (0.3.7)
Requirement already satisfied: psutil>=5 in /opt/conda/lib/python3.10/site-packages
(from qiskit-terra>=0.15.1->qiskit-ignis) (5.9.4)
Requirement already satisfied: ply>=3.10 in /opt/conda/lib/python3.10/site-packages
(from qiskit-terra>=0.15.1->qiskit-ignis) (3.11)
Requirement already satisfied: six>=1.5 in /opt/conda/lib/python3.10/site-packages (f
rom python-dateutil>=2.8.0->qiskit-terra>=0.15.1->qiskit-ignis) (1.16.0)
Requirement already satisfied: pbr!=2.1.0,>=2.0.0 in /opt/conda/lib/python3.10/site-p
ackages (from stevedore>=3.0.0->qiskit-terra>=0.15.1->qiskit-ignis) (5.11.1)
Requirement already satisfied: mpmath>=0.19 in /opt/conda/lib/python3.10/site-package
s (from sympy>=1.3->qiskit-terra>=0.15.1->qiskit-ignis) (1.3.0)
Installing collected packages: qiskit-ignis
Successfully installed qiskit-ignis-0.7.1

[notice] A new release of pip available: 23.1.1 -> 23.2.1
[notice] To update, run: pip install --upgrade pip
```

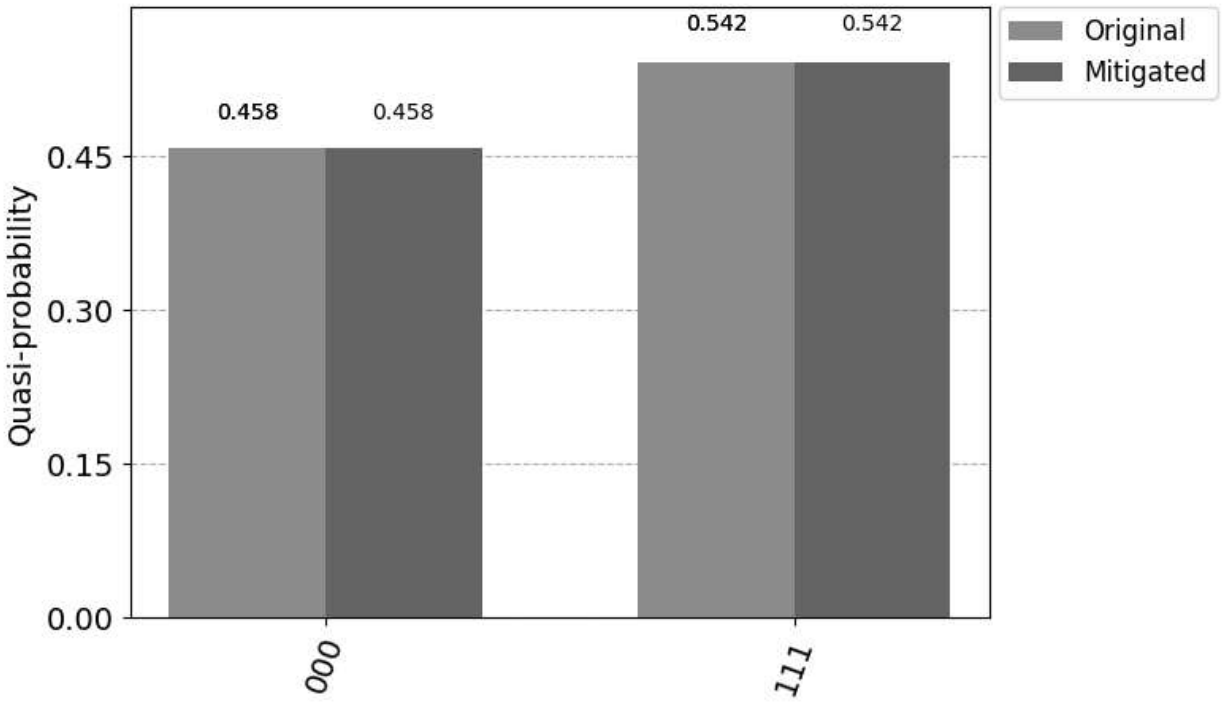
Title : Tackle Noise with Error Correction

In [13]:
```
from qiskit import QuantumCircuit, assemble, Aer, transpile
from qiskit.visualization import plot_histogram
from qiskit.ignis.mitigation.measurement import CompleteMeasFitter, complete_meas_cal,

# Define the quantum circuit
qc = QuantumCircuit(3, 3)

# Apply gates and operations to the circuit
qc.h(0)
qc.cx(0, 1)
qc.cx(0, 2)
```

```
qc.measure([0, 1, 2], [0, 1, 2])

# Transpile the circuit
backend = Aer.get_backend('qasm_simulator')
transpiled_qc = transpile(qc, backend)

# Simulate the noisy circuit
qobj = assemble(transpiled_qc, shots=1000)
job = backend.run(qobj)
result = job.result()
counts = result.get_counts()

# Perform error mitigation
cal_circuits, state_labels = complete_meas_cal(qubit_list=[0, 1, 2])
cal_job = backend.run(assemble(cal_circuits, backend=backend))
cal_results = cal_job.result()
meas_fitter = CompleteMeasFitter(cal_results, state_labels)
mitigated_counts = meas_fitter.filter.apply(counts)

# Print the original counts
print(f"Original Counts : {counts}")

# Print the mitigated counts
print(f"Mitigated Counts : {mitigated_counts}")

# Plot the histograms of the original and mitigated counts
plot_histogram([counts, mitigated_counts], legend=['Original', 'Mitigated'])
```

```
/tmp/ipykernel_120/3904565391.py:20: DeprecationWarning: Using a qobj for run() is de
precated as of qiskit-aer 0.9.0 and will be removed no sooner than 3 months from that
release date. Transpiled circuits should now be passed directly using `backend.run(ci
rcuits, **run_options).
  job = backend.run(qobj)
Original Counts : {'111': 542, '000': 458}
Mitigated Counts : {'000': 458.00000003715667, '111': 541.9999999647916}
/tmp/ipykernel_120/3904565391.py:26: DeprecationWarning: Using a qobj for run() is de
precated as of qiskit-aer 0.9.0 and will be removed no sooner than 3 months from that
release date. Transpiled circuits should now be passed directly using `backend.run(ci
rcuits, **run_options).
  cal_job = backend.run(assemble(cal_circuits, backend=backend))
```

Out[13]:


0.542
0.542
0.458
0.458
Original
Mitigated
Quasi-probability
0.45
0.30
0.15
0.00
000
111