Checkpoint 1: Constraint-Specific VQE Entanglers

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Project Ideas

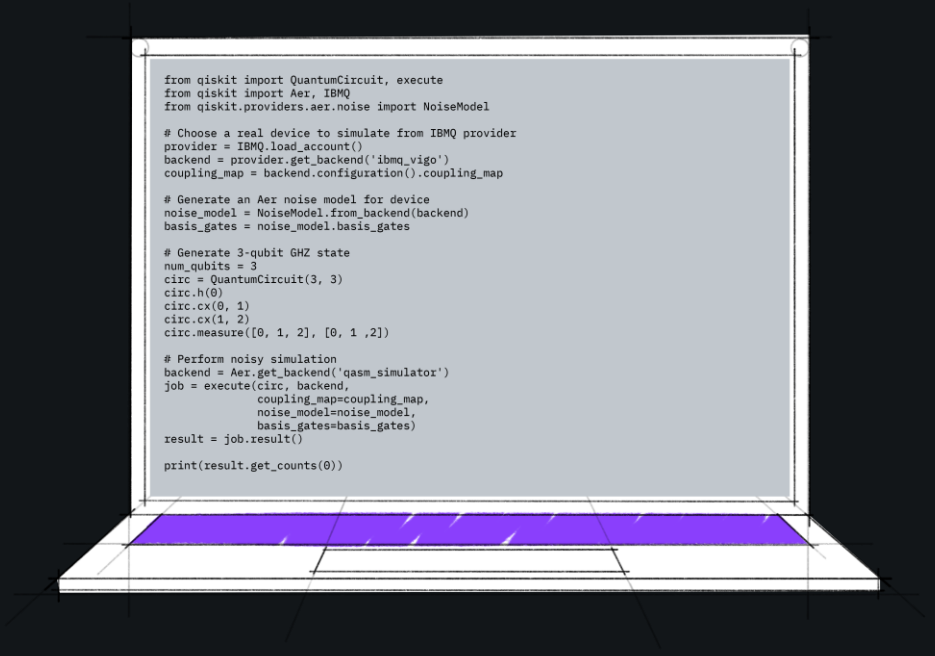
- VQE – ground state energy estimation
- Entanglers/Variational Forms/PQCs – Tunable unitary operation on “n” qubits applied to a reference state
- Current limitations
  - Few entangler types with general static structures
  - Lack feasibility consideration
- Solution: Dynamic entanglers that reflect constraints

Current Goals

- Special class to check for constraints
- Layout feasible test cases
- Technical note summary

Expected Timeline

- Checkpoint 2 (November)
  - Code design
  - Decide problem cases for final article
  - Extended study
- Checkpoint 3 (December)
  - Submit PR
  - Written report
  - Future work...



```
from qiskit import QuantumCircuit, execute
from qiskit import Aer, IBMQ
from qiskit.providers.aer.noise import NoiseModel

# Choose a real device to simulate from IBMQ provider
provider = IBMQ.load_account()
backend = provider.get_backend('ibmq_vigo')
coupling_map = backend.configuration().coupling_map

# Generate an Aer noise model for device
noise_model = NoiseModel.from_backend(backend)
basis_gates = noise_model.basis_gates

# Generate 3-qubit GHZ state
num_qubits = 3
circ = QuantumCircuit(3, 3)
circ.h(0)
circ.cx(0, 1)
circ.cx(1, 2)
circ.measure([0, 1, 2], [0, 1 ,2])

# Perform noisy simulation
backend = Aer.get_backend('qasm_simulator')
job = execute(circ, backend,
              coupling_map=coupling_map,
              noise_model=noise_model,
              basis_gates=basis_gates)
result = job.result()

print(result.get_counts(0))
```