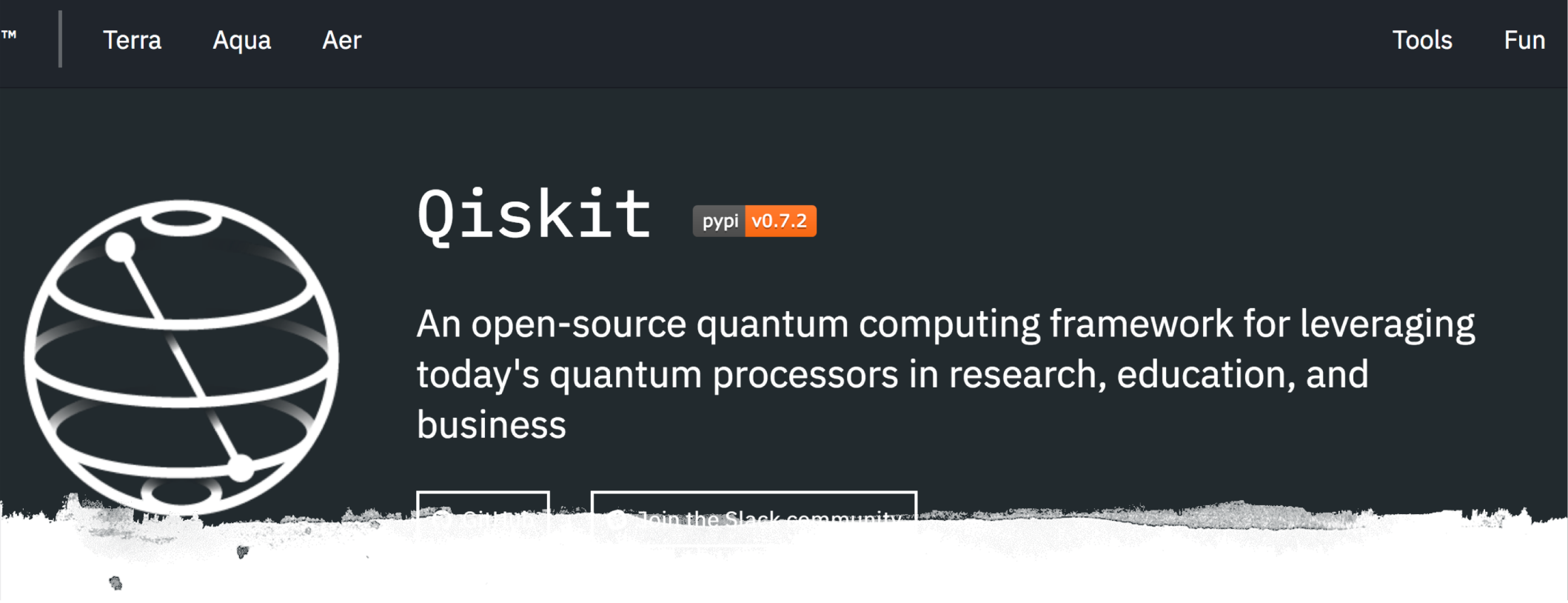
Creative Tools for Qiskit

James Wootton
IBM Research

twitter: @decodoku
GitHub/Medium: @quantumjim



Qiskit

- Open source framework for quantum computation
- Apache 2.0 license

qiskit.org

```
q = QuantumRegister(2)
c = ClassicalRegister(2)
qc = QuantumCircuit(q, c)

qc.h(q[0])
qc.cx(q[0], q[1])
qc.measure(q, c)

backend = Aer.get_backend('qasm_simulator')
```

Qiskit Terra

- ‘Machine code’ level manipulation of quantum programs

qiskit.org/terra

```
sat_cnf = """
c Example DIMACS 3-sat
p cnf 3 5
-1 -2 -3 0
1 -2 3 0
1 2 -3 0
1 -2 -3 0
-1 2 3 0
"""
```

Qiskit Aqua

- High level tools for AI, optimization, chemistry, finance

qiskit.org/aqua

Qiskit Aer

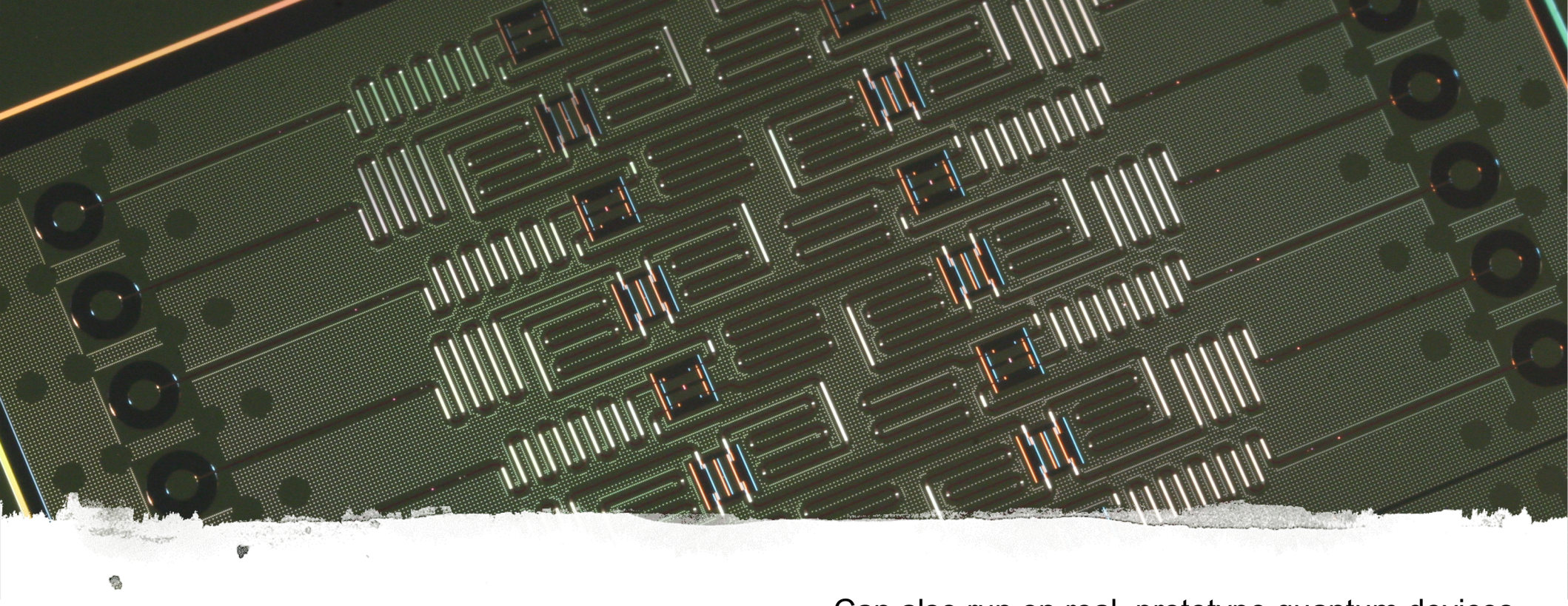
A high performance simulator framework for quantum circuits

GitHub Tutorials

Qiskit Aer

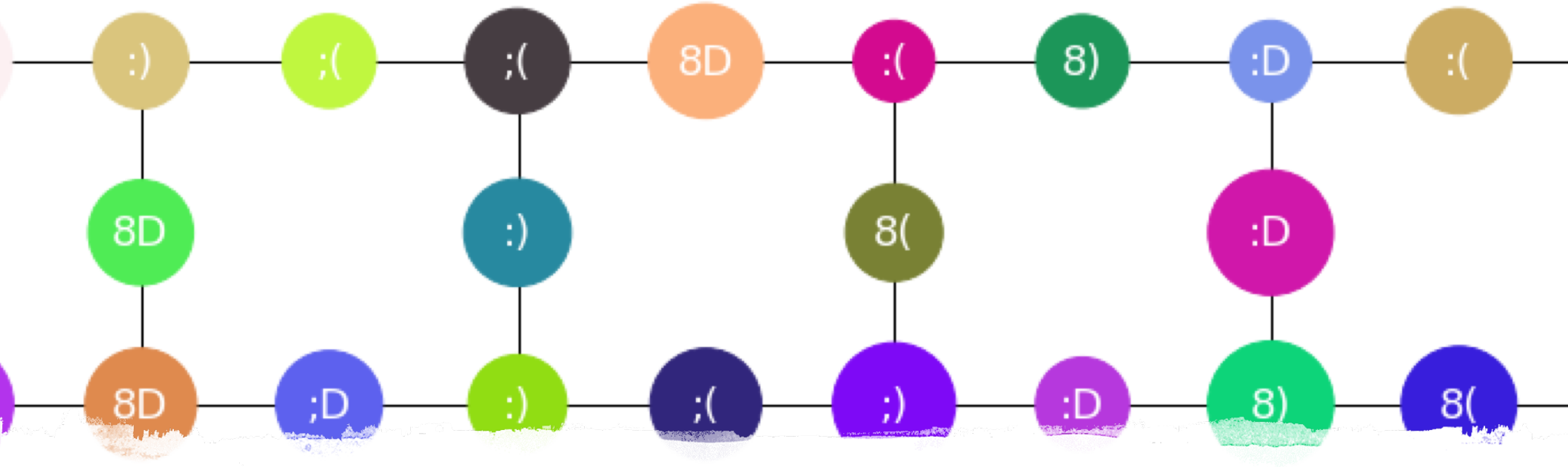
- Simulates quantum programs with your own computers
- Can simulate them perfectly, or with noise

qiskit.org/aer



IBMQ Hardware

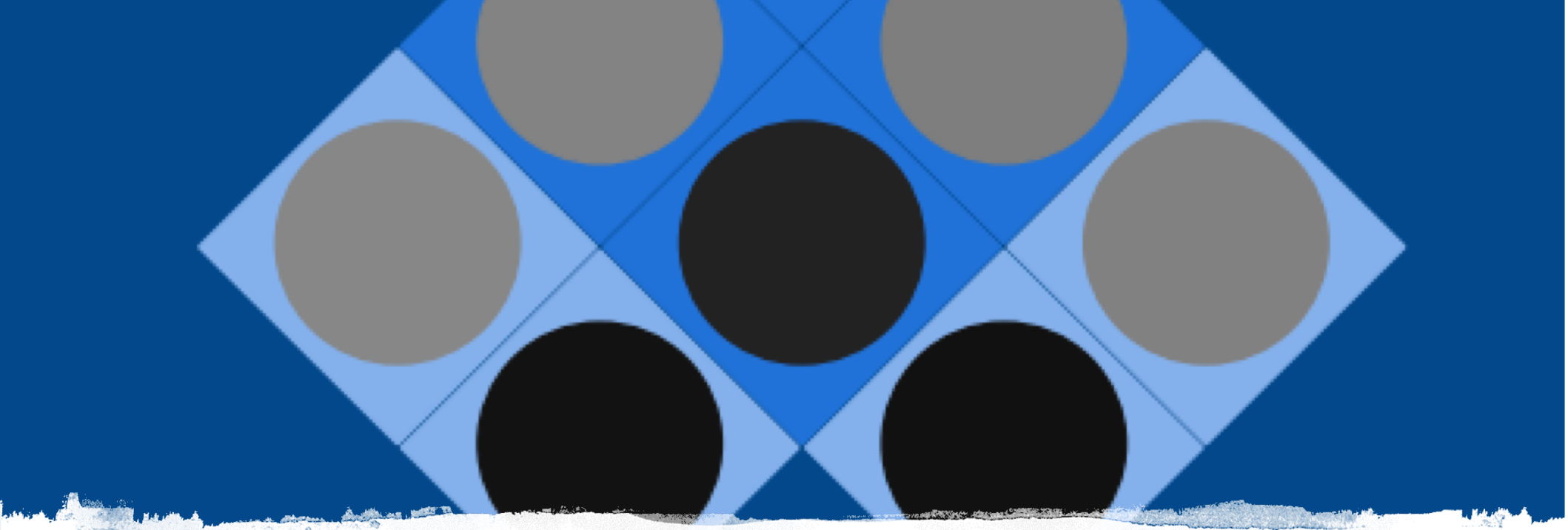
- Can also run on real, prototype quantum devices
- Adds design constraints and mysterious effects of noise
- Sign up for an account to use
- Results provided for non-commercial purposes



CreativeQiskit

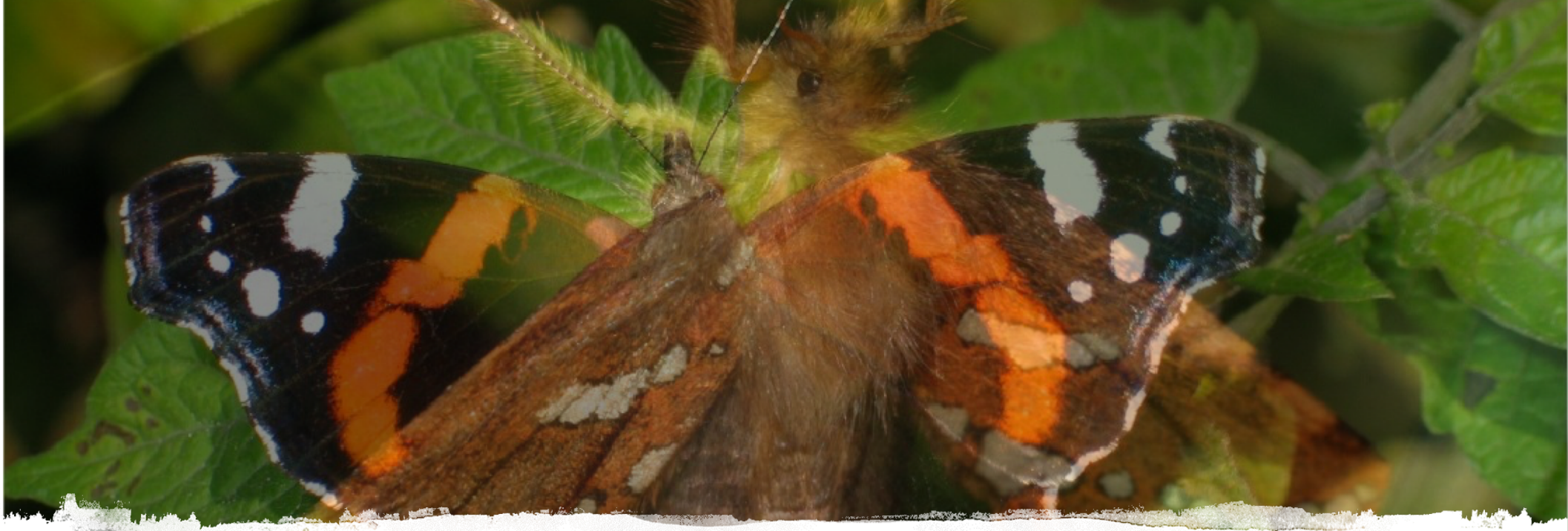
- Do you not want to learn all of QC in a game jam?
- Do you not want to make a game in Python?

- CreativeQiskit is for you!



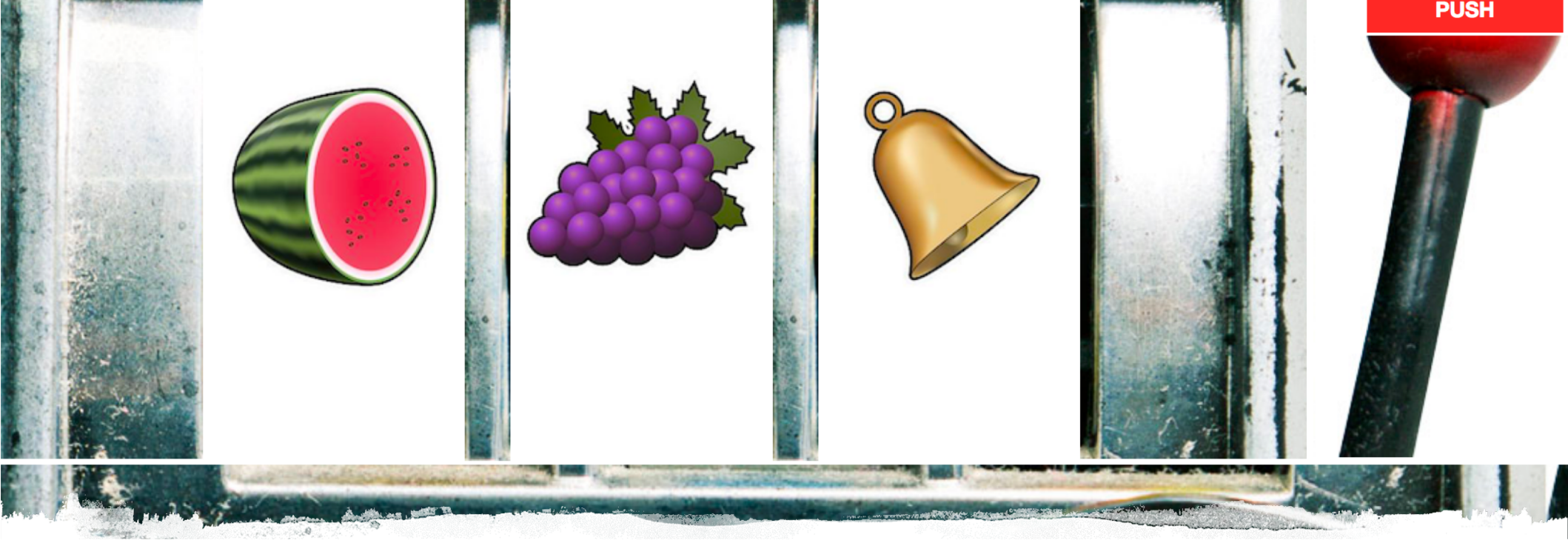
CreativeQiskit

- Quantum game mechanics
- Image and audio generation
- Visualize what’s going on in a quantum computer
- Procedural generation
- QRNG



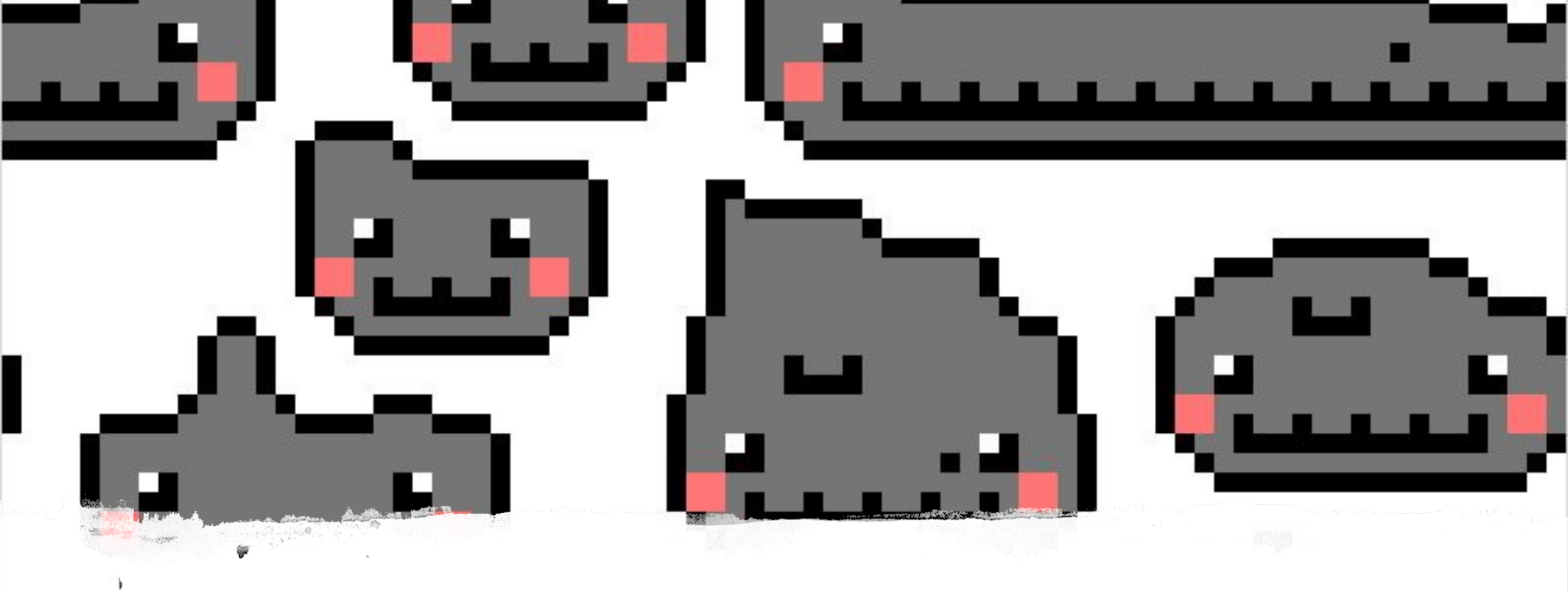
CreativeQiskit

- Use CreativeQiskit to make assets for your game
- Download from *ibm.biz/get-creative-qiskit*
- Run on the web at *ibm.biz/run-creative-qiskit*



How to Use

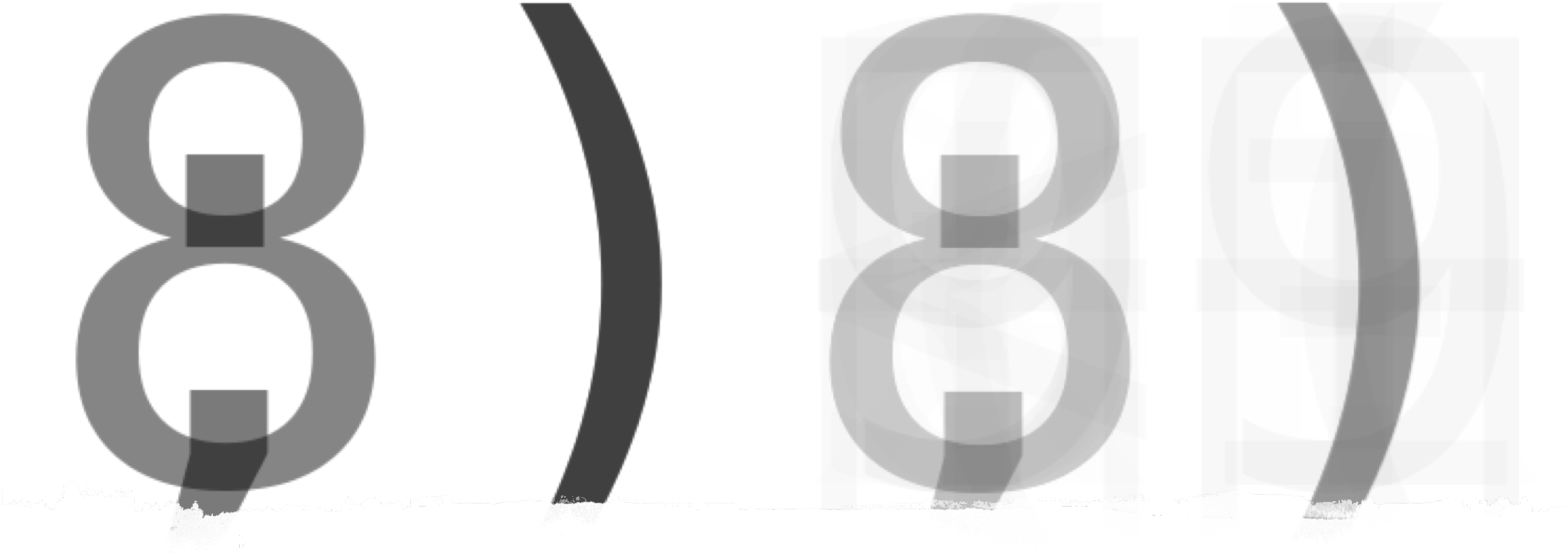
- Examples for all tools *ibm.biz/get-creative-qiskit*
- Also info on
  - Using the IBM Q Experience
  - Setting up QRNG without Python



Other Tools

- Quantum Piano: to jam with a quantum computer
  ibm.biz/quantum-piano

- Wavefunction collapse with real quantum
  ibm.biz/wfc



Noise

- Current quantum devices are noisy
- Strange things happen, even for the simplest programs
- You'll see it on the real devices
- You can simulate it within Creative Qiskit

Noise

- We need to track noise noise
- We need to find out what it is doing
- We need to fight it!

Noise

- Cutting-edge science experiment
- Glimpse into the unknown
- Opportunity to explore!

Over to you!

ibm.biz/get-creative-qiskit