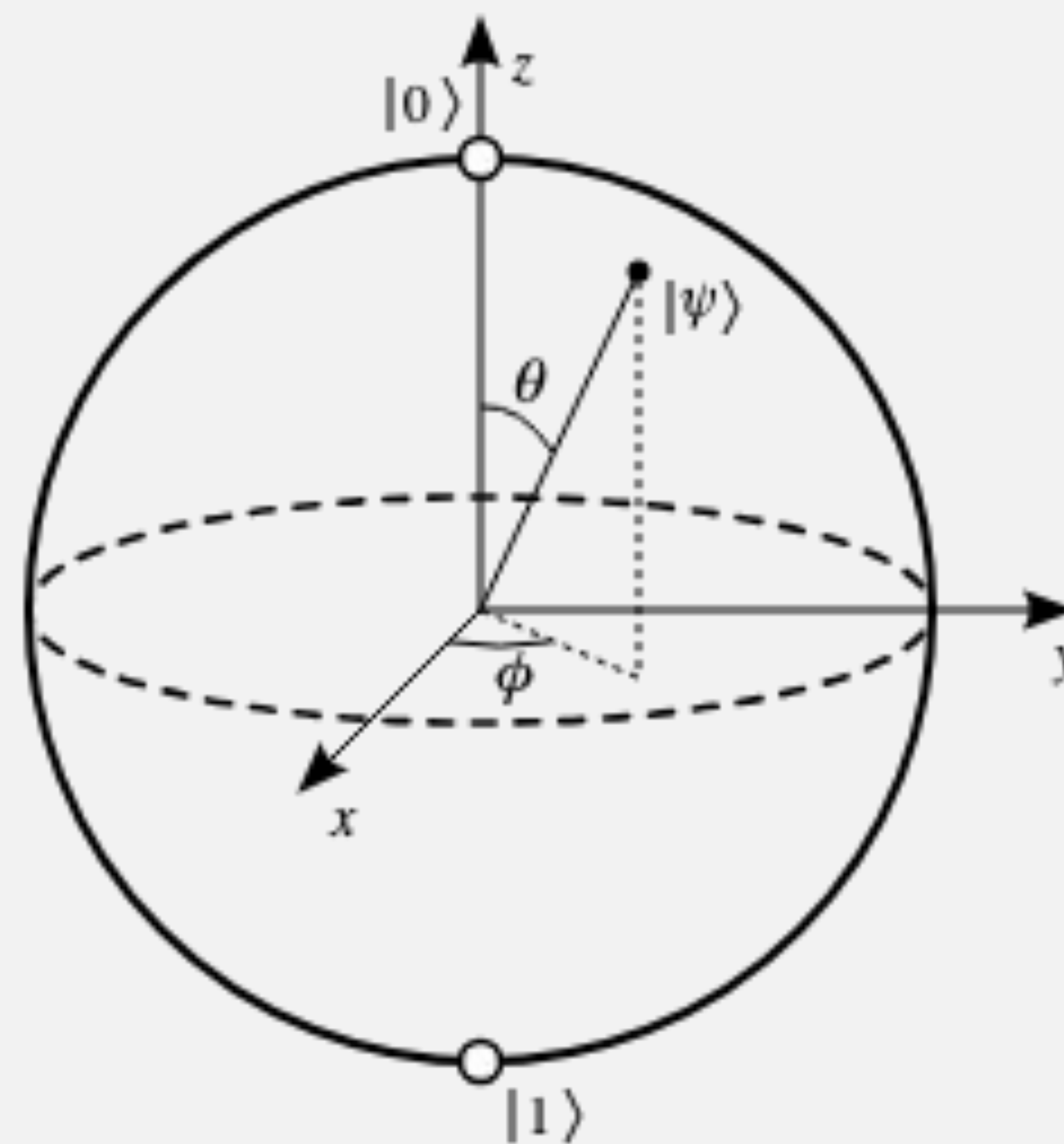


Introduction Presentation

Why Quantum Natural Gradients Fail

Project Team:

Christopher Kverne
Nathan Lioe-A-Tjam
Isabella Anthony



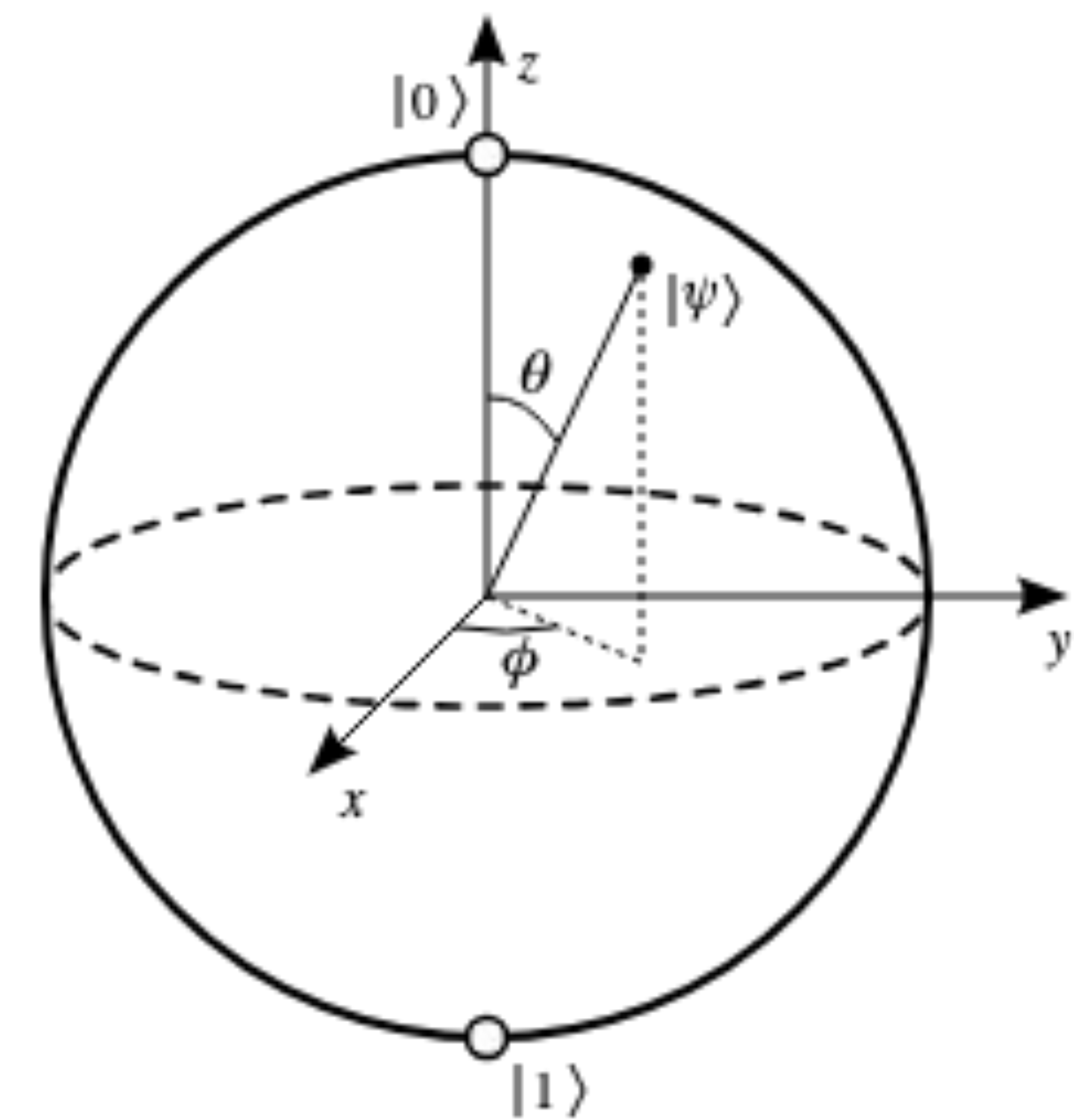
Classical VS Quantum Computer

Bit (Classical) → 0 or 1

Qubit (Quantum) → Superposition of 0 and 1 (state on a curved space)

Advantage → Massive computational possibilities

Challenge → Hard to optimize + highly noise-sensitive



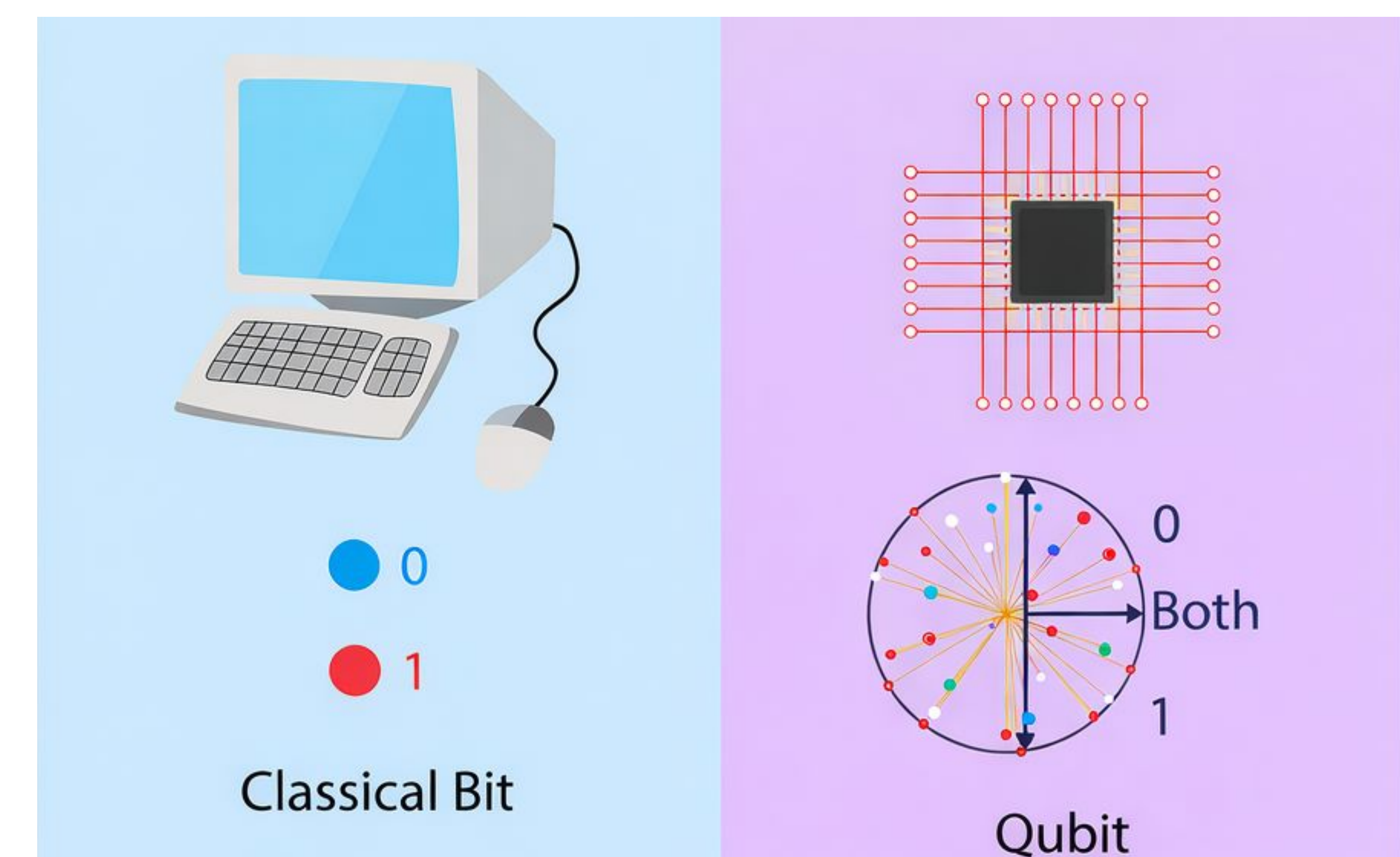
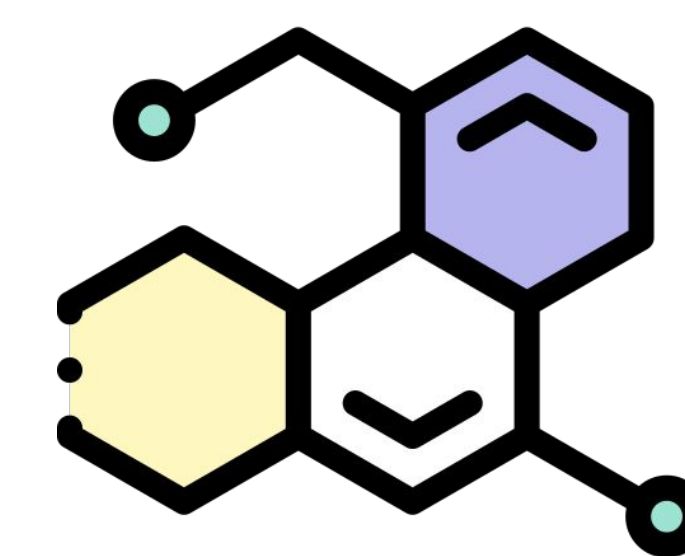
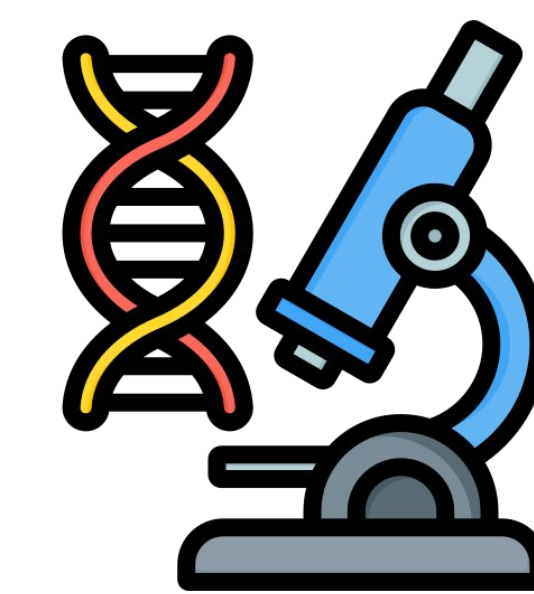
QML Real-World Applications

Medicine → Drug discovery

Chemistry → Molecular simulation

Biology → DNA analysis and modeling

Finance → Trading optimization



Flat Earth Paradox

The fubini-study metric creates a curved quantum statistical manifold. Quantum natural gradient maps the tangent vector through an euler step on the ambient coordinate chart dropping the levi-cevita connection of the manifold. This creates a retraction error forcing the descent path away from its optimal direction

