

Quantum Circuits Card Game

Use quantum logic to create a secret quantum state before your opponent does! You can explore the bizarre world of quantum mechanics where uncertainty rules by combining quantum gates to make quantum superpositions and entanglement. Quantum logic provides the power behind quantum computers—machines that will be able solve certain problems far more quickly than the world's best supercomputers!

How to Win

The goal is to create your own secret quantum state before your opponents create theirs. All players (or teams) start from the same simple initial state and take turns applying quantum gates to gradually build up a quantum circuit. (All players or teams together build one circuit.) The challenge is to construct a circuit that transforms the initial state into your secret state. However, your opponents are trying to use the same circuit to create their own secret state, and so you must create your state first to win. Note that there are many, many circuits that can produce your state!

Game Setup

Rules of the game:

1. Separate the playing cards into 4 piles: initial states, secret states, two-qubit gates, and one-qubit gates. Shuffle each pile and lay the piles face-down on a flat surface.
2. One player deals 4 two-qubit gate cards and 4 one-qubit gate cards to each player face-down so that the players cannot see each other's cards. The dealer also selects an initial state card and displays it face-up so that all players can see the initial state.
3. Each player then randomly draws one secret state card, being careful to not let the other players see what their secret state is.
4. One of the players who did not deal (this player can be chosen randomly) begins by laying down a gate card of their choice face-up, underneath the initial state. The players then take turns, each time either laying down one gate card from their hand or drawing a new card from either gate card pile if they prefer.
5. The game concludes when a player is able to, on their turn, complete a circuit that transforms the initial state into their secret state. This could happen either before or after they put down a gate card. After the circuit is complete, the player then lays their secret state card at the bottom of the circuit, and the other players must confirm it is correct. If no players can complete a circuit that produces their secret state even after all cards are played, then it is a draw.





















