IBM **Quantum**

Qiskit

QCHack 2022 Challenge

The IBM Quantum Challenge is presented in two tiers. Participants who successfully finish Tier 1 will receive IBM Quantum digital swag and certificate. Participants who finish Tier 2 will be judged critically and compared against each other. Only the strongest project(s) from Tier 2 will receive custom Qiskit backpacks and be named the QCHack 2022 IBM Quantum Champs.

Tier 1 – Create a working interactive 'program' (it can be a website, game, app, etc.) in which a human user is facing off against a quantum computer. This is broad on purpose – the program can be built in many different ways. Your program should implement strategies that seriously challenge the human player. The implementation must utilize more than just probabilities related to measuring quantum states. You must use Qiskit to program the computer's gameplay strategy, and as much as possible, the strategy should be implemented with quantum circuits and quantum gates on real quantum hardware (although using the Simulator is understandable given the time limit).

Tier 2 – Present a presentation of your project (more details on next page). Furthermore, augment your program to include as many of the following as possible:

- Add a compelling UI implemented with available, or custom, widgets
- Display code in real time alongside the UI
- Include a gameplay progression loop, or a competitive aspect to be shared on social media
- Make the game playable in an IBM Quantum Lab notebook
- Create educational elements of your game for non-quantum players to learn from
- Different difficulty levels, with an explanation of what happens behind the scenes to change the difficulty

Additional Info:

Presentations – you must include either a YouTube video (no longer than 5 minutes) or a slide deck (no more than 12 slides) which shows off your project, mentions your team members, and goes into detail of how you built the project, challenges faced, and possible next steps.

One of the first games implemented on a computer in which a human played against the computer is Nim, so it might be an interesting and fitting game to implement on a quantum computer. This Wikipedia article describes the game, strategies, and variants. https://en.wikipedia.org/wiki/Nim

Any game or experience is allowed, but preference will be shown to projects which:

- Emphasize *quality* of features over quantity
- Are fully original
- Benefit the quantum community at large
- Present the concepts in a new and unique manner
- Show clear love for the source material

All projects submitted must be using Qiskit version 0.35. Anyone can submit a project, however someone working for a GOE, i.e. Government Owned Entity, will not be eligible for prizes or awards. Full eligibility rules here.