Jeffrey Morais

Quantum Gravity Theorist

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⊕ IsolatedSingularity
in *jeffrey-morais*

Educational Background

2019 - 2023 — **B.Sc. Honours Physics**, *McGill University*, Montréal Canada. GPA: 3.84/4.0

Selected Experience

Summer 2023 — **Quantum Computing Theorist**, *University of Alberta*

- Demonstrated correlation between holographic entanglement of qubits and topological wormholes in **quantum information theory in Python**.
- **Developed algorithms for distinguishing identical quantum entangled states** via geometric phases occurring in the system's parameter space.
- **Characterized information loss in entangled qubit systems** with an emphasis on density matrices in the path integral representation.

Supervisor: Prof. Igor Boettcher

Summer 2022 — **String Cosmology Theorist**, *McGill University*

- **Increased efficiency of extracted signals** from cosmic strings within cosmological **non-linear noise** functionals occurring in string cosmology.
- Created the cosmic string signal and **developed numerical algorithms** in **Python** to recognise its profile with **more accuracy than previous statistics** with correlation functions.
- Classified the string stability and isolated its signal with **wavelet** and **match-filtering statistics** from the spacetime dependent noise. ↗ 🐙

Supervisor: Prof. Robert Brandenberger

Fall 2021 — **Computational Astrophysics Data Scientist**, *McGill University*

- Characterized fast radio burst signals captured by the **CHIME telescope** for use of radio astronomy experiments in Canada & the United States.
- **Developed computational methods in Python** for decoupling the signals from non-linear radio noise.
- **Coordinated with 10+ physicists** to optimize the calculation of decorrelation bandwidths of the burst via **bash scripts used in Canada Compute**.
- **Established a method for finding the position of the bursts** using spatial correlations in the linear radio noise. 🐙

Supervisor: Prof. Victoria Kaspi

2019 - 2020 — **Quantum Theorist**, *Vanier College*

- **Developed a novel approach** to **solve non-linear PDE** Hamilton-Jacobi equations of motion and generated quantum trajectories in pilot-wave theory.
- Developed algorithms in **Python** using the **Crank-Nicolson method** and **recurrent neural networks** to produce trajectories for arbitrary potentials.
- Reformulated and **numerically solved** the the time-dependent **Schrödinger equation**. ↗

Supervisor: Prof. Ivan Ivanov

Python + Mathematica

- **Quantum enhanced Markov chain Monte Carlo simulations** in arbitrary dimensions.
- Analyzing data structures with **quantum neural networks** and custom **OOP** modules.
- Custom **integrators for non-linear PDEs** and **multi-threaded multibody simulations**.