Jeffrey Morais

Quantum gravity theorist
Montréal, Canada

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IsolatedSingularity

Education

- **B.Sc. in Theoretical Physics** — Sept 2019 – May 2023
  Department of Physics, McGill University — *Montréal, Canada*

Selected Experience

- **Quantum Computing Theorist** — Edmonton, Canada
  University of Alberta — *Summer 2023*
  - Demonstrated the relationship between the holographic entanglement of qubits and topological wormholes in **quantum information theory** and quantum gravity.
  - Related topological wormholes to quantum tunneling events for **qubits in potential well lattices** to be **used in quantum computers.**
  - **Characterized information loss in entangled qubit systems** with an emphasis on density matrices in the path integral representation.

  Supervisor: Prof. Igor Boettcher

- **String Cosmology Theorist** — Montréal, Canada
  McGill University — *Summer 2022*
  - **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

- **Astrophysics Data Scientist** — Montréal, Canada
  McGill University — *Fall 2021*
  - **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** supercomputer clusters.
  - **Established a method for finding the position of the bursts** using spatial correlations in the linear radio noise.

  Supervisor: Prof. Victoria Kaspi

- **Quantum Theorist** — Montréal, Canada
  Vanier College — *2019 - 2020*
  - **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 **recurrent neural networks** and the **Crank-Nicolson method** and to produce trajectories for arbitrary potentials.
  - Reformulated and **numerically solved** the the time-dependent **Schrödinger equation** for pilot-wave theory.

  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**.