

# Reproducibility Package – Reproducibility Engineering: Quantum Reinforcement Learning

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## I. Introduction

Reproducibility is one key factor in conducting scientific research for (dis)proving new theories. For example Karl Popper as one major scientific philosophers describes repetitions for scientific observations as necessary to convince oneself that one is not confronted with a random coincidence.[Pop02] In contrast to this idea of philosophy of science, there is the apprehension of a reproducibility crisis in science, shared for instance in surveys by one of the most popular research magazines. A majority of the participated 1576 researchers sees a reproducibility crisis and has failed to reproduce the experiments of other scientists.[Bak16]

To make a contribution in the meaning of reproducibility, this paper documents the approach of reproducing current research about reinforcement learning in quantum computing with variational quantum deep Q-Networks (VQ-DQN) by Franz et al.[FWP+]

## II. Research: Uncovering Instabilities in Variational-Quantum Deep Q-Networks

## III. Reproducibility Package

### References

- [Bak16] M. Baker, “Reproducibility crisis,” *Nature*, vol. 533, no. 26, pp. 353–66, 2016. doi: 10.1038/533452a. [Online]. Available: <https://www.nature.com/articles/533452a> (visited on 02/08/2022).
- [FWP+] M. Franz et al., “Uncovering instabilities in variational-quantum deep q-networks,”
- [Pop02] K. Popper, *The Logic of Scientific Discovery*. Routledge, 2002, p. 23, isbn: 9780203994627.