TWO QUBIT DEUTSCH JOZSA ALGORITHM USING OPTICS AT THE UNDERGRADUATE LEVEL

EMILY HERBERT

Abstract. Beginnings of the Senior Prodject for Physics

1. Mathematics

Quantum computing is rooted in the principles of linear algebra. The reasoning is that a qubit is a vector. To better understand it, this section will delve into the mathematical tools used throughout the project.

Appendix A. Appendix

A.1. **Theory Deutsch-Jozsa Computation.** This project originated from work with the mathematics department. Provided here is the original computation for case 2 of the Deutsch-Jozsa.

$|\Psi_0\rangle = |01\rangle$

$$(H \otimes I) \circ (U_f) \circ (H \otimes H) |0\rangle \otimes |1\rangle = (H \otimes I) \circ (U_f)(\frac{1}{2}(|0\rangle + |1\rangle) \otimes)$$

Date: April 8, 2024.