Representation of non local optical potentials in nuclear reactions

The atomic nucleus, comprised of neutrons and protons, stands as a fundamental building block of our world and a cornerstone of modern physics. most of nuclear physics is built upon the idea of these nuclei interacting with each other, colliding with each other. That is what we refer to as nuclear reactions, which the scientific community strives to accurately predict the outcome of.

In this thesis, we will explore some of the attempts at modelling these nuclear reactions. These are essential in understanding the nuclear reactions we seek to predict. For this purpose, several popular models have been compared.

In this thesis we bridge the gap between these two models by employing a novel approach. Through comparative analysis, various models are examined, shedding light on the structures of microscopic potentials.

In order to achieve this, we develop a mathematical foundation, providing a framework for understanding the complex potentials. Through this lens, the model we investigate is deconstructed and represented analytically, offering a clearer understanding of its behaviour.

In essence, this thesis serves as a bridge between the some of the models for the potentials used in calculations in nuclear reactions. By progressing the models for nuclear interactions, it offers a path to better predictive capabilities and a deeper understanding of nuclear reactions.