Draft version December 15, 2020
Typeset using LaTeX default style in AASTeX63

Exo2: An Exploration Into a Novel Characterization Algorithm for K2 Photometry

Sameer Singh[1]

[1] *Valley Stream South High School*

ABSTRACT

In 2008, NASA launched the *Kepler Space Telescope* in the hopes that it would provide the measurements necessary to determine the frequency of Earth-like planets orbiting Sun-like stars. When in 2012 the original mission was jeopardized by mechanical failure, it was repurposed as *K2*, which has since undergone 19 80-day-long observational campaigns across the sky. The *Kepler* mission collected transit-photometric data from millions of stars, taking measurements of brightness thereof with respect to time. These raw measurements have been dubbed "light curves" by astronomers, and periodic dips with certain geometries within them may be indicative of the presence of exoplanets. While manual classification efforts of light curves have led to the discovery of a limited number of exoplanets, a large and ever-expanding field of research in astronomy has been the development of algorithms able to automatically detect potential exoplanets in *Kepler* data. Some particularly elaborate machine learning methods have been able to perform the task with great accuracy; nevertheless, complexity, high storage requirements, and lack of replicability have all been associated with these algorithms. I present *Exo2* – a novel exoplanet-identification program built upon accessible mathematical principles – as an effective alternative, more amenable to citizen science. The model is highly effective at discriminating periodic phenomena from non-periodic astrophysical phenomena, as well as at discriminating true positives from false positives. *Exo2* was validated using SFF-corrected light curves from *K2*: ___% of the candidates it identified were true exoplanets, and it identified ___% of all true exoplanets. With more transit-photometric data becoming available via the ongoing *TESS* mission, *Exo2* has the potential to facilitate exoplanet identification by citizen scientists.

Keywords: exoplanet — transit — Kepler — detection

1. INTRODUCTION

Corresponding author: Sameer Singh
sameersingh22@icloud.com