Drift Rate Analysis of Detected Signals of Interest

Anna Gagnebin and Dr. David DeBoer
Berkeley SETI Research Center

Introduction

Background:

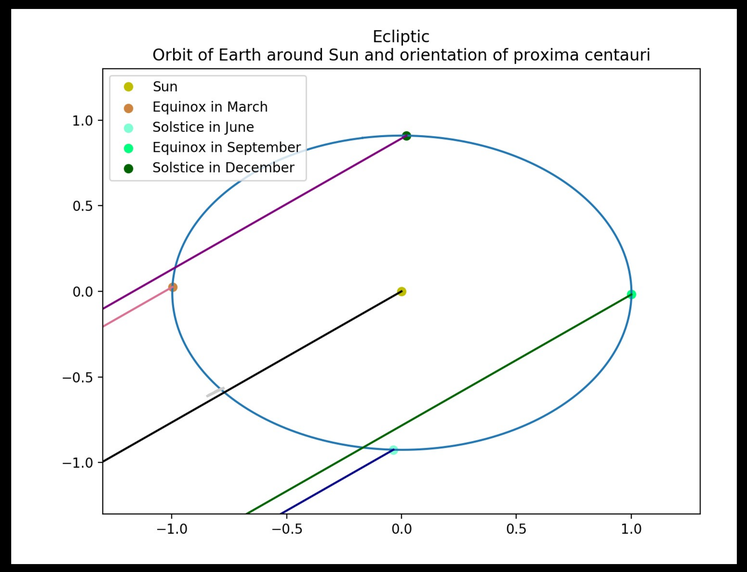
- This project builds upon a set of code written by Dr. David DeBoer to analyze the validity of a signal of interest that seemed to originate from Proxima Centauri.

Causes of Drift

- Movement of the solar system barycenter, geocenter, and the rotation of the Earth at the location of the observer
- Rotation of the signal source around its star
- Radio interference from phones, radios, or other transmitters in or on moving cars, bicycles, planes, satellites, or probes
- Electronic oscillations in Earth-bound transmitters

Goals

- To help develop a comprehensive set of code that can be used to analyze potential signals of interest.
- To develop a user-friendly Jupyter Notebook to help visualize the direction and drift rates of a potential signal from any star.



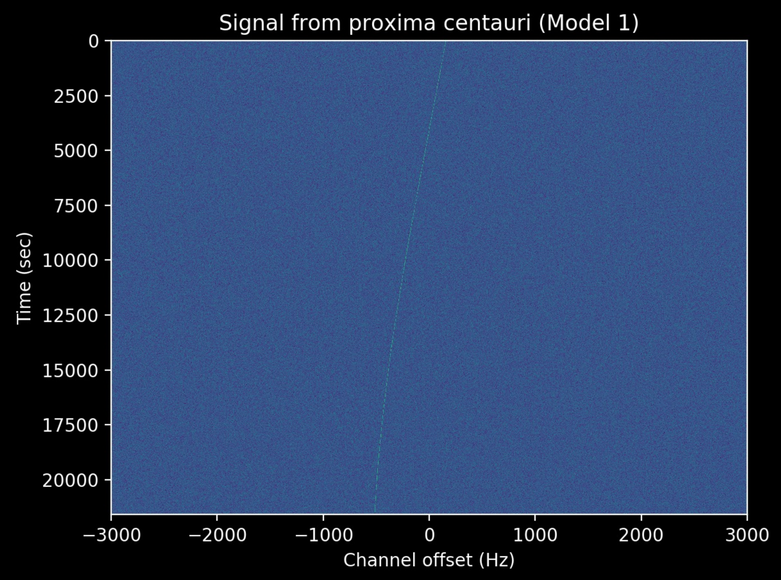
Models and Assumptions

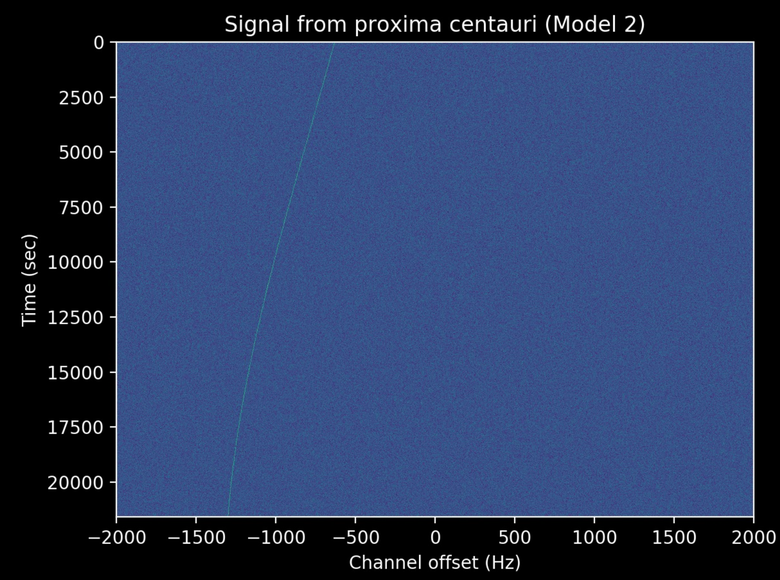
Model 1:

- The signal was sent intentionally to our solar system, so the drift due to the motion of our solar system's barycenter as well as the motion of the source has already been accounted for

Model 2:

- The signal was intentionally sent to the Earth, so the drift due to the motion of the source as well as our barycenter and Earth's geocenter has already been accounted for





References:

- Taylor et al. (2018). Spectral kurtosis-based RFI mitigation For chime. *Journal of Astronomical Instrumentation*, *08*(01). https://doi.org/10.1142/S225117171940004X
- Thompson, N.C. (2014). *RFI mitigation in radio astronomy* [Master's thesis, Stellenbosch University]. https://core.ac.uk/download/pdf/37421941.pdf
- Price et al. (2020). The Breakthrough Listen Search for Intelligent Life: Observations of 1327 Nearby Stars over 1.10-3.45 GHz. *The Astronomical Journal*, *159*(3). https://doi.org/10.3847/1538-3881/ab65f1
- Work done by Sheikh et al. and Smith et al.

Funding:
Funding for this project is provided by the National Science Foundation and Breakthrough Initiatives