SCIENCE FAIR:

- Obtaining a high resolution spectrum of the sun & comparing it to a G2V star

TIME TABLE

Jan 20: order pieces (diffraction grating & slit

Jan 24: hopefully pieces arrive, start building spectrograph
3D print pieces
Jan 25: finish building spectrograph

Jan 31: collect & calibrate all sun spectrums

Feb 5: get half mineral spectra

Feb 7: get other half

Feb 14: calibrate all spectras of minerals

before Feb 21: compare & identify element

Our project has changed, so we will not be using this schedule

Background Research

What is Spectrography?

Spectrography is the scientific technique of using a spectrograph to disperse light into its component wavelengths & analyzing the resuting spectrum. It identifies chemical composition, temperature, density, & velocity of objects by analyzing emmision & absorbtion lines.

(learnt this from a nasa website page)

Question / Purpose

The purpose of this experiment is to find out if the spectrum of the sun lines up perfectly with the spectrum of an average G2V star

Hypothesis

I think that there will mostly be similarities between the spectrum of the G2V star & the sun, but I think that there will be some minor changes in the absorbtion lines

Materials

- Plywood: 14.5in x 7.5in
- laptop: Rspec spectrography program, Camera EOS utility
- diffraction grating: 2400 lines per mm
- Slit: 7 microns wide
- 3D printed slit holder
- 3D printed diffraction grating holder
- Dslr camera
- shoe box

Procedure

- build spectrograph, 3D print slit holder & grating holder
- Capturing the spectrum of the sun
  - Remotely control camera through Canon EOS utility & focus into the spectrum
  - put spectrograph into shoe box & cut out small window for sunlight to pass through & only fall on the slit.
  - gradually tilt the grating so that you can see & capture the rest of the spectrum.

Variables

Controlled
- distance from slit to grating
- distance from grating to camera
- Camera lens focal length

Dependant
- exposure time for each section of th spectrum
- blue end of the spectrum requires shorter exposure than the red end

Independant
- the spectrums of the G2V & sun

Data:

The data that I have collected is all online & since they are photographs I cannot describe them here

Results / Conclusion

The spectra that I captured was analysed in Rspec. After comparing the fully calibrated spectrum of the sun, I concluded that the solar spectrum matches almost perfectly with the spectrum of the G2V star.

Application

This research can be applied in Renewable technologies. Understanding the spectrum of sun for the creation of more artificial lights that can enhance the rate of photosynthesis & allowing for more advanced photovoltaic cells to be developed

Activity

Jan 20: ordered pieces (diffraction grating & slit), began background research
Jan 27: slit arrived, still waiting for grating
Feb 4: grating finally arrived, have begun planning for spectrograph layout
Feb 6: started 3D printing the pieces that will hold the slit & grating
Feb 7: the slit holder print failed, will have to reprint.
Feb 10: Assebled spectrograph.
Feb 11: taking trial spectra of sun, fine tuned the distances & angles
Feb 13: took spectra, requested trial version for Rspec.
Feb 15: I spent time learning the software.
Feb 16: Captured a new set of pictures of the solar spectra with a fully finetuned spectrograph
Feb 17: Calibrated the spectra
Feb 18: Combined all the spectra & normalized it
Feb 20: Analysis of the spectra has been completed
Feb 21: started filling out online CYSF info