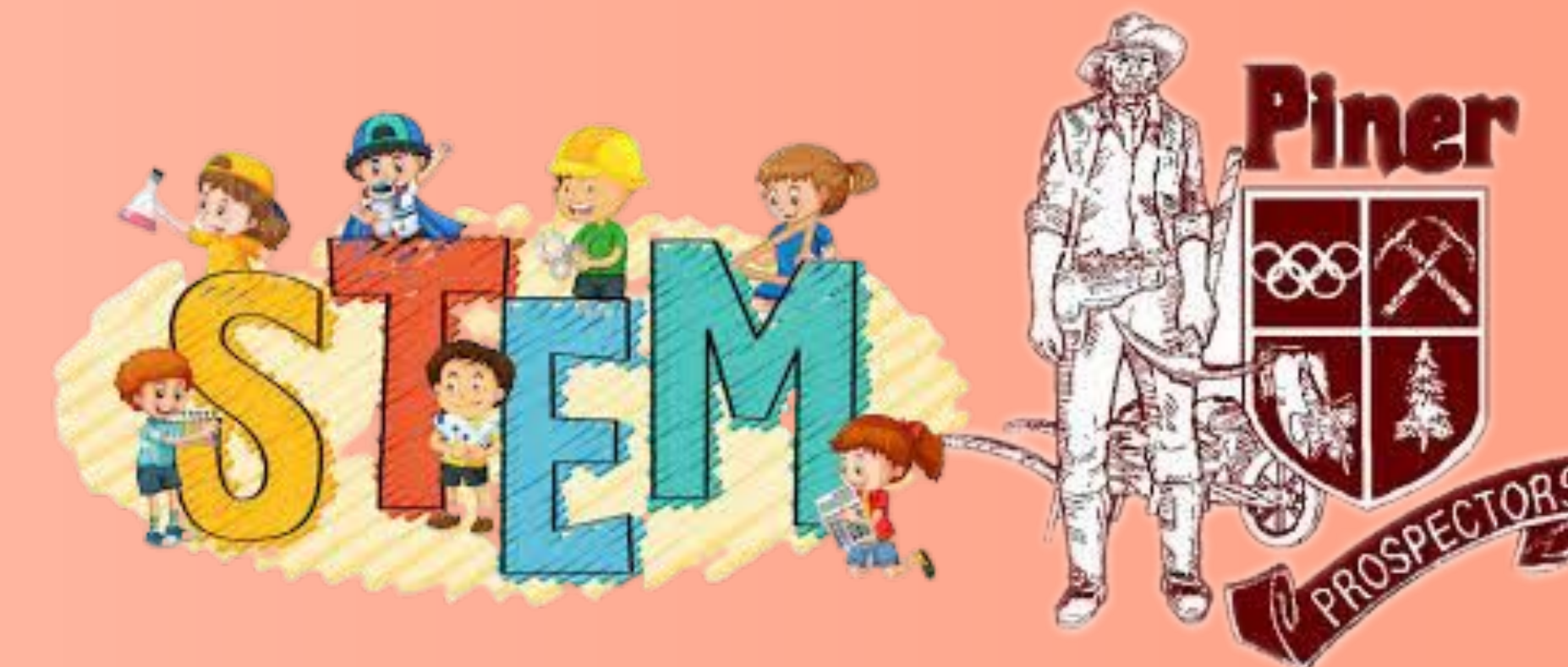


M74 - ASTROPHOTOGRAPHY

Julie Bui, Kurt Kruger, and Steve Smith
Piner High School - STEM Level II
May 2023



What is Astrophotography?

Astrophotography is the ability to image and/or record details of objects that are outside of the visible spectrum. This may include, but are not limited to, asteroids, galaxies, the moon, planets, stars, and the sun. While the basis of astrophotography consists of taking photographs, it can also get very complex and time-consuming.

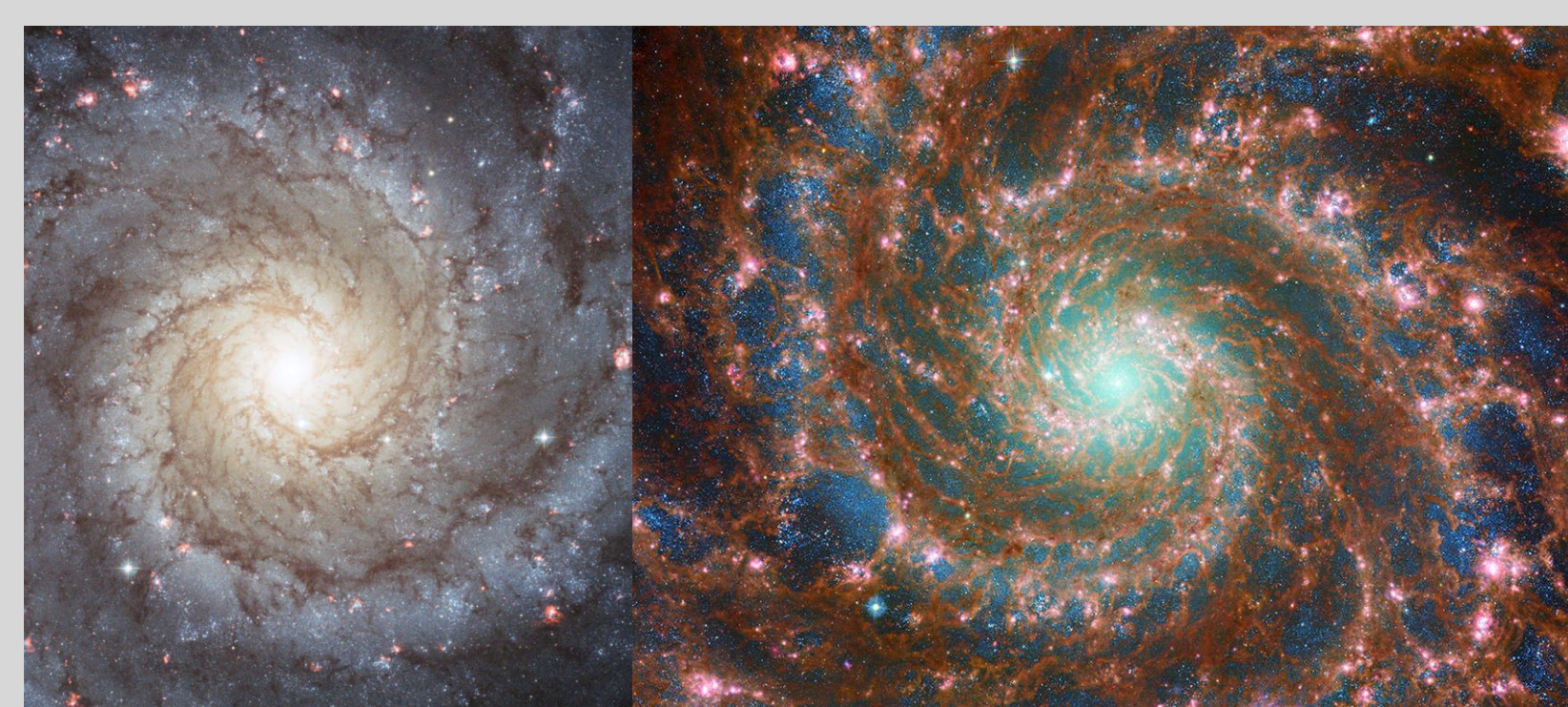


The STEM Program at Piner High has not only allowed me to become a STEM Prospect as a junior, but has also given me the chance to continue working with Kurt Kruger and Steve Smith. We specifically used Piner's SPARQ Observatory.

Type of Galaxy

M74 - Messier 74

- Discovered by Charles Messier's assistant in 1780
 - Large spiral galaxy
 - Located in the constellation, Pisces
 - It is about 32 million light years away from Earth!



Number of Sessions/Filters

Sessions

Since I completed a Photometry Project the prior school year, I immediately knew that I wanted to work with the telescope again! As a result, I began imaging in October 2022.

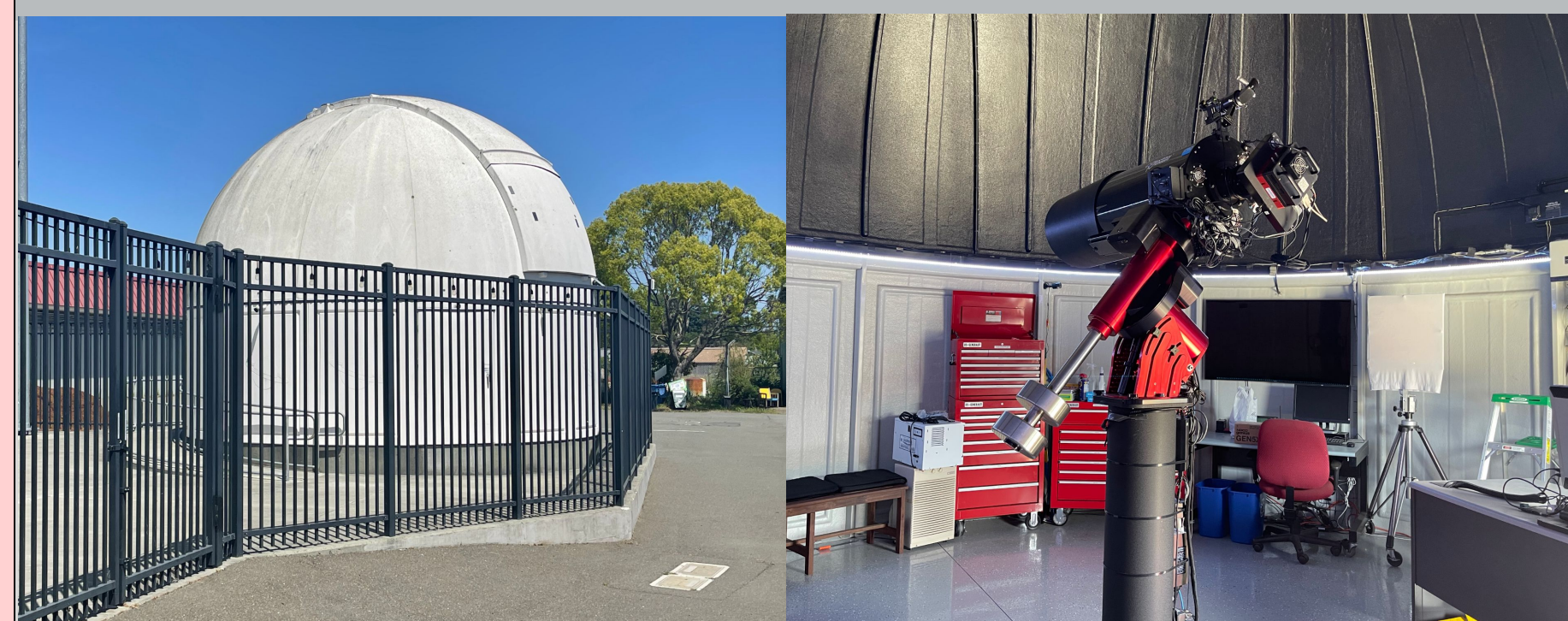
Imaging Sessions: October 23-29, 2022
Pixinsight and Photoshop Sessions: April 19, 2023, May 2, 2023, May 11, 2023, May 14, 2023

Filters

LRGB → Lumen, Red, Green, Blue

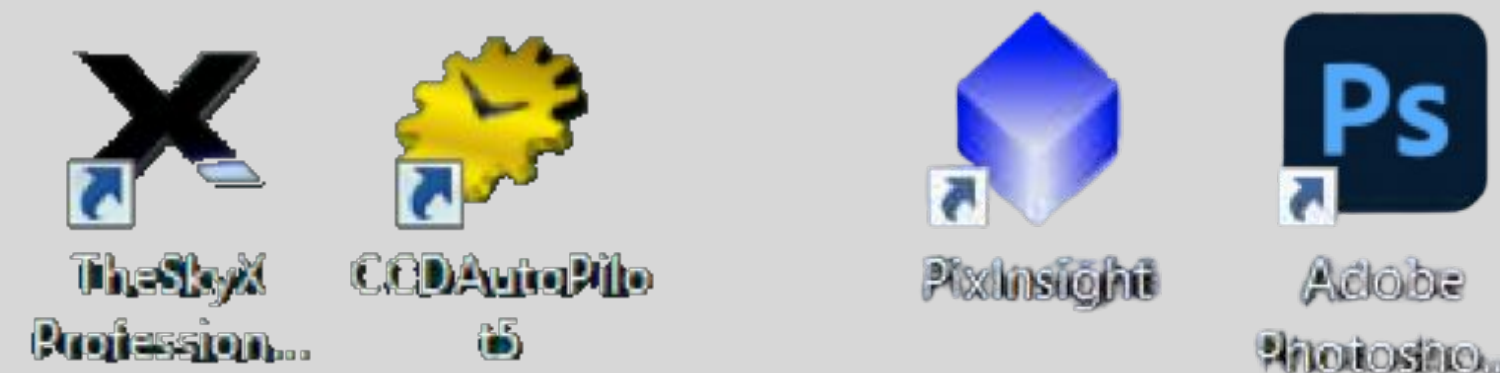


The Process of



Equipment & Software

Above: Sirius 6.7 Meter Dome & Planewave 12.5" Telescope



Final

Astrophotography!

- 1). Take raw images
- 2). Pixinsight
 - Image Rejection, Calibration Frames, Cosmetic Correction, Select Best Images, Star Alignment
 - Image Integration, Cropping
 - Lumen and RGB Processing (Separately)
 - LRGB Combination
- 3). Photoshop
 - Repair bad pixels
 - Smoothen and darken backgrounds
 - Color Balance and enhancement

General Process

Brief example of some of the different folders!

5 target registered	5/2/2023 10:42 PM	File folder	
6 target masters	5/2/2023 10:42 PM	File folder	
7 target cropped	5/2/2023 10:42 PM	File folder	
8 target L	5/11/2023 8:43 PM	File folder	
9 M74 RGB	5/11/2023 9:12 PM	File folder	
10 M74 LRGB	5/14/2023 2:49 PM	File folder	
11 M74 PS	12/10/2020 2:54 PM	File folder	
1 M74 lrgb TGVD.xisf	5/11/2023 9:26 PM	Extensible Image ...	57,308 KB
2 M74 lrgb CT.xisf	5/11/2023 9:28 PM	Extensible Image ...	57,312 KB
3 M74 lrgb LHE.xisf	5/14/2023 2:11 PM	Extensible Image ...	57,316 KB
4 M74 lrgb DSE.tif	5/14/2023 2:14 PM	TIF File	28,491 KB
4 M74 lrgb DSE.xisf	5/14/2023 2:13 PM	Extensible Image ...	57,316 KB
LHE mask.xisf	5/14/2023 2:07 PM	Extensible Image ...	19,096 KB
M74 Julie Final Image.tif	5/14/2023 2:49 PM	TIF File	28,501 KB
TGVD mask.xisf	5/11/2023 9:19 PM	Extensible Image ...	19,096 KB

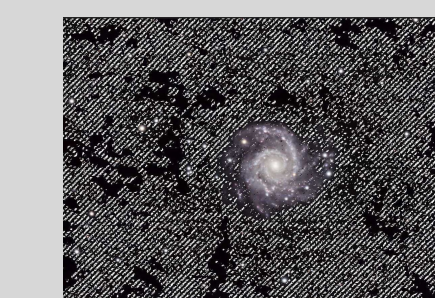
Results



Project Reflection

Highlights: My favorite part of the project was the ability to become an "artist."

Below: Repairing Bad Pixels



This particular Astrophotography Project has most definitely been one of my favorite projects to do. It is an activity not many schools in the SRCs District and Sonoma County can offer. Having a Telescope, Dome, and Planetarium at Piner High School is one of a kind. Take advantage of your resources!

If you are interested in STEM, I highly recommend doing an Astrophotography or Photometry Project!

STEM Program Reflection

As the 2022-2023 school year ends, I am so fortunate that I have been a participant in the Piner STEM Program. Although I received my Prospect Award as a junior, I am thankful that I continued to explore all my opportunities.

Future Plans:

Major in Computer Science while attending UCLA!
#gobruins 🧡💙



Acknowledgements

A special thanks to my STEM Mentor, Steve Smith! This is the second year I have worked with Steve. Thank you sharing your passion with me!

Steve Smith



Kurt Kruger



In addition, I would love to recognize my STEM Advisor, Kurt Kruger. Thank you for the last four years. The Piner STEM Program has been the highlight of my high school career!