Subject: Crab Nebula

Source: Images taken and processed from WIYN 0.9m in October of 2016 by Professor van Zee. Edited and colorized by myself.

- Image 1: This image of the Crab Nebula was created using three different narrowband filters: H-alpha, Oxygen III, and Sulfur II. This is a natural color image therefore, H-alpha is colored bright red, Oxygen III is colored blue, and Sulfur II is colored deep red. I chose this coloration by accident. I felt that this combination of colors was the most appealing and it so happened that each filter was very close to its natural color, which I did not realize until later. I chose these filters because I wanted to focus on the regions of the Crab Nebula with the possibility of star
formation. The presence of H-alpha is evidence of this as it occurs only in the hottest regions as well as Oxygen III which is present in planetary nebula with high heat indexes. I was also very interested in the science behind the narrowband filters and the information that can be understood from light of a very specific wavelength. Artistically I really focused on showing the structure within the Crab Nebula which only came out in these narrowband filters, while still showing the different regions that have a higher concentration of each light source.

- Image 2: This image of the Crab Nebula was created using two different filters: one broadband Red filter and one narrowband Oxygen III filter. This is a false color image because I colored the broadband Red filter in yellow and the Oxygen III filter in deep blue. This image is meant to be seen kind of as a transition between the first image and the final image. I say that because this image uses both broadband and narrowband filters while the others are solely one or the other. I wanted to capture the structure seen in the narrowband filters and the dust seen in the broadband filters. I chose these colors because I wanted to distinguish between the different
areas within the Crab Nebula. Red is the lowest energy level visible light and blue is near the top. I tried to show the contrast between the two to try and reflect the temperature differences in real life. I think blue and yellow contrast very well compared to other color combinations. Even though connotatively this image provides a cooler feel when in real life it is much hotter, it does still demonstrate the difference between the areas.

- Image 3: This image of the Crab Nebula was created using three different broadband filters: Violet, Red, and Blue. This image is almost a natural color image however, I would still classify it as a false color image because the Violet broadband filter is colored as red, the Red broadband filter is colored as an orangey-red, and the Blue broadband filter is colored as deep blue. I created this image as a contrast to the first image. I wanted to capture the beauty in the dust as there is not a specific structure nor design but it is more of an amorphous blob. Therefore, I combined these three filters in a way that created an appealing color but still showed the details of the Crab Nebula. If we were to see it with the naked eye this would probably be close to
what would be seen. Similar to the image before, this image shows the vast difference in temperatures and energy emitted from the Crab Nebula as each filter shows wavelengths of different energy levels. I also tried to relate this image back to the first one in the sense of color. I wanted to demonstrate that the same object with nearly the same colors can be extremely different based on how it is viewed.

- To conclude I wanted to summarize how exactly I edited these pictures. I began by layering the different images captured from each filter by what I wanted to focus on in each picture (i.e. structure, narrowband vs broadband, etc.). Then I colorized each layer and played with each layer until it was appealing to me and achieved what I wanted in each image. Then I began to adjust the levels within each layer to get rid of some of the fuzziness of the images. This made the black universe in the background sharper and helped with contrast. Then I used the “clone stamp tool” to remove a fuzzy streak on the left side of each layer as I found it distracting from the focus of the images, the Crab Nebula. Then I just made some final touch ups with color and saturation to really make sure that I emphasized what I wanted in each photograph. I hope you enjoyed viewing my images.