**NGC 6992 observations and processing summary**

**July 2022, OHP T120, Universite Paris Saclay summer school**

Integration time per individual pointing:

r filter = i filter = 4x40s = 160s (~3mn)

OIII filter = Halpha filter = 4x90s = 360s (6mn)

Sky coverage goal: one degree tall and 0.7 degree wide, assuming a ~1’ overlap on each side of the camera field of view. This leads to a 5x6 mosaic (see script MakeMosaicNGC6992 in ./Info), as visualized on 01-NGC6992-MosaicOHPT120.jpg in ./Info).

The 30 coordinates (going from bottom right to top left, right to left per row) are fed into a google sheet easing the tracking of the observations between the four groups of students (see Mosaic\_NGC6992-OHPT120\_ObservingStatus.xlsx in ./Info).

The sky was photometric (no absorption) but fairly bright due to the Moon (range from ~300 ADUs to 1400ADUs in r, 700 to 1800 in i, 50 to 150 in Halpha, 40 to 250 in OIII). Average image quality across the full dataset is 2.6”, for a pixel scale of 0.77”/pixel.

The i-band shows little of the nebula since there aren’t any emission line from that shock wave falling in that filter (cf 02-MosaicNGC6992\_mosaic.O-r-H-i.jpg in ./Info), and it turned out to be of no interest for the color image as Halpha must remain in the R channel from the RGB. Eventually the color image is based on OIII,r,Halpha, with the G channel the result of the addition of all three filters to achieve more pleasing contrasts and colors. OIII is assigned to the B and Halpha to the R. The RGB image presented here was produced by AstrOmatic’s stiff and then optimized with various image editing tools to achieve the final render, a color correction was needed in particular (Hue) to bring up the expected colors of this nebula in the optical.

The making of the image can be tackled at different levels, all intermediary steps and needed material being provided here:

1) From raw data to single stacks (30 per filter): this is what you were shown during the school and is not covered here.

2) From the 30 stacks per filter to a mosaic per filter = Montage. The collection of 30 stacks are located in the directory 01-Stacks-Optimized (sorted per filter) and that path can be fed to the script MakeMontageOffsetOnly.MosaicNGC6992 found in ./Intro (two input arguments). The output will be a large mosaic for the given filter at the native resolution (0.77”/px, which is hard coded in the Montage header MosaicNGC6992.T120.OHP.hdr which defines the desired field of view as well, see IPAC’s Montage tutorials for further tweaks).

3) From the Montage mosaics to an RGB image. The output of step 2) above is provided in 02-MontageMosaics and going from the FITS files to a RGB image can be done through tools such as Siril as demonstrated during the school tutorial. See remark above about assigning a given FITS filter to the R,G,B channels.

4) Optimization of the RGB: the 6 images presented in the 03-Coloring illustrate in a few large leaps how the final image was obtained. Demonstrations were made using Siril during the tutorial and you are encouraged to explore it yourself, starting from the file 4-RGB.MosaicNGC6992\_montage.stiff.tif