Widefield and Nebula Imaging

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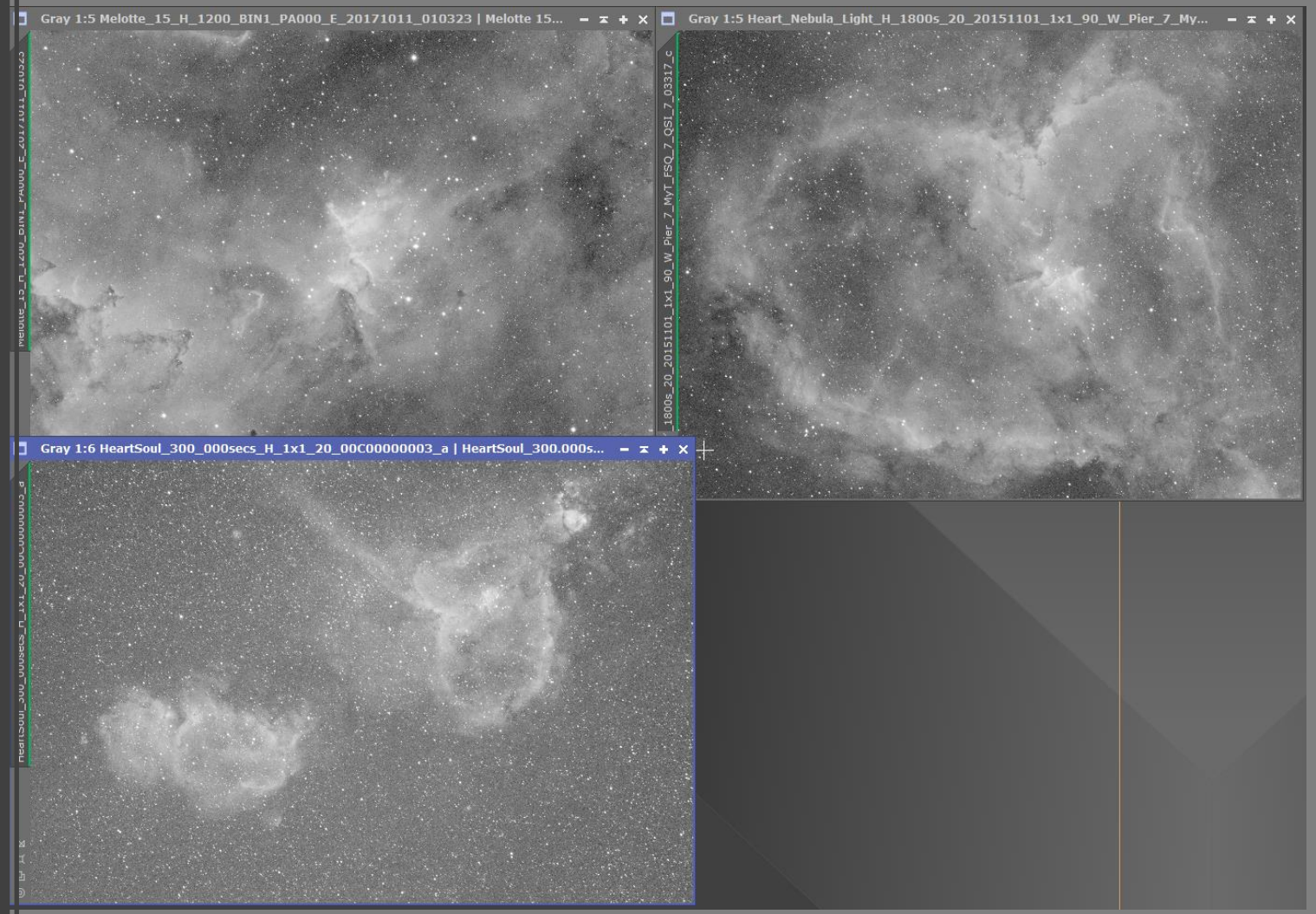
Topics

- Widefield composition
- Improving nebulas with narrow band data
- Processing – some new tricks (for me)
- Hardware considerations

Widefield composition

Variety of Perspectives

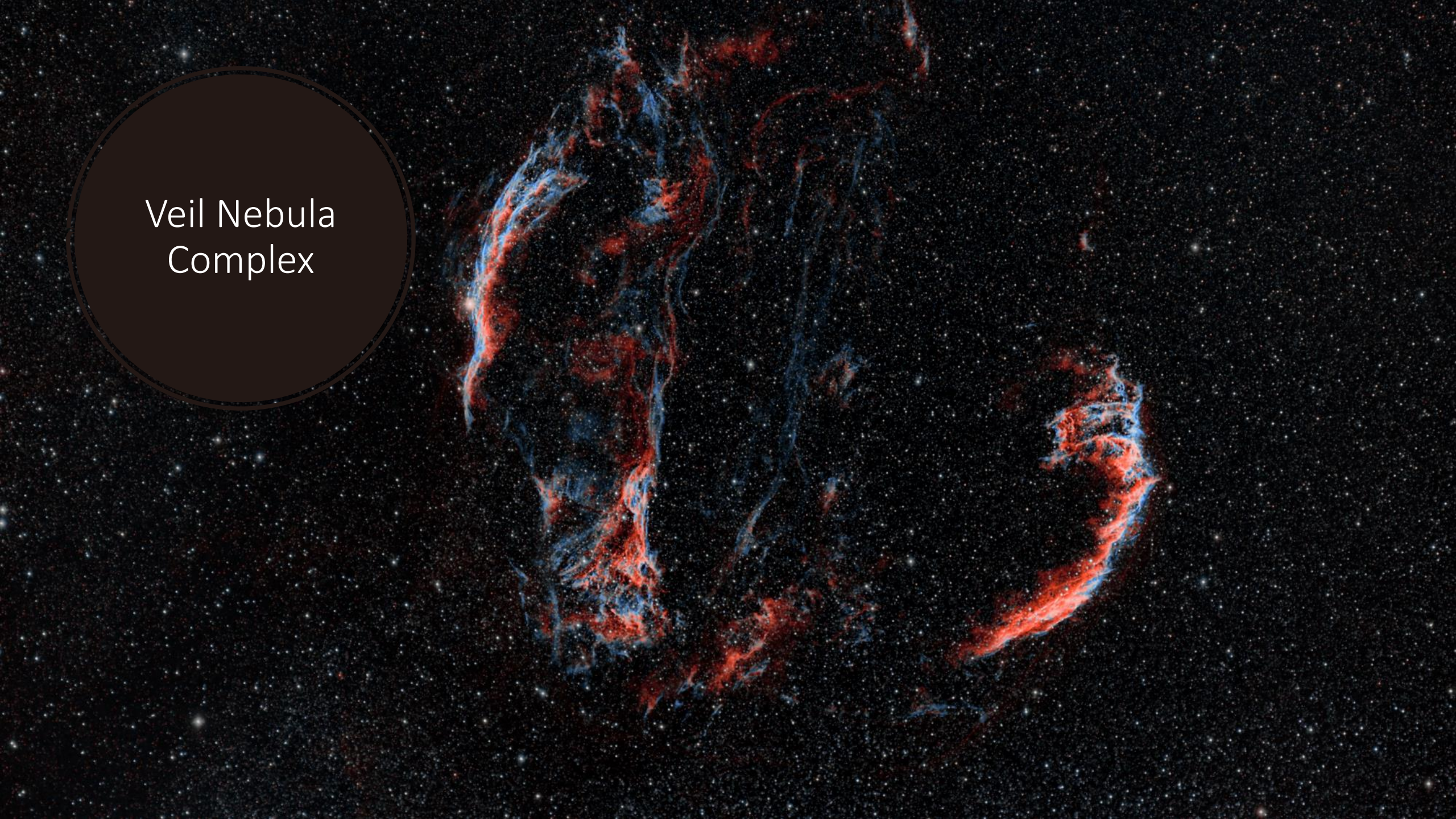
Melotte 15 within Heart Nebula adjacent to Soul/Fetus Nebula



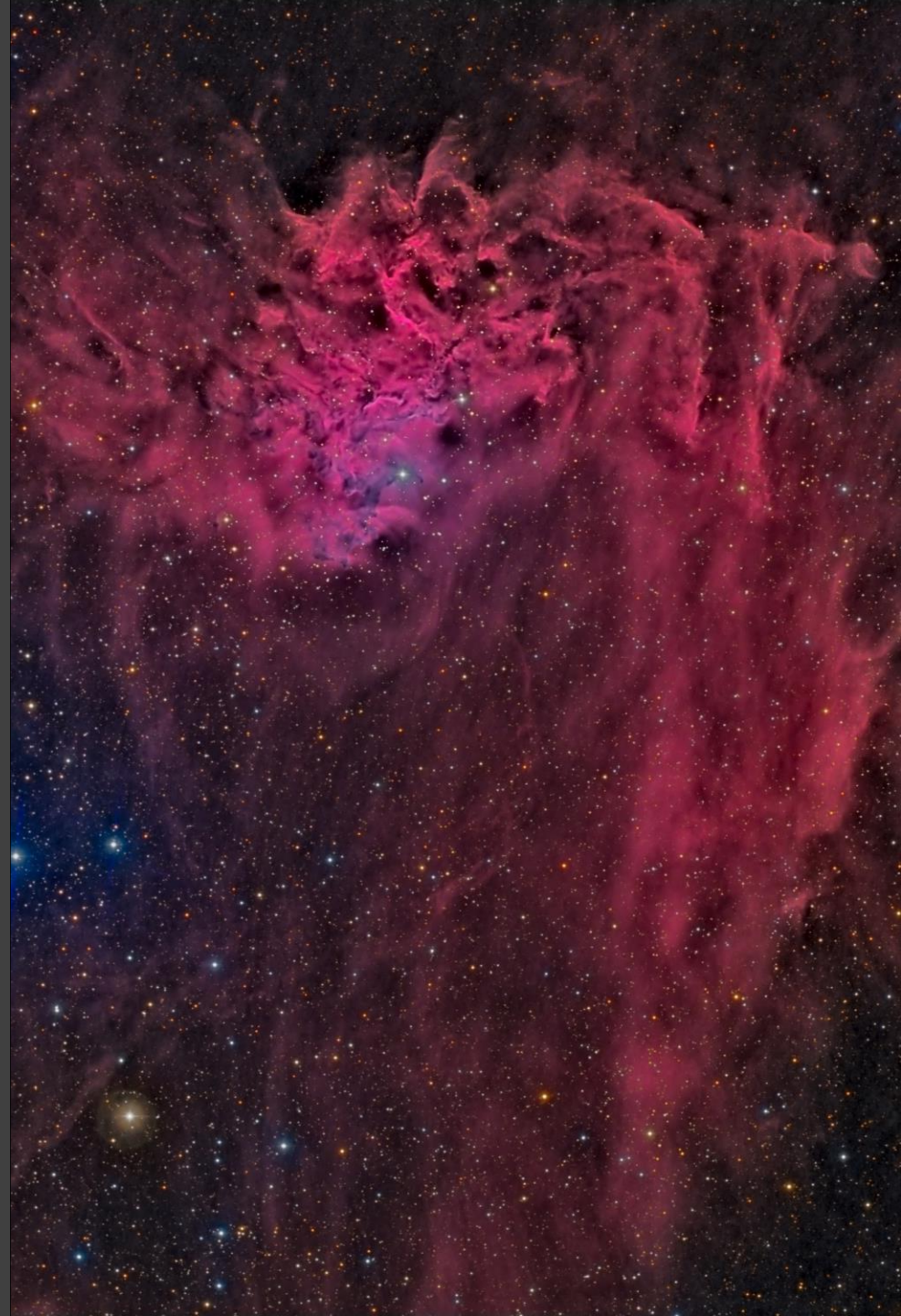
Show the “bigger picture”

Display relative position of familiar targets to each other

Veil Nebula Complex



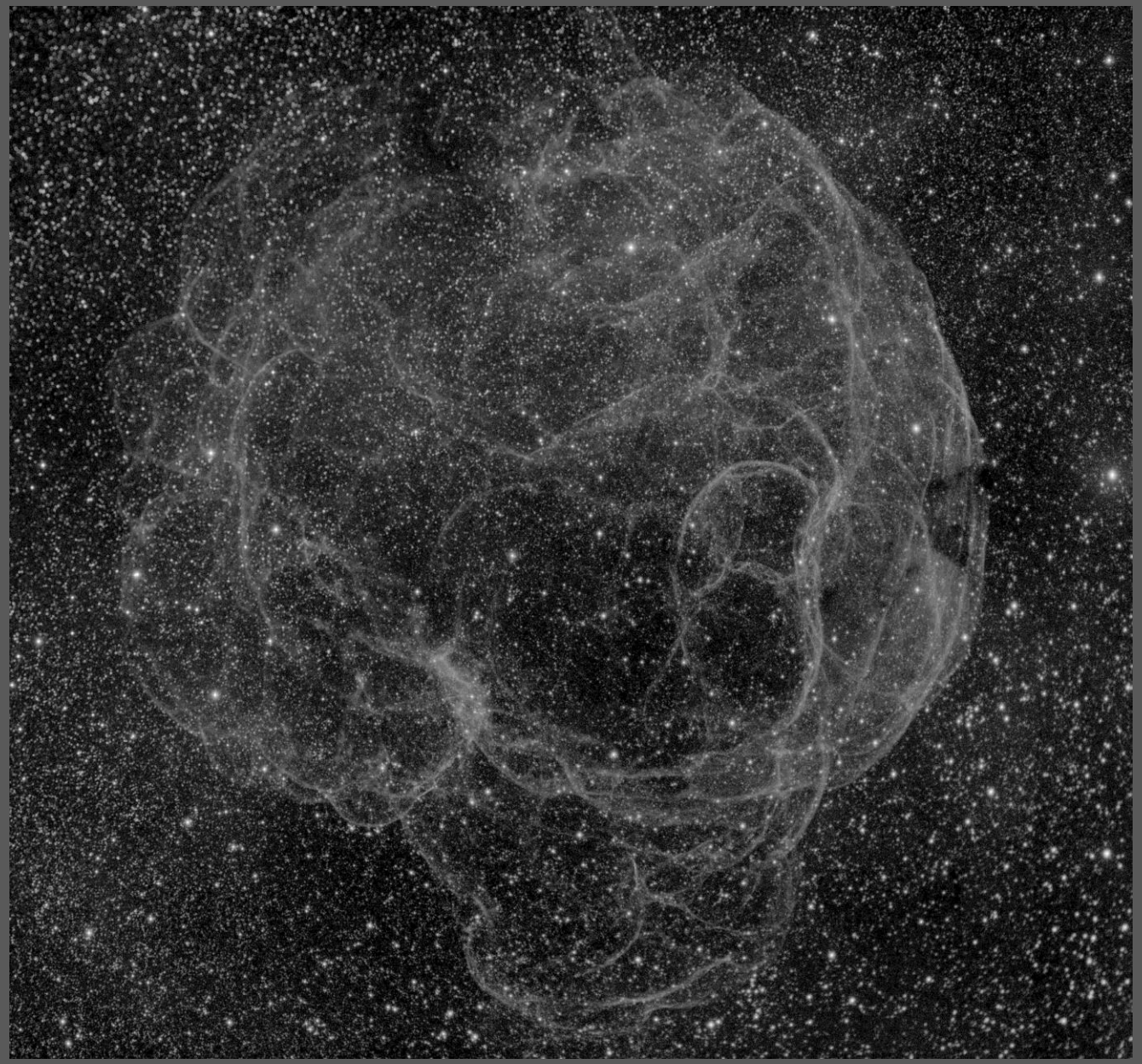
Flaming Star Nebula




Flaming Star
and Tadpoles

Heart and Soul Wide

Or capture a very large target



Improving nebula contrast with narrow band data

Comparison of single frames in Auriga


DSLR, 180 seconds


Red filter, monochrome camera, 180 s


H-alpha
narrow
band, 300s

What to do with narrowband data

- Combining LRGB with Narrowband: http://www.lightvortexastronomy.com/tutorial-combining-lrgb-with-narrowband.html
- Bicolor narrowband: http://www.lightvortexastronomy.com/tutorial-narrowband-bicolour-palette-combinations.html

Processing – some new tricks (for me)

Small, medium star reduction

- Many nebula in dense star fields
  - Overwhelm faint nebula
- Target reduction of small to medium sized stars
- Poor masks create artifacts such as tiny barbells
- Aggressive manual or softer automated star reduction

Aggressive

- Rogelio Bernal Andreo (reknowned widefield astrophotographer) method
  - More control of process
  - Apply HDRMT to image copy for better star detection
  - Select “Contours” to create mask that targets outer edge of stars
  - http://www.deepskycolors.com/archive/2011/09/08/star-size-reduction-via-Morphological-.html

Automated

- Star reduction script (free)
- Can be applied two or three times
- Easier to avoid artifacts
- Less aggressive results
- Used on linear image just after background extraction (but I've broken this rule with some success)
- QDigital Astrophotography by Dave Watson
  - http://www.qdigital-astro.com/pixinsight-star-reduction

Hardware considerations

How to get a wide field of view

- Really big camera chip
  - SBIG STX-16803 - $10K (expensive)
- Shorter focal length (possibly cheaper)
  - DSLR lens or very short focal length scope
  - Less resolution
  - Permits mid to small camera chips
  - Ultra fast lenses, f/1.4 – f/2.8 allow shorter exposures

Matching cameras and telescopes/ lens

- Camera pixel size determines resolution in arc-seconds per pixel
  - Local seeing rarely better than 2 arc – seconds
  - Larger scales still represent large fields well
    - Easier tracking/guiding
- Chip dimensions (width/height) determine field of view for given focal length
  - Many planetarium programs will compute and display
  - 135 mm lens with small Sony chip yields field of view in earlier examples
    - 4.9 arc-seconds per pixel

Questions?