Techniques of Visual Deep-Sky Observing

Akarsh Simha

22nd Jan 2017

Outline

Seeing the real thing

Visual deep-sky observation: visually detect the light from faint, distant objects

Sometimes, that light has traveled billions of years to get to your eye.

Depth for the cost

Equipment for astrophotography:

 +  [1] + 

+ Software

Results: mostly wide-field photos, unless you can afford an excellent mount.

Also needs hours of exposure!

Equipment for observing:

 + 

[2]

Results: can go pretty deep, although no colour.

Needs minutes of observing time.

[1] Credit: Marie-Lan Nguyen / Wikimedia Commons, via Wikimedia Commons

[2] Credit: Lucias Clay, Flickr; CC-BY-NC-SA

Depth for the cost

Similar features for half the cost:

Other reasons

- Less set-up, alignment.
- Feels less like going to work.
- Less technical, less optimization.
- High dynamic range of eyes

Pre-requisites

Pre-requisite knowledge of visual observation (not covered in detail in this talk)

- What causes light pollution
- Set-up of equipment (mounting / collimation)
- Operation of equipment (moving, using a finder scope)
- Maintenance of equipment
- Types of DSOs (nebulae, galaxies, ...)
- Morphology of DSOs (edge-on vs face-on etc.)
- Using a star atlas; star-hopping and other finding techniques
- Some understanding of celestial coordinate systems

There exist many resources for these things.

Understanding the sensor

Understanding the eye is important as it is the sensor in visual observing.

Rods and Cones

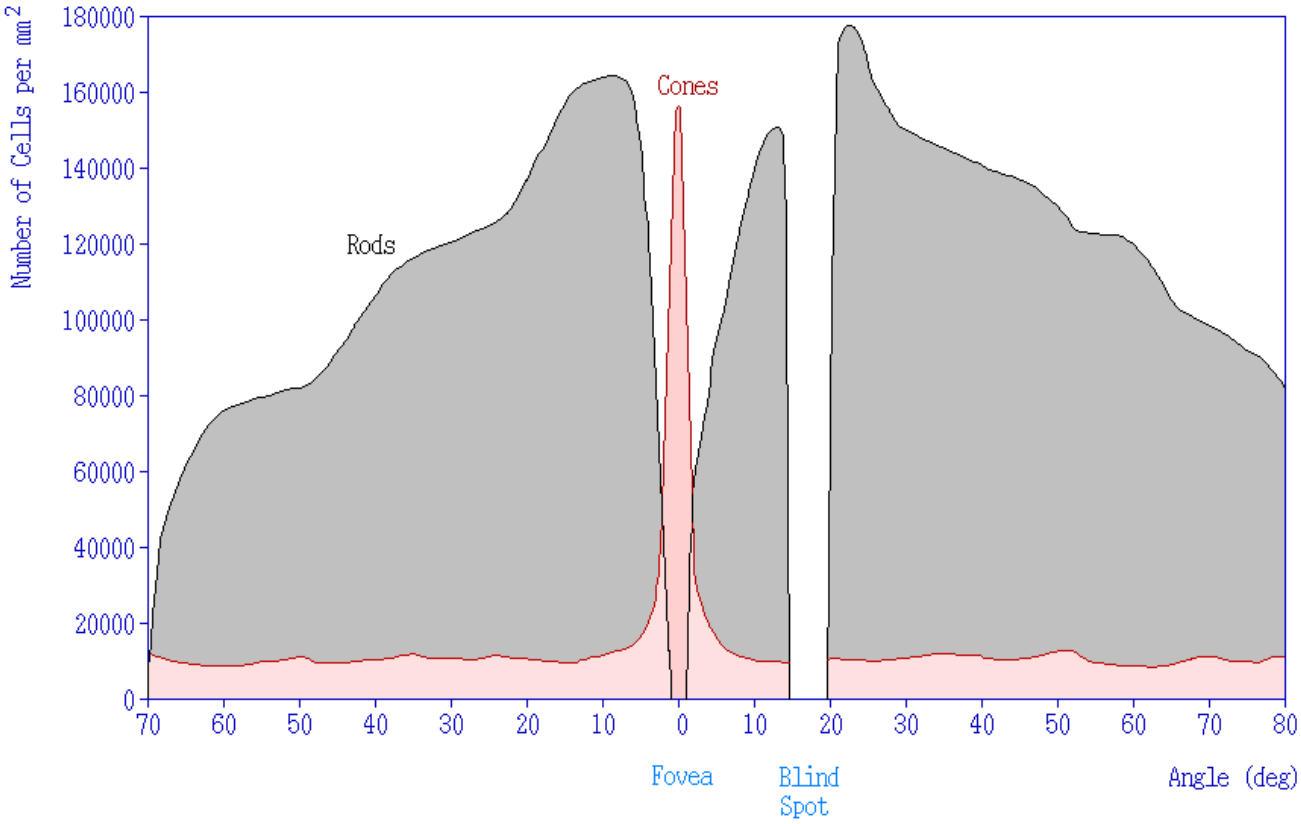
Cone cells:

- Three types (roughly RGB, whence they are primary colours).
- Work well only in bright light conditions.
- Responsible for colour vision.
- Maximum density is in the center of the retina along optic axis (*fovea centralis*).

Rod cells:

- Very sensitive to light (works well in dim light)
- Contain a pigment called *rhodopsin*.
- No notion of colour – single type.
- Peak sensitivity is in the green
- Maximum density at the corners of the retina, away from the optic center.

Distribution of rods and cones



Credits: Jochen Burghardt [CC BY-SA 3.0], via Wikimedia Commons

Intensity control

Pupil dilation: Happens within a minute

Bleaching of rhodopsin takes $\sim$ 30 minutes to 1 hour to recover.

See `http://www.cns.nyu.edu/~david/courses/perception/lecturenotes/retina/retina.html` for details, especially for this photograph showing rhodopsin after various amounts of light exposure.

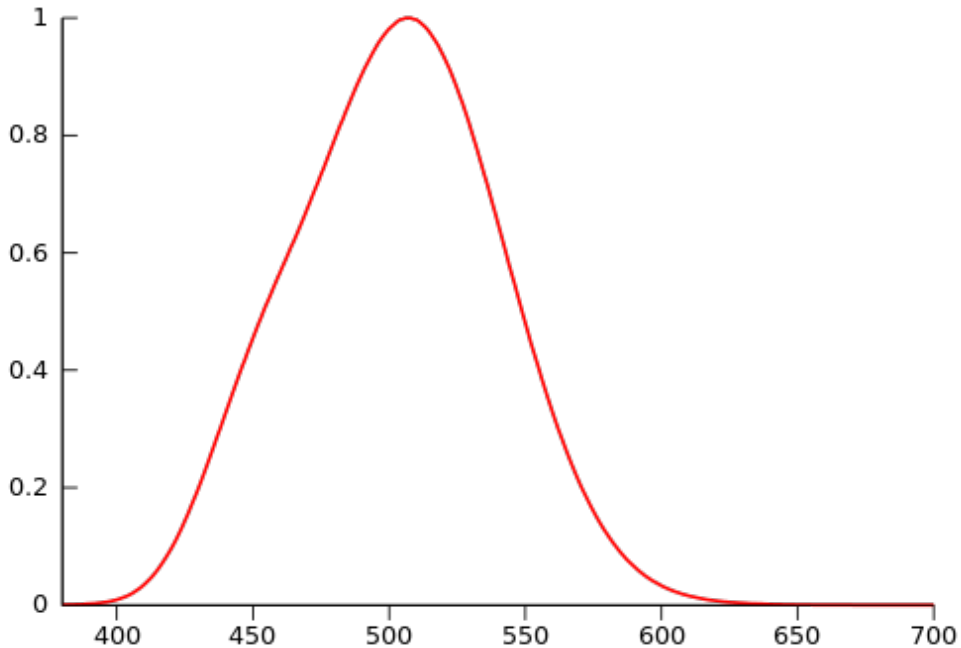
Dark adaptation takes time!

Recovery of rhodopsin is a slow process $\Longrightarrow$ dark-adaptation is precious!

See Roger N. Clark "Visual astronomy of the deep sky" for further details.

Scotopic vision

- Rhodopsin is a red pigment; it's virtually *blind to red light* (i.e. reflects red light).



Scotopic response of the eye.

Averted vision

Distribution of rods $\Longrightarrow$
Averted vision / peripheral vision : look away from the object, towards corners of the eyepieces.

Red screening

Red insensitivity of rhodopsin $\Longrightarrow$ red screening.

- The red light excites the cones without affecting the rods.
- Rubylith (esp. touchscreens)
- Translucent red acrylic sheet
- Red-screening apps are usually insufficient
- Red-backlit keyboards
- *Dimmable* red flashlights
- Black insulation tape to cover all other lights

Every visual observer needs to get over insecurity of darkness.

Eye patches etc.

Rhodopsin recovery takes ~ 30 minutes $\implies$ dark-adaptation is precious

- Eye patch available at medical stores / astronomy suppliers
- Orion "AstroGoggles" – red goggles
- Use an eye-patch on your observing eye when reading finder charts.

Sunglasses and UV

- UV turns eye lens milky (advanced stage: cataract)
- Wearing UV protective sunglasses during the day slows this down.

Observing in long stretches

- 1 observing run of 3 days is much better than 3 observing runs of 1 day.
  - No driving
  - No set-up / tear-down

  More than a week might start to become less productive (fatigue)
- Comfortable sleep in the morning is important to be well-rested. Not easy, especially with camping!

Criteria for an ideal observing site

- **Low Light pollution:** Use David Lorenz's atlas:
  https://djlorenz.github.io/astronomy/lp2006/overlay/dark.html
  Following map shows local lights more, but doesn't model light spreading very much:
  https://www.lightpollutionmap.info
- **Local lights** absent or shielded.
  Local lights hinder dark adaptation and distract.
- **Low humidity** prevents scattering of local lights / light pollution into the sky, and also reduces extinction.

Criteria for an ideal observing site

- **Weather / Climate** must be good in general.
  Digression: need Indian analogs of tools developed by amateur astronomers in the US – cleardarksky.com, good weather forecast maps.
- **Elevation** helps because dust and particles in the atmosphere decrease rapidly.
- **Accessibility** ensures fast transportation and frequent use.
- The ability to stay **extended periods** makes observing more efficient.

Criteria for a good target

- Should be well-placed (i.e. must come close enough to culmination during night)
- Should be plausible with the given sky condition and equipment constraints
- Must be interesting to the observer!
  - Interesting features?
  - Challenging?
  - Completes a series?
  - Interesting history?
  - Interesting science?

Where to look for targets

Beginners:

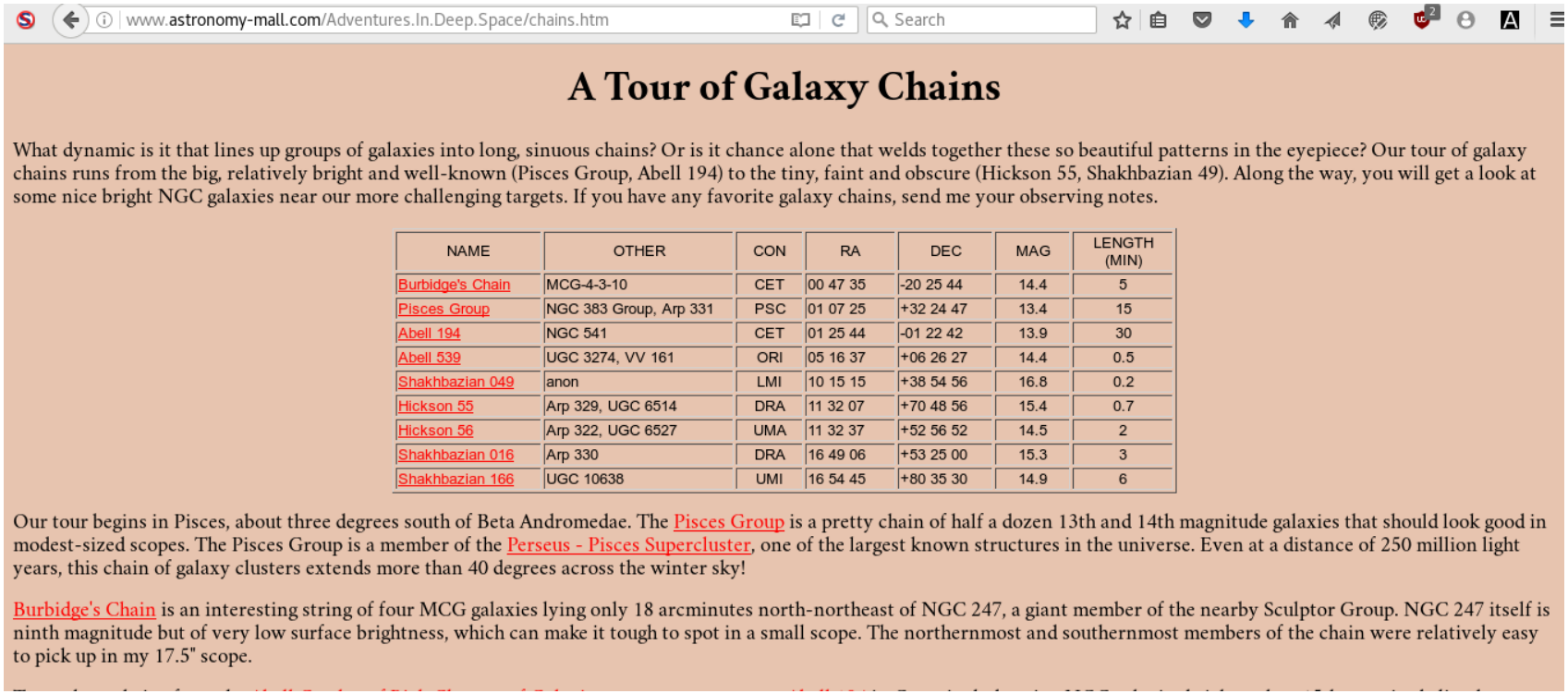
- Messier catalogue
- Caldwell catalogue
- Cambridge / Norton Star Atlases shortlist objects
- Herschel 400 Part I (optional?)

These are almost training material, certainly worth doing.
Beyond that?

Going about picking targets

- Can go about systematically. eg: US-based Astronomy League's Observing Programs: https://www.astroleague.org/observing.html
- Can go about randomly choosing – I prefer this (objects that are interesting *to me* only).
  But this means: more work in organizing a session.

Adventures in Deep Space



A Tour of Galaxy Chains

What dynamic is it that lines up groups of galaxies into long, sinuous chains? Or is it chance alone that welds together these so beautiful patterns in the eyepiece? Our tour of galaxy chains runs from the big, relatively bright and well-known (Pisces Group, Abell 194) to the tiny, faint and obscure (Hickson 55, Shakhbazian 49). Along the way, you will get a look at some nice bright NGC galaxies near our more challenging targets. If you have any favorite galaxy chains, send me your observing notes.

NAME	OTHER	CON	RA	DEC	MAG	LENGTH (MIN)
Burbidge's Chain	MCG-4-3-10	CET	00 47 35	-20 25 44	14.4	5
Pisces Group	NGC 383 Group, Arp 331	PSC	01 07 25	+32 24 47	13.4	15
Abell 194	NGC 541	CET	01 25 44	-01 22 42	13.9	30
Abell 539	UGC 3274, VV 161	ORI	05 16 37	+06 26 27	14.4	0.5
Shakhbazian 049	anon	LMI	10 15 15	+38 54 56	16.8	0.2
Hickson 55	Arp 329, UGC 6514	DRA	11 32 07	+70 48 56	15.4	0.7
Hickson 56	Arp 322, UGC 6527	UMA	11 32 37	+52 56 52	14.5	2
Shakhbazian 016	Arp 330	DRA	16 49 06	+53 25 00	15.3	3
Shakhbazian 166	UGC 10638	UMI	16 54 45	+80 35 30	14.9	6

Our tour begins in Pisces, about three degrees south of Beta Andromedae. The Pisces Group is a pretty chain of half a dozen 13th and 14th magnitude galaxies that should look good in modest-sized scopes. The Pisces Group is a member of the Perseus - Pisces Supercluster, one of the largest known structures in the universe. Even at a distance of 250 million light years, this chain of galaxy clusters extends more than 40 degrees across the winter sky!

Burbidge's Chain is an interesting string of four MCG galaxies lying only 18 arcminutes north-northeast of NGC 247, a giant member of the nearby Sculptor Group. NGC 247 itself is ninth magnitude but of very low surface brightness, which can make it tough to spot in a small scope. The northernmost and southernmost members of the chain were relatively easy to pick up in my 17.5" scope.

http://www.astronomy-mall.com/Adventures.In.Deep.Space/

Springer: “XX, and How to Observe it/them”

Link to series

From designation to coordinates

Chances are: your software will not have the deeper catalogues!
Use professional databases: **SIMBAD** and **NED** to find coordinates and feed them into software.
Advertisement: KStars does this automatically!

SIMBAD:

- Good for milky way stuff
- Query "by identifier" to find coordinates given a name
- Query "by coordinates" to find objects given (J2000) coordinates
- Lists references

NED:

- Good for extra-galactic stuff
- Query "by name" to find coordinates given a name
- Query "near position" to find objects near coordinates
- Much more powerful
- Lists references, images etc.

Using SIMBAD to resolve coordinates of JnEr 1

Portal | Simbad | VizieR | Aladin | X-Match | Other | Help

PN JnEr 1

other query modes : Identifier query | Coordinate query | Criteria query | Reference query | Basic query | Script submission | TAP | Output options | Help

Query : PN JnEr 1

C.D.S. - SIMBAD4 rel 1.5.10 - 2017.01.20CET15:16:34

Available data : Basic data • Identifiers • Plot & images • Bibliography • Measurements • External archives • Notes • Annotations

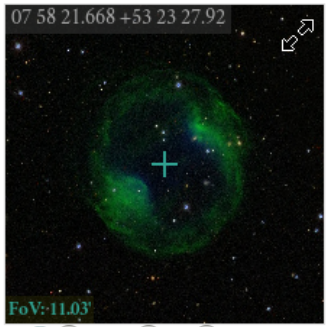
Basic data :

PN ARO 121 -- Planetary Nebula

Other object types:	PN (PN,AG82,...), * (GSC2,[LFO93]), WD* (WD), IR (IRAS)
ICRS coord. *(ep=J2000) :*	07 57 51.612 +53 25 16.91 (Optical) [49 48 90] C 2009yCat.2294....0A
FK5 coord. *(ep=J2000 eq=2000) :*	07 57 51.612 +53 25 16.91 [49 48 90]
FK4 coord. *(ep=B1950 eq=1950) :*	07 53 58.92 +53 33 22.4 [158 157 90]
Gal coord. *(ep=J2000) :*	164.8065 +31.1809 [49 48 90]
Proper motions *mas/yr* :	2 1 [3 3 169] C 2011MNRAS.417.1210G
Radial velocity / Redshift / cz :	V(km/s) -84.3 [~] / z(~) -0.000281 [~] / cz -84.29 [~] D ~
Spectral type:	DQ D 1988PASP..100..187L
Angular size *(arcmin)*:	6.333 6.333 90 (Rad) D 2008ApJ...689..194S
Fluxes (9) :	B 16.775 [0.005] B 2013MNRAS.428.2118D
	V 17.128 [0.013] C 2013MNRAS.428.2118D
	R 17.288 [0.001] B 2013MNRAS.428.2118D
	I 17.501 [0.023] C 2013MNRAS.428.2118D
	u (AB) 16.28 [0.01] C 2011MNRAS.417.1210G
	g (AB) 16.80 [0.01] C 2011MNRAS.417.1210G
	r (AB) 17.35 [0.01] C 2011MNRAS.417.1210G
	i (AB) 17.71 [0.01] C 2011MNRAS.417.1210G
	z (AB) 18.10 [0.03] C 2011MNRAS.417.1210G

SIMBAD query around with radius 2 arcmin

Interactive AladinLite view



VizieR photometry viewer

Search within radius Max 30 arcsec

notes:

- often incorrectly named: NGC 2474-5

Determining observability

Quantitative:

- *Magnitude*: total integrated flux
- *Surface brightness*: accounts for the area over which it is distributed
- Related: theories of Roger N. Clark and José R. Torres

Qualitative:

- *Dreyer's descriptions*: J. L. E. Dreyer's notes for NGC objects. See `ngcicproject.org` for more. Also has Steve Gottlieb's notes.
- Reports of other visual observers, guess for your aperture
- Unprocessed and (roughly) calibrated images: DSS and SDSS.

Sky Surveys

To find photographs of a region of the sky, use...

Digitized Sky Survey

- Scans of photographic plates. Not exactly calibrated, but still reasonable.
- All sky coverage.
- Original interface: https://archive.stsci.edu/cgi-bin/dss_form
- My interface: http://www.bas.org.in/dssdirect.php

Sloan Digital Sky Survey

- A fully digital survey. Calibrated.
- Only partial sky coverage.
- Interface: http://skyserver.sdss.org/dr10/en/tools/chart/navi.aspx
- Advantages: photometry (magnitudes), spectroscopy sometimes.

Most visual observers have a sense of brightness of object in their telescope from DSS.

My DSS interface

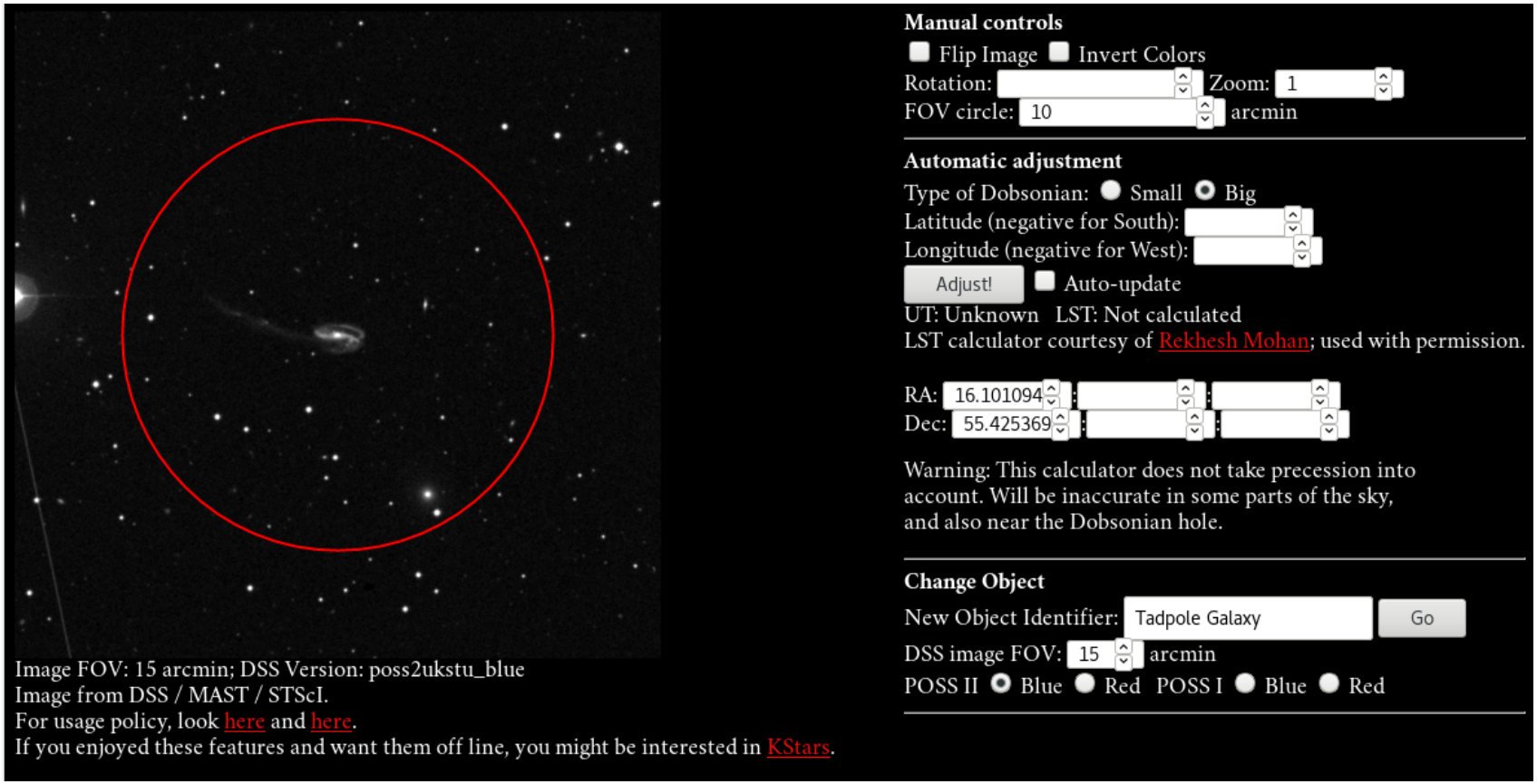


Image is from DSS/MAST/STScI.

Making a plan is essential!

- Night-sky time is precious!
- Observing session without a plan is useless
- Very easy to lose motivation at 2 AM. A plan mitigates that by giving you a goal.
- Easy to forget objects that you wanted to observe and were excited about.

A minimal plan

- A list of objects visible during the night
- Ordered by RA or grouped by constellation
- Accompanied by software / star atlas that plots these objects.
- Works for basic/bright objects with small / wide-field telescopes.

Example minimal plan (ordered by RA):

1. NGC 891
2. NGC 1300
3. NGC 1365
4. NGC 1999
5. NGC 2392

Example minimal plan (grouped by constellation):

Andromeda: NGC 891, M 31, M 32, M 110
Eridanus: NGC 1300, NGC 1232
Fornax: NGC 1365

Alternative: Make books with checklists

Example excerpt from Logbook project:

3

List of Objects by Constellation

NOTE: Numbers in square brackets are page numbers

Andromeda

HCG 10 [37]
HCG 1 [19]
HCG 8 [33]

Canes Venatici

HCG 68 [153]
HCG 70 [157]

Capricornus

HCG 87 [191]

Centaurus

An ideal plan

- Objects are assigned observation times as close to meridian transit as possible
- Sufficient time allotted for observing objects, esp. fainter ones
- Detailed finder chart + reference image (eg: DSS)
- Notes about what specific features to look for (easy to forget, believe it or not!)
- Other observers' logs / tips on how to observe.

... a pain to create and follow.

Software planning tools

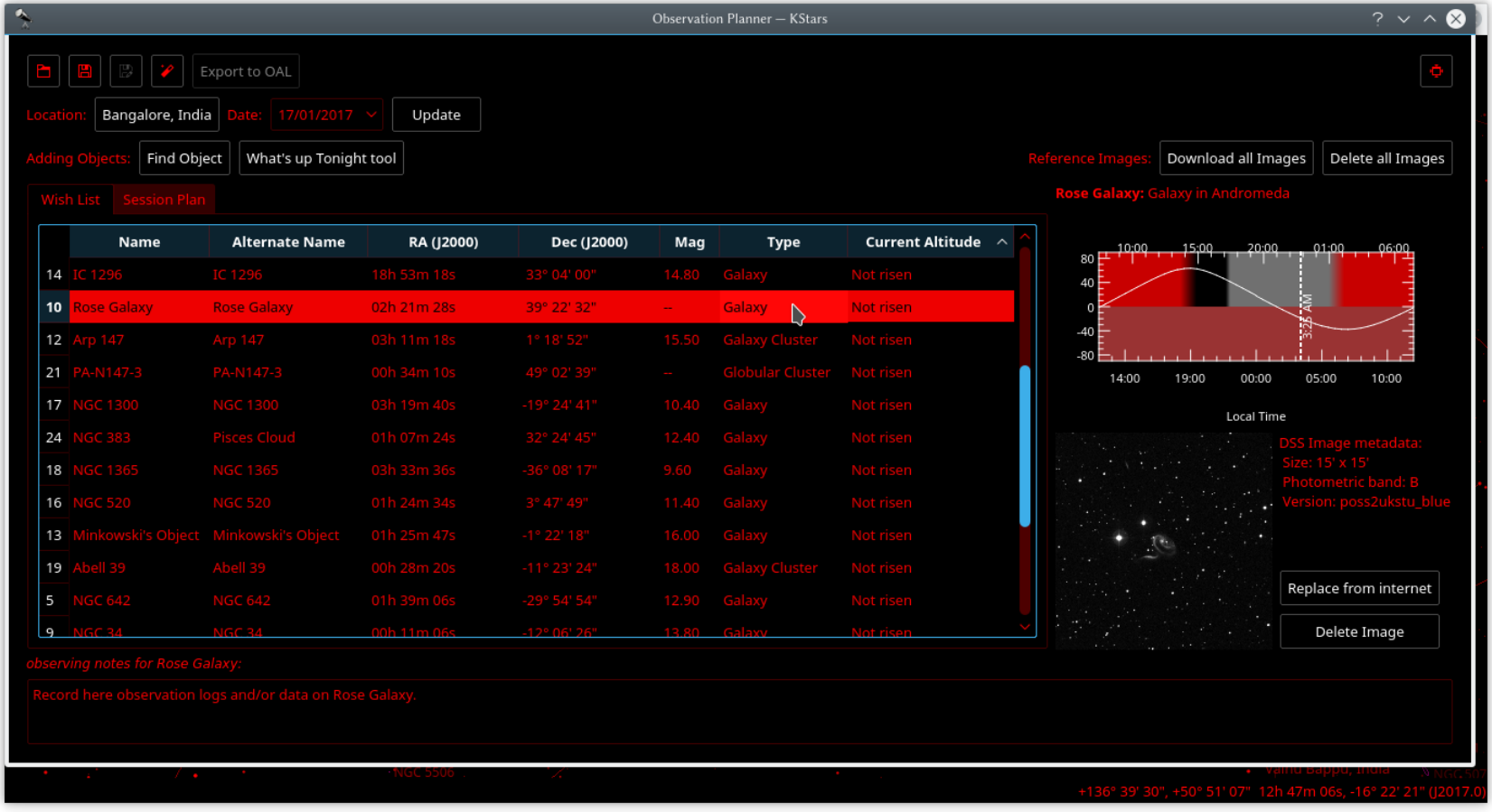
Proprietary:

- Astroplanner
- SkyTools 3

Free:

- KStars (my preference)

Observation planner in KStars



Demonstration of my observing workflow

Demonstration of Sanath's observing workflow

Comfort is important!

- Warm clothing, acrylic outer to avoid dew
  "Cooling to 3 K"!
- Carbohydrates, food, beverages
  Helps stay warm, active. Carbohydrates keep the brain and body powered at 2 AM. Makes a huge difference.
- No alcohol
  Impairs night vision
- Ladder / stool etc. to prevent neck-wringing
- Place to sleep in the morning

Optimization!

For an object / feature at the threshold of visibility, optimizing the instrument train:

$$\underbrace{\text{telescope}}_{\text{collimation, baffling}} \rightarrow \underbrace{\text{eyepiece}}_{\text{contrast, elements}} \rightarrow \underbrace{\text{eye}}_{\text{dark adaptation, hood, averted vision}} \rightarrow \underbrace{\text{brain}}_{\text{tracking, oxygen, comfort, food and water}}$$

makes all the difference.

Prevent light loss

- Secondary collimation, checking that it is perfectly centered to the focuser axis.
- Good collimation : laser collimator makes it much easier (eg: collimators by Howie Glatter).
- Collimate where you observe, even if it means neck-wringing (tube flexure).

Increase contrast

Baffling:

- Light shrouds

  Anecdote: Observation of Holmberg IX was easier in light-shrouded 18" than in 30" without shroud.
- Light shields
- Internal baffles for reflectors anyone? Might be a good idea!

Eyepieces:

- More elements $\Longrightarrow$ more light loss, more scattering
- Multicoated elements reduce internal reflection
- Orthoscopic eyepieces!
- TeleVue's Delos and Ethos, Pentax XW etc.

Light shielding

Telescope with light shroud

https://www.astrozap.com/scripts/prodList.asp?idCategory=62

Astrozap's Light Shields

Tracking

Obvious advantages:

- Less likely to lose the object at high power
- Less frustration of moving the telescope

Less obvious, but more important advantage:

- Object stays put, so eye-brain system spends less processing on following the object!

Anecdotal: 25% increase in effective aperture.

The tracking need not be of astrophotography-quality : equatorial platforms and ServoCAT work fine

Picking the right eyepiece: power

What power should I use for a DSO?
(Sophisticated theory: Clark-Blackwell)

Rule of thumb: object should suspend about 10° at the eye.

Another rule of thumb: typically try 10x per inch of aperture ($= 2.5$mm exit pupil ≈ 2mm exit pupil).

Best practice: try 2mm exit pupil, then bump up / bump down and try (different detail at different power).

Picking the right eyepiece : AFOV vs contrast

Large AFOV is good for open clusters, globular clusters, M 51...
Trade-offs: typically contrast, price...
TeleVue Ethos: an exception – large AFOV with high contrast.

Usually, contrast is the key parameter, not AFOV!
Personal favourites: TeleVue Delos, Pentax XW

Value for money: multi-coated orthoscopics (eg: University Optics HD Orthos)

Observing is more than looking

- Observation $=$ eye $+$ brain, not just eyes.
  Focus the brain's processing efforts.
- Spending > 1 minute per object is essential.
  (Long lines at a telescope $\neq$ observing)
- Use a hood to block distracting brighter sources
  (eg: milky way / skyglow)

Observing is more than looking

- Creating movement sometimes helps (neural adaptation?)
  - Tapping the telescope – works well for large objects
  - Rocking the focus (tip from Jimi Lowrey) – animates, but in-place.
- Taking a break sometimes helps
- Normal breathing
- Sufficient carbohydrate and water

How do you know you're seeing?

Especially given that we look at an image before-hand!

A very difficult question to answer! Learned with experience?

Some techniques:

- Unknown aspect (eg: orientation / size of a feature).
- Two observers' corroborating reports that do not agree expectations.
- Try to center faint feature, check star-field.
- Knowing your threshold ("noise" in the eye?)

Multiple good observers' reports generally corroborate!

Popping in and out

It is okay that an object is not held continuously in your view!

Reasons (speculative): seeing, sensory adaptation, natural tendency to focus vision rather than avert it etc.
...but this is definitely everyone's experience.

Eye is a logarithmic sensor

Can differentiate more shades of gray than a CCD sensor

Visual size of “core” is much smaller than photographic size of core. Example using M 31

M 31

Photo by Dr. Suresh Mohan

M 31 : visual simulation

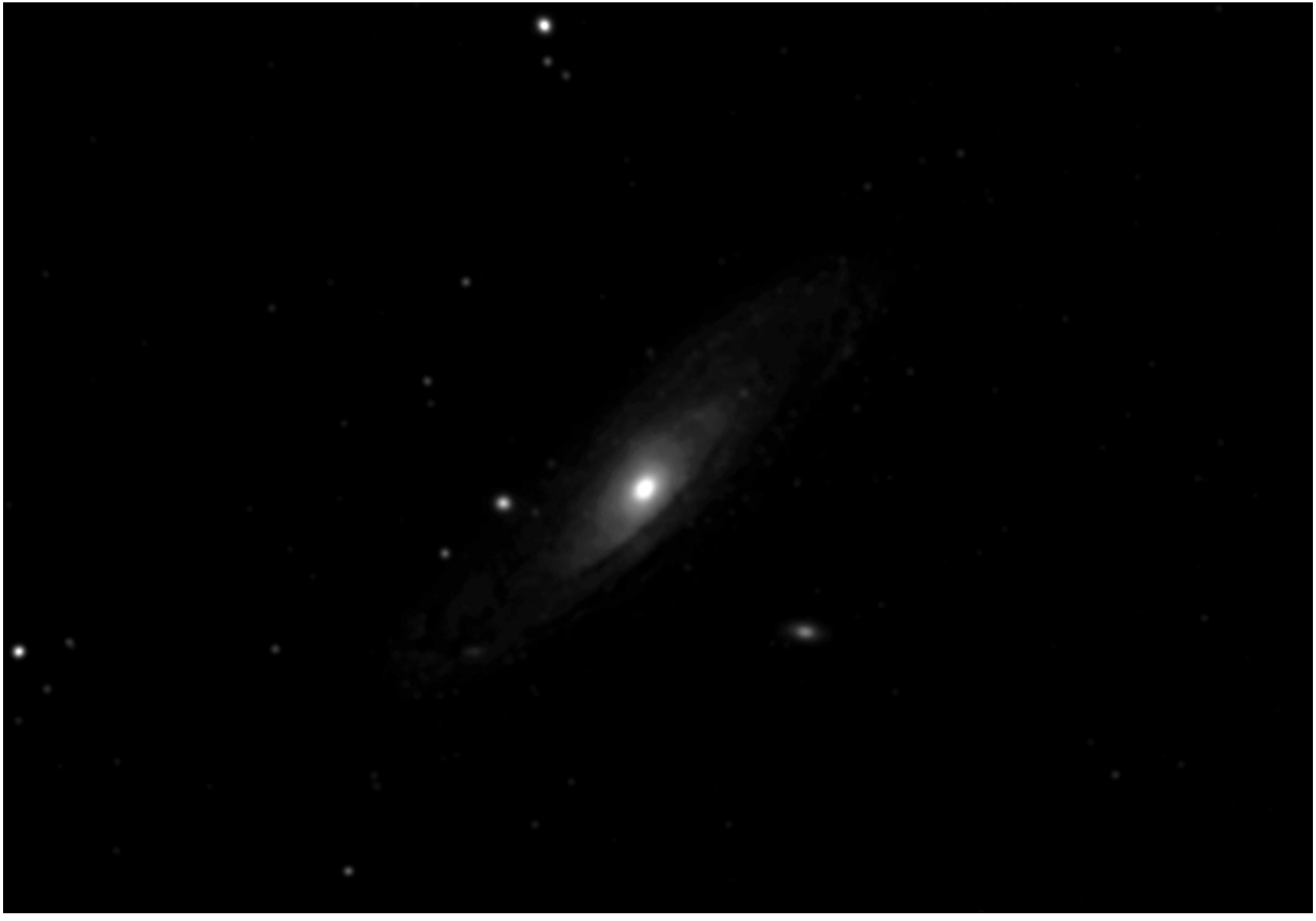


Photo by Dr. Suresh Mohan, heavily modified!

M 87

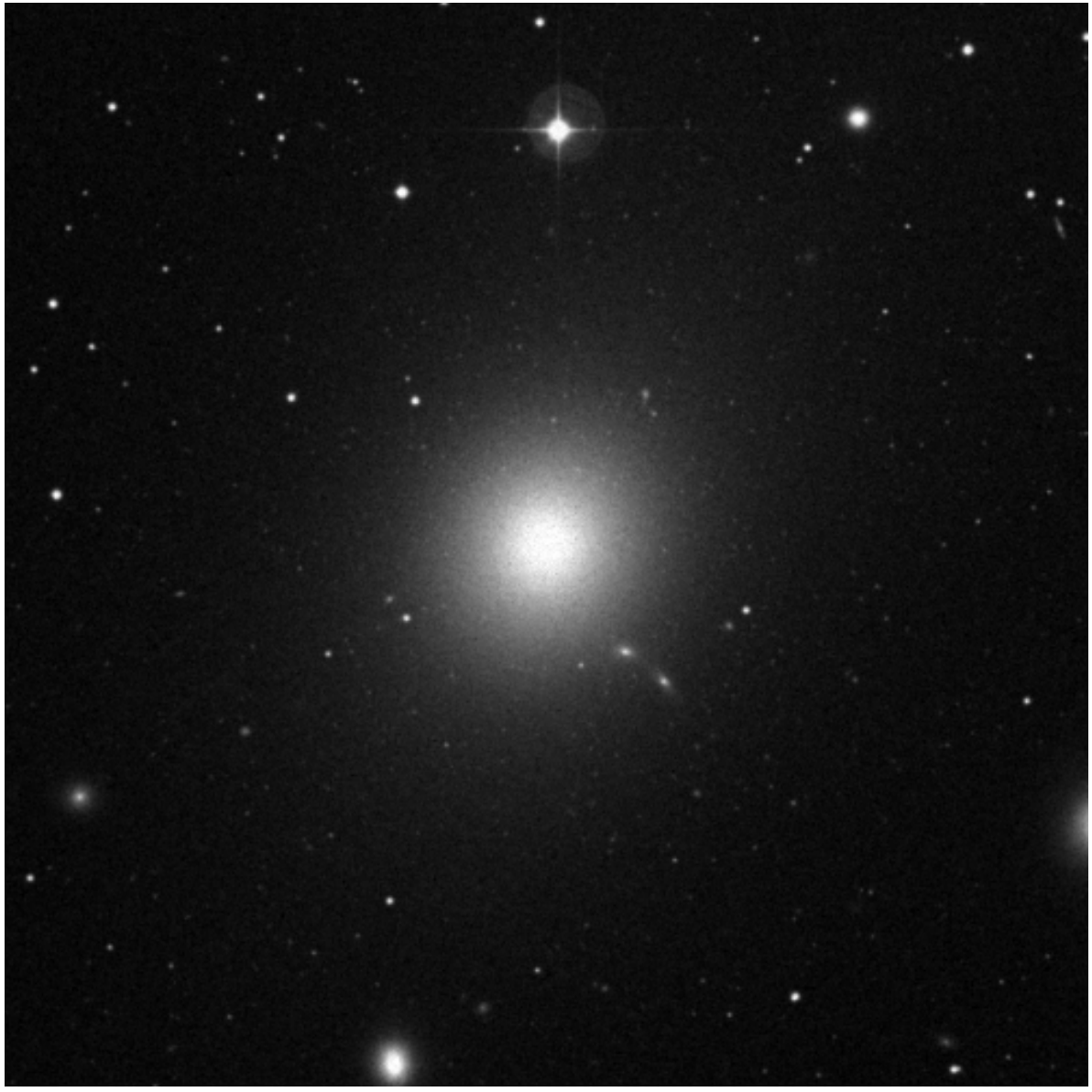


Image from DSS/MAST/STScI

Knots and spiral arms

Knots: Usually HII regions and stellar associations.

- Use sufficient power so that knot is big enough to be observed.
- Use UHC / DGM NPB / Baader UHC-S to pull out nebulosity if necessary
- Spiral arms usually have knots : connect up the knots to track spiral arms.

Most prominent example: NGC 604 in M 33.

M 33 with small aperture

(17.5" is quite large aperture, but the magnification was not high and similar views may be obtained in much smaller aperture)

Bridges and tidal tails

- Extreme averted vision!
- Use sufficient magnification to make it thick enough, but do not spread it out too much.
- Easy check whether you're seeing it: clock position, length.
- *Transition from dark to bright to dark!*

The Mice

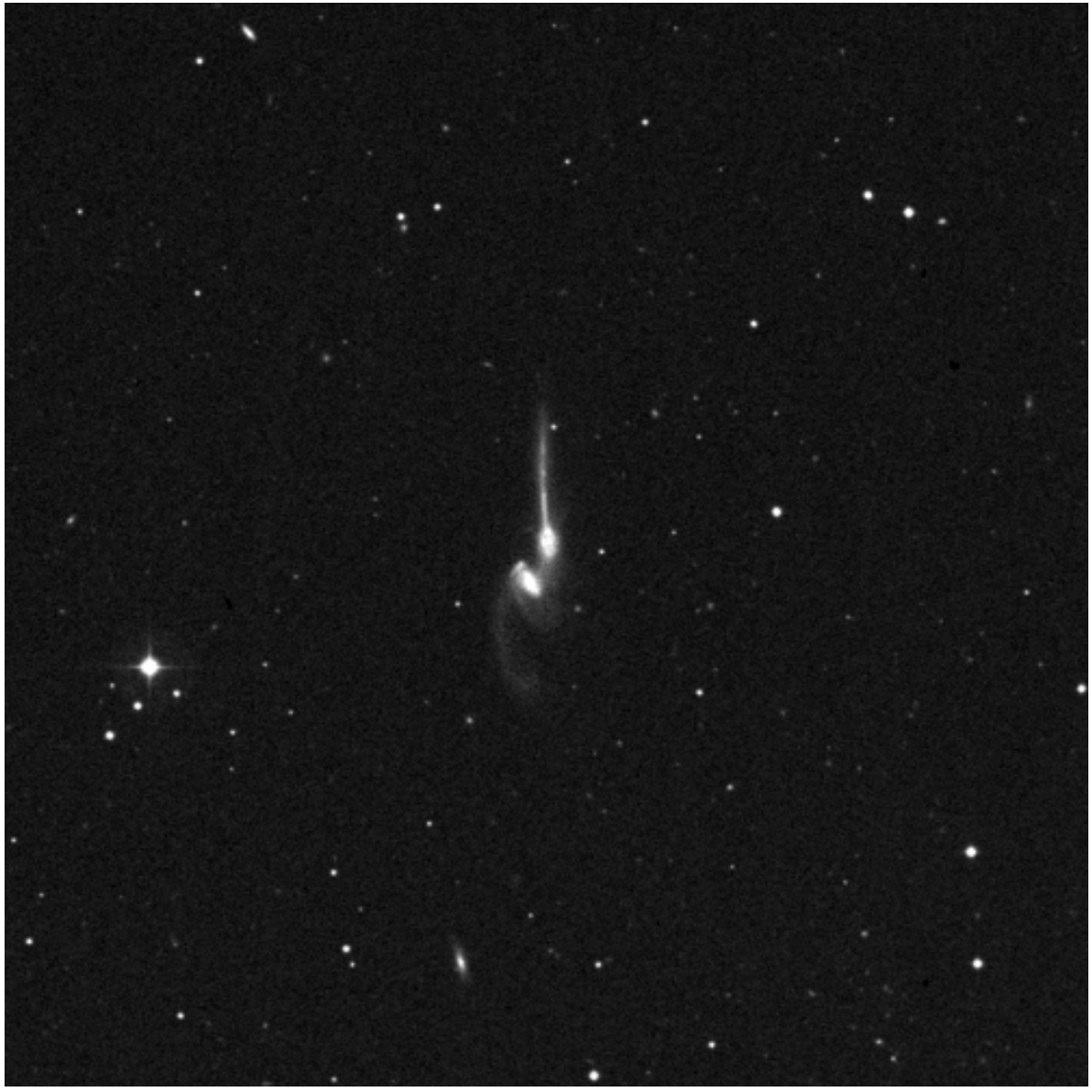
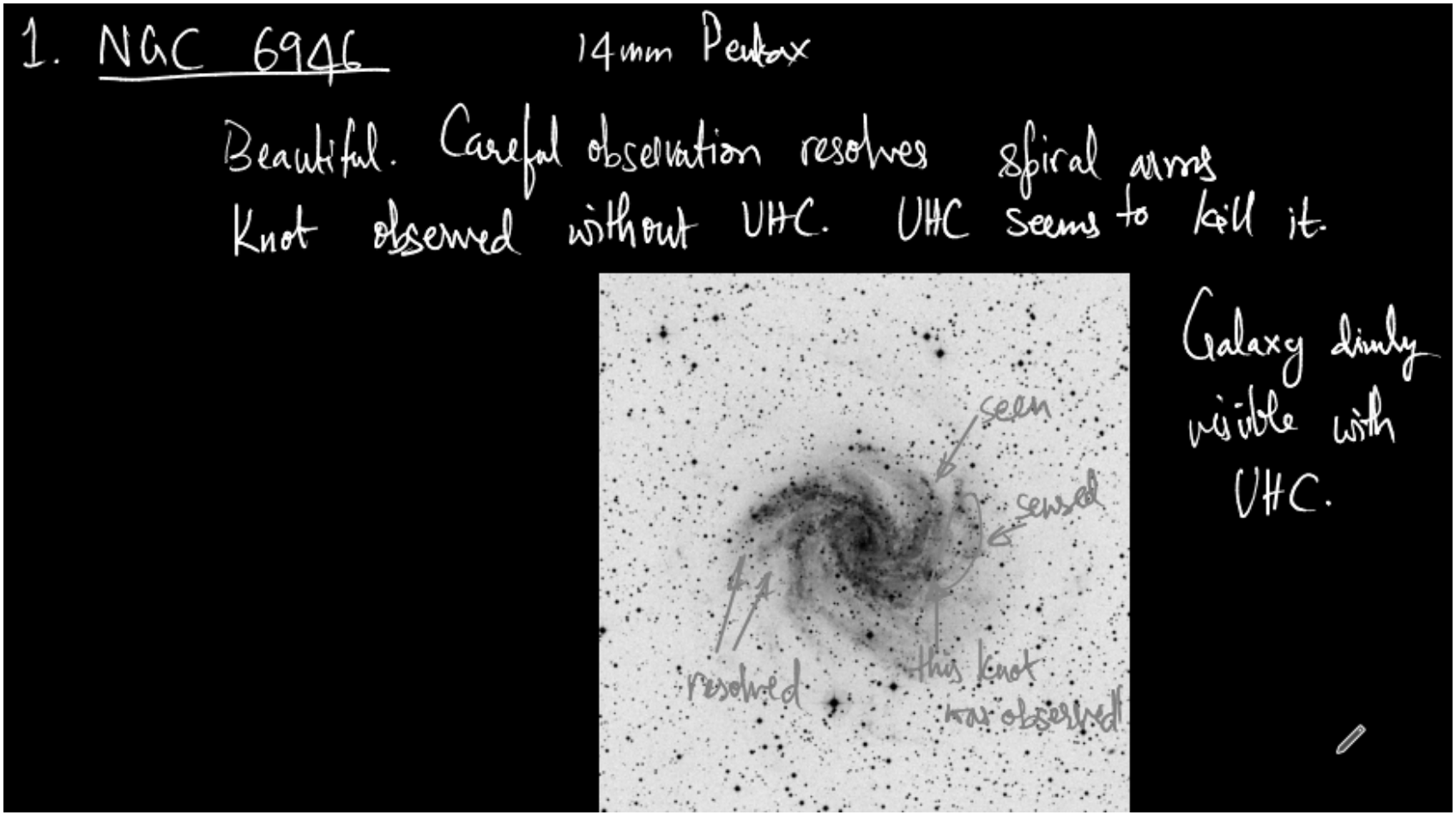


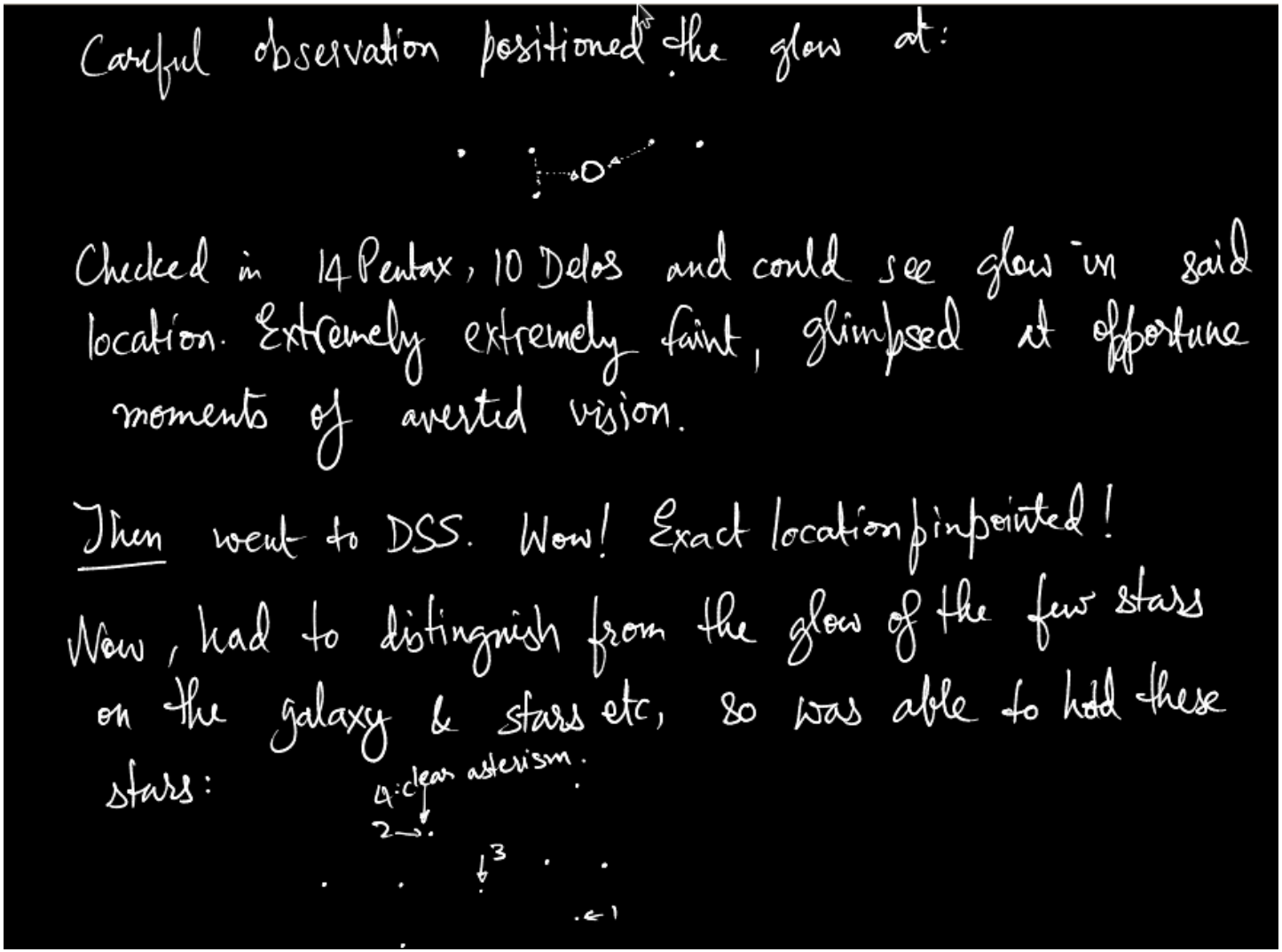
Image from the DSS/MAST/STScI

Case Study: NGC 6946



Excerpt from my log at Okie-Tex Star Party 2015
18" f/4.5 Obsession dob
The annotated image is from DSS/MAST/STScI

Case Study: Maffei II



Excerpt from my log at Okie-Tex Star Party 2015
18" f/4.5 Obsession dob

Case Study: HCG 1

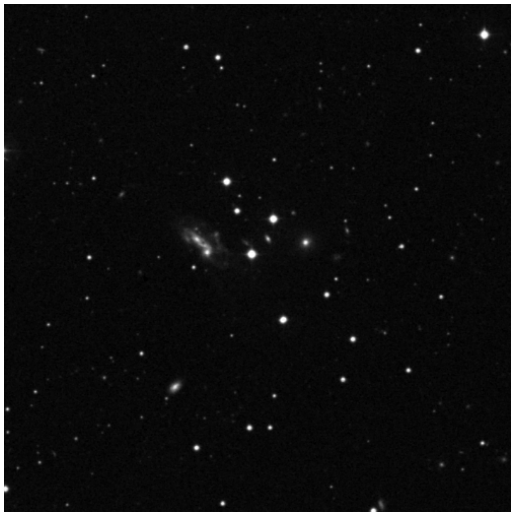
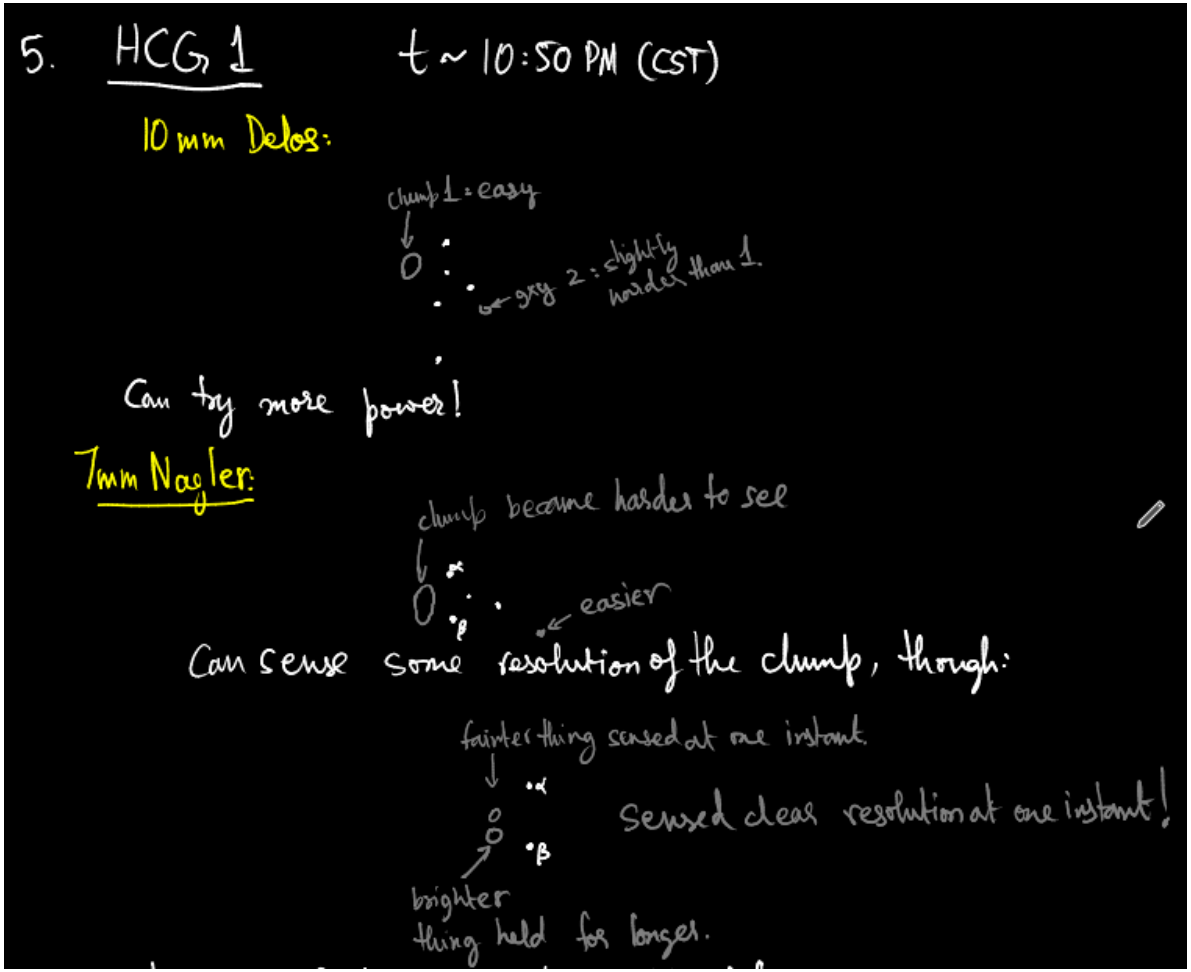


Image from DSS/MAST/STScI

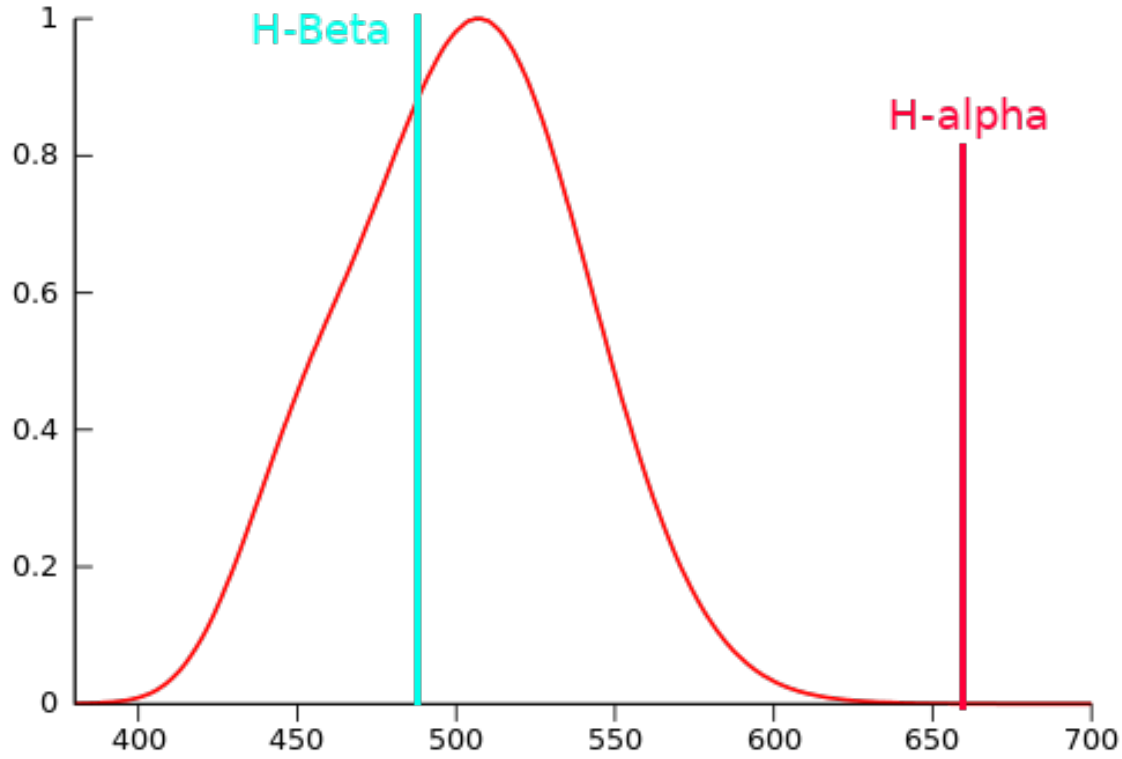


Excerpt from my log (18" f/4.5 Obsession)

“Photographic nebulae”

Nebulae like Horsehead nebula are extremely easy to photograph, but extremely difficult to observe.

- Strongest optical emission of hydrogen in nebulae, (Balmer) H-alpha (656.3nm), is in the red.
- Unfortunately, the eye’s scotopic response is very poor in red.
- The eye’s night vision can only see H-beta (486.1nm).



H-Beta is generally weaker

Anecdotal: H-Alpha : H-Beta ratio is usually $2 \sim 3$.

For an example, see the spectrum of eta-Carina nebula shown in C. T. Hua and A. Llebaria, Astronomy and Astrophysics, 1981

Filters

The absolute strength of the signal doesn't matter – what matters is the signal to noise ratio!

Filters allow a small band around the Hβ and OIII emission lines: makes a huge difference!

For spectra of various filters, see
http://www.astrosurf.com/buil/filters/curves.htm

Filters provide tremendous increase in contrast!

PN Abell 7

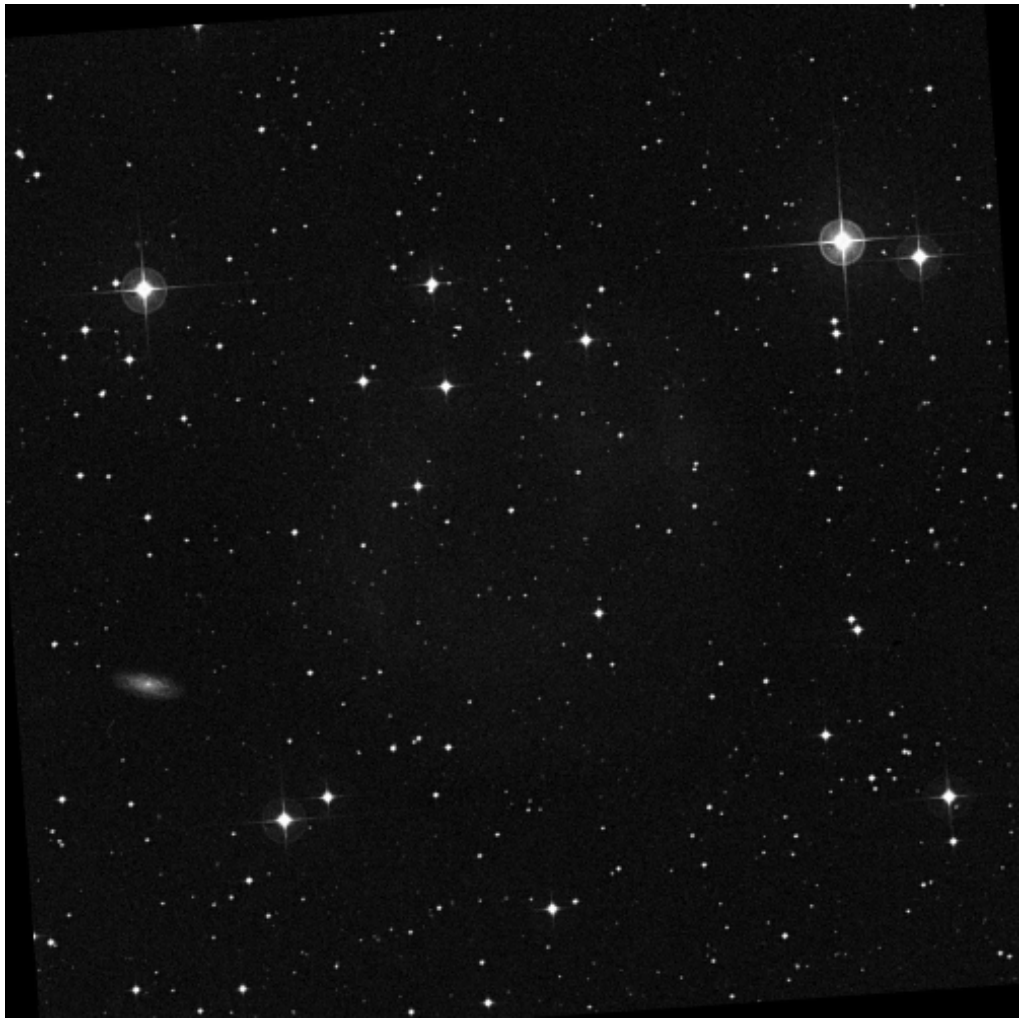
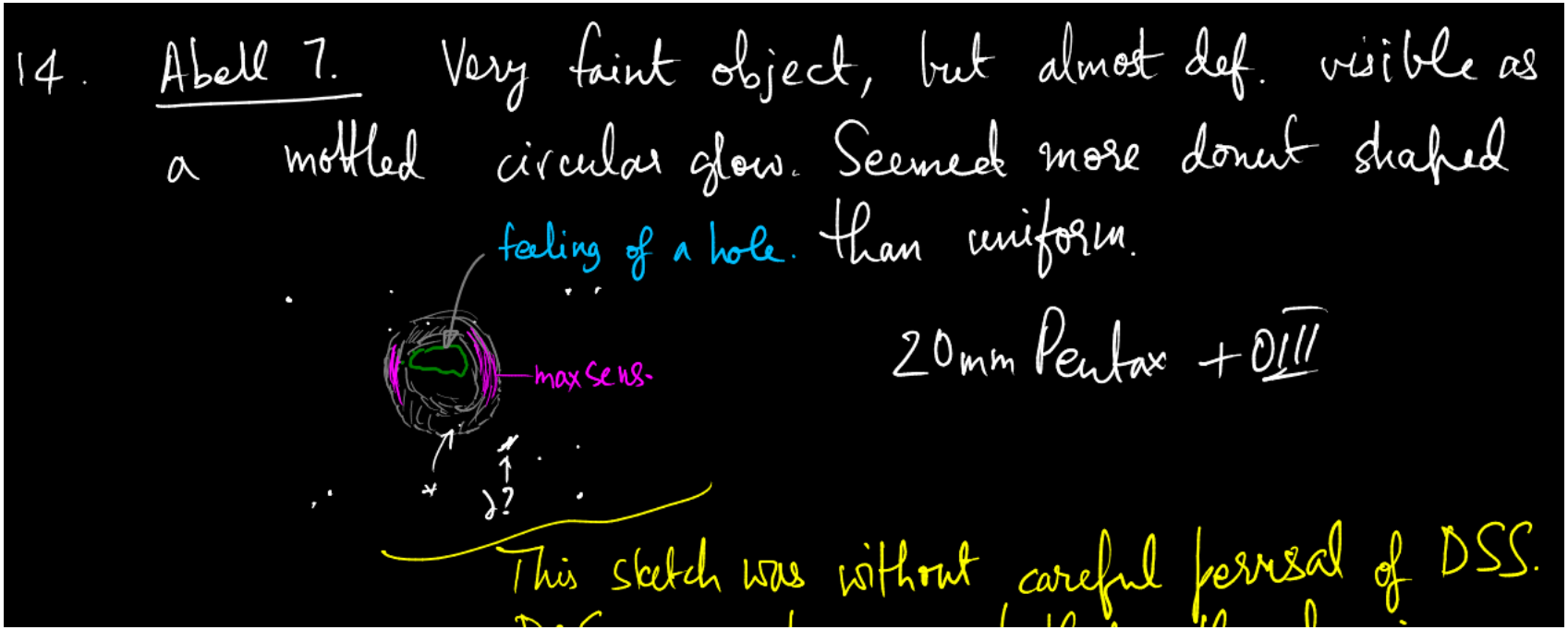


Image $(25' \times 25')$ from DSS/MAST/STScI

Filters provide tremendous increase in contrast!

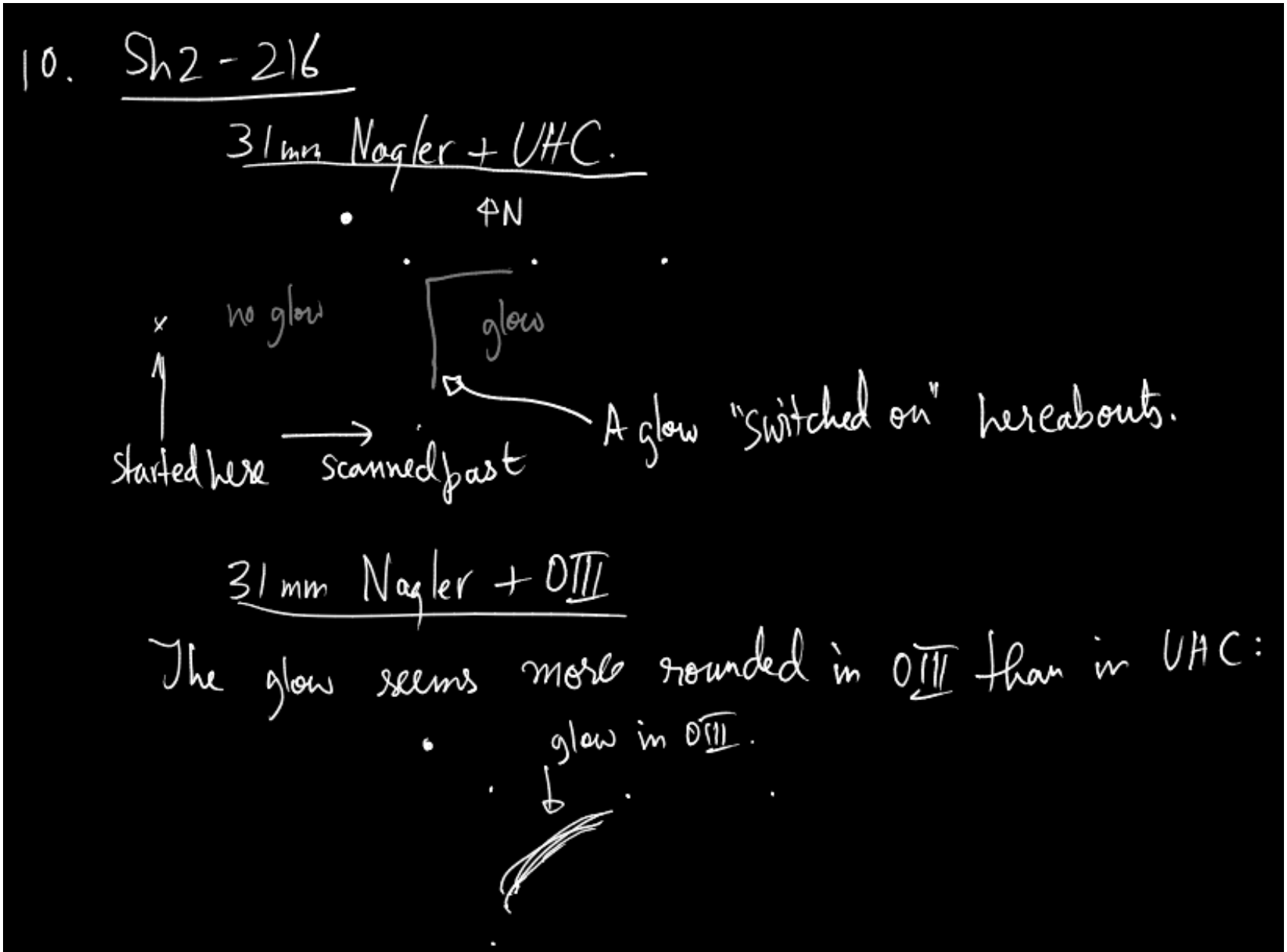


Excerpt from my logbook (18" Obsession f/4.5, Pentax XW 20mm, Lumicon OIII)

Detecting large nebulae

- Find the sharpest / brightest boundary in a photograph
- Star-hop to the boundary.
- In the eyepiece, try to find the **a transition in the level of background glow**

Case Study: Sh 2-216

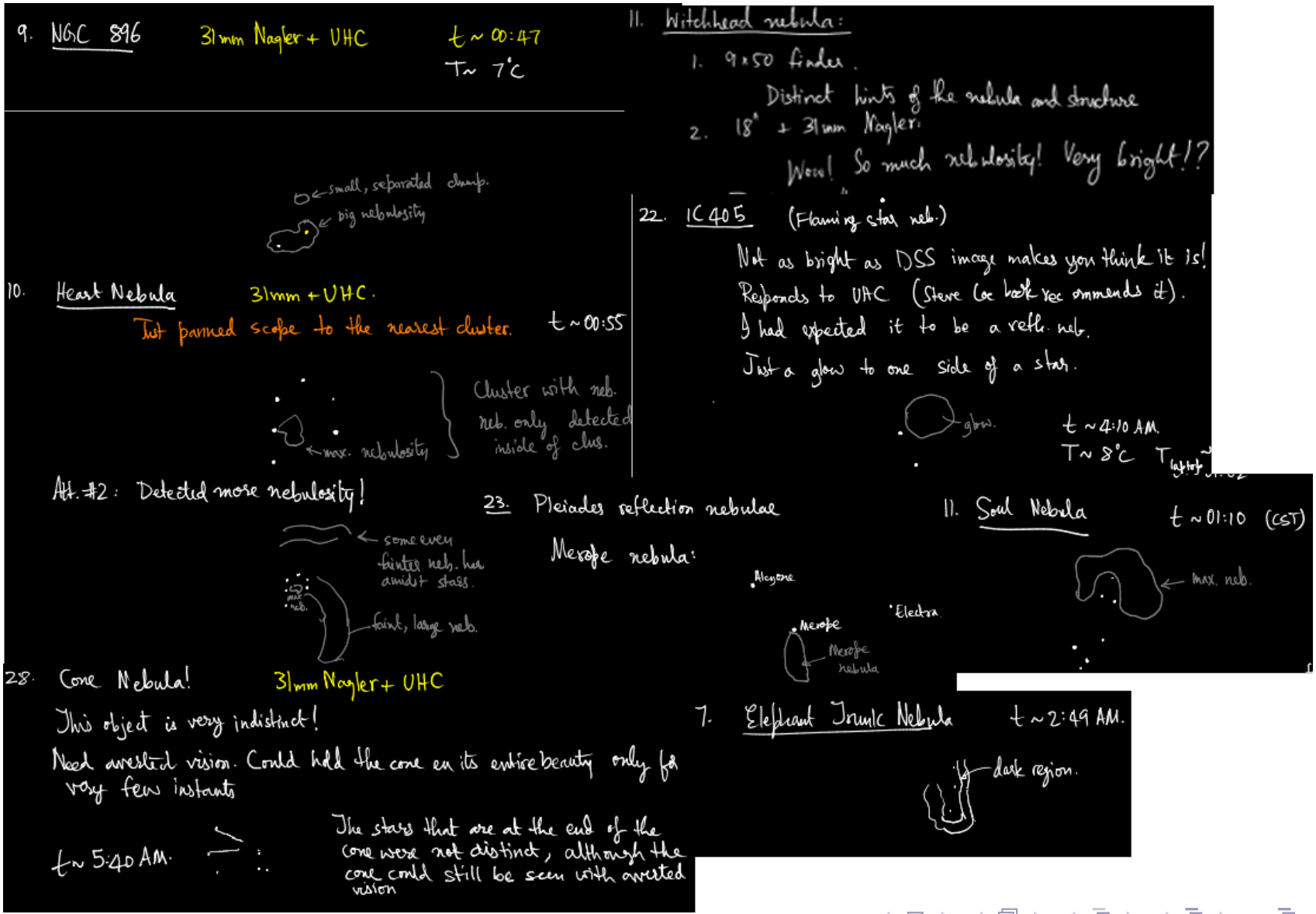


Reflection nebulae

- Reflection nebulae look a lot like halos caused by scattering / poor transparency / bad optics! Hard to tell apart.
- Stronger halo around one star than the others?
- Asymmetric shape that remains as you pan the field?
- Sometimes need to move the bright star out
- Eg: NGC 2023, Pleiades reflection nebula

There are no "photographic" nebulae

Just need *dark skies*, *filters* and *proper technique*.



Contrast, contrast, contrast!

- Sky conditions, contrast is everything
- Aperture is not as important (the object is already big)
- A well-baffled refractor might challenge a large dob!?
- Sometimes, the object is so diffuse that only mapping the transition can help (eg: Ursa minor dwarf)

Observing at high power...

... is like watching a video that is constantly being randomly blurred.

- Seeing plays an important role.
- Might see a feature clearly, and 2 minutes later, cannot see it at all.
- Need to catch the few instants of steady air.
- Views may pop in and out

Example: Mars polar ice caps (I realize this is a deep-sky talk...)

Logging

- Supremely important!
- I don't remember most of my observations; logs help.
- Logs make you a better observer as they prompt more detail.
- Especially sketching.

Logging

NGC 6210 = PK 43+37.1 = ?5 = PN G043.1+37.7
16 44 29.4 +23 48 00
V = 8.8; Size $20'' \times 13''$

$17.5''$ (5/27/00): beautiful bluish oval at $220\times$, elongated 4:3 E-W, $0.4' \times 0.3'$. At $380\times$, there appears to be a very small fainter halo. At $500\times$, the narrow outer envelope is more evident and is elongated in the direction of the major axis, increasing the size to $\sim 30'' \times 20''$.

- by Steve Gottlieb

Obtained from ngcicproject.org.

Sketching

See sketches and talk on astronomical drawing by Howard Banich

Acknowledgements

Mom
Dad
Dilip Kumar
Prakash Subbanna
Amar Sharma
Hemant Hariyani
John Tatarchuk
Jimi Lowrey
Steve Gottlieb
Howard Banich

Where I look for targets : catalogues

- Challenging globular clusters : Palomar
- Dark nebulae : Lynds' Dark Nebulae (LDN)
- Emission nebulae : Sharpless (Sh2)
- Planetary nebulae: Abell
- Interacting galaxies: Vorontsov-Velyaminov (VV)
- Peculiar galaxies: Atlas of Peculiar Galaxies (Arp), Arp-Madore (AM), Zwicky (Red book)
- Groups of galaxies: Hickson (HCG), Rose (ROSE), Shakhbazian (Shk)
- Clusters of galaxies: Abell (AGC)
- Dwarf galaxies: Holmberg (?), David Dunlap Observatory catalogue (DDO), Paul Hickon's Atlas of the Local Group
- Extragalactic objects: Paul Hodge's Atlas of M 31, and "An Atlas of Local Group Galaxies".

Where I look for targets : lists

- RASC Challenge List:
  http://messier.seds.org/xtra/similar/rasc-dsc.html
- Texas Star Party advanced observing lists (yearly):
  https://texasstarparty.org/activities/tsp-observing-programs/tsp-observing-program-archive/
- Deep Sky Forum's "Object of the Week" (turned into lists etc):
  http://www.deepskyforum.com/forumdisplay.php?8-Object-of-the-Week-2017-(OOTW)
- Reiner Vogel's selection of large planetaries:
  http://www.reinervogel.net/LargePN/LargePN_e.html

Where I look for targets : observing guides

(Listing ones that I know of, there may be more)

- Astronomy League:
  https://www.astroleague.org/observing.html
- Alvin Huey:
  http://www.faintfuzzies.com/
  DownloadableObservingGuides2.html
- Clear Skies Observing Guides (Victor van Wulfen):
  http://www.clearskies.eu/csog/
- Reiner Vogel:
  www.reinervogel.net/Artikel_e.html#observingguide
- My astronomy logbook project:
  http://bas.org.in/~akarsh/Logbook-Project/

Where I look for targets : sites, books, features

Websites:

- Adventures in Deep Space (my favourite!):
  http://www.astronomy-mall.com/Adventures.In.Deep.Space/
  (Also on Facebook)
- "Paul's Page" by Paul Alsing (constellation-wise):
  http://www.pnalsing.com/

Features:

- Webb Society's "Deep-Sky Observer" issues
- Sky & Telescope "Going deep" features

Books:

- Steve O' Meara's series of books
- Annals of the Deep-Sky (Willmann-Bell)
- Springer "X and how to observe them/it" series books
- In particular, "Galaxies and how to observe them" by Steinicke and Jakiel (another favorite!)

Even more obscure targets

- Always be on the lookout!
- Scientific papers!
  Eg: arXiv:1604.00435 has a list of interacting pairs, although that might not be the most key thing about the paper!
- Historical reports
- News articles
- Hubble images / APOD
- Poring through the works of observational astronomers