

MINI REFRACTORS

“ITS NOT HOW BIG IT IS,
ITS HOW YOU USE IT”

By: Jim Thompson

Date: January 2022

HOW SMALL ARE WE TALKING?

- Aperture 30 to 50mm
- Focal length = 135 to 250mm
- Mass = 300g to 1500g
- Finder scope w/ high quality optics (ED doublet or triplet)
- Most come w/ field flattener



AVAILABLE MODELS

1.



2.



3.



4.



5.



6.




#	MAKE	MODEL	Ø	F.L.	F/R	LENS	REDUCER / FLATTENER
1	William Optics	Redcat	51	250	4.9	Petzval	N/R
2	Askar	FMA230	50	275	5.5	triplet	Included, gives 230mm f.l. – f/4.6
3	Skywatcher	EVOGUIDE	50	242	4.8	doublet	Flattener extra
4	TPO	Ultrawide	40	220	5.5	triplet	Included, gives 180mm f.l. – f/4.5
5	Askar	FMA180	40	220	5.5	triplet	Included, gives 180mm f.l. – f/4.5
6	Askar	FMA135	30	135	4.5	triplet	Flattener included

BUT BIGGER IS BETTER, RIGHT? ...

...perhaps not!

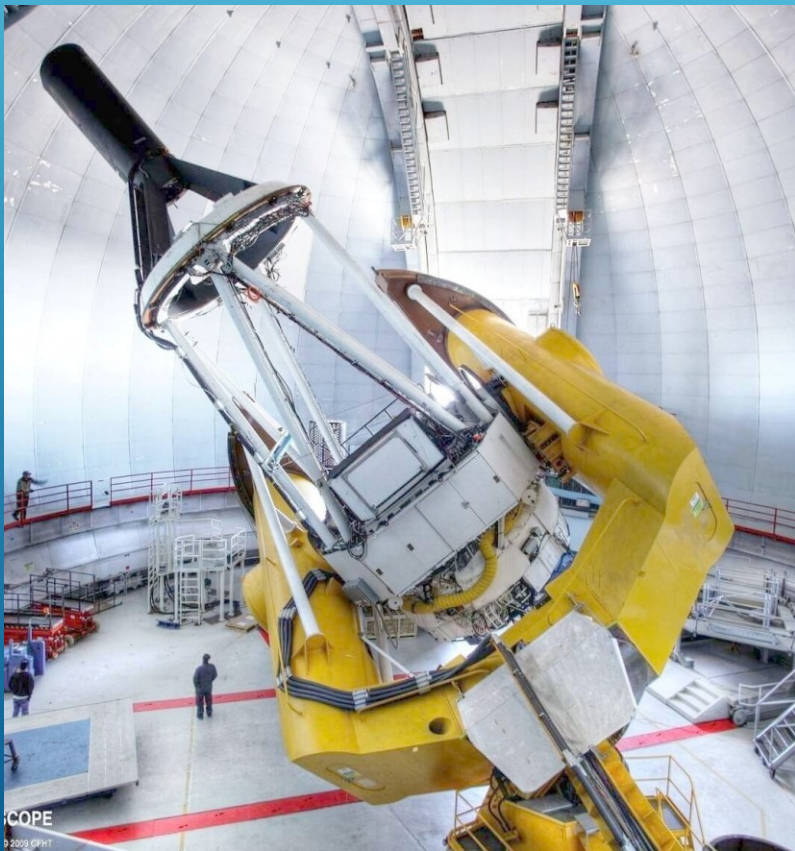


CONVENIENCE

- Portable:
 - camping, hiking, travelling
 - Versatile:
 - Finder scope, guider, wide field
 - Easy to use:
 - Helical focuser, low mount burden, low tracking burden
- 
- Several white diagonal lines of varying lengths and thicknesses are positioned on the right side of the slide, extending from the middle towards the bottom right corner.

LIGHT GATHERING

- Which scope produces a brighter image?



Canada-France-Hawaii Telescope

- 3.6m aperture
- 13.5m focal length

OR

Takahashi Epsilon 130D Astrograph

- 130mm aperture
- 430mm focal length



LIGHT GATHERING

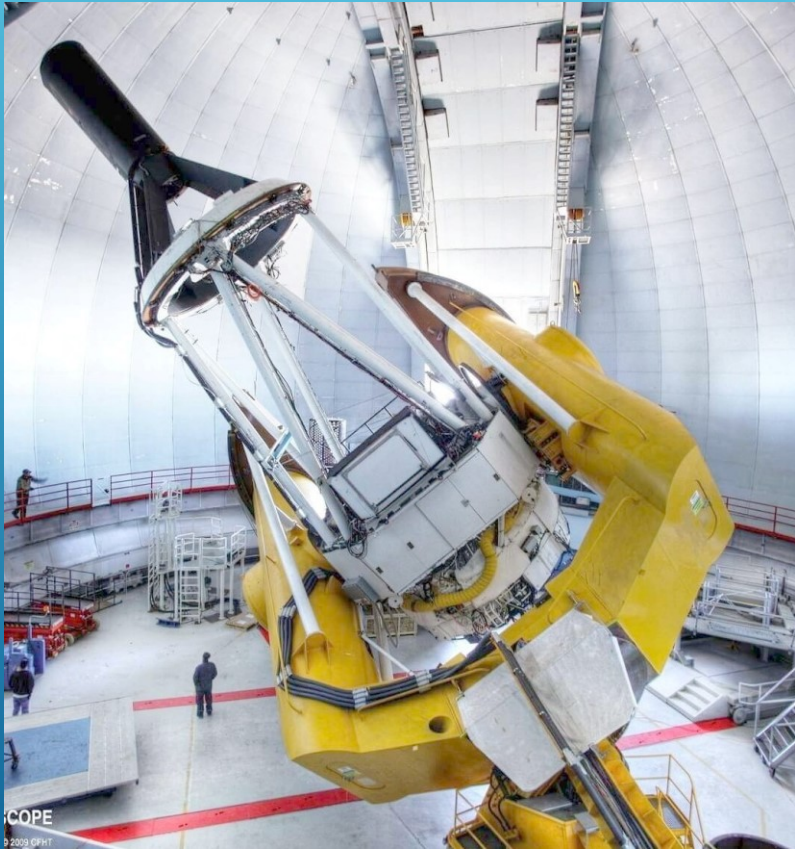


- Conventional wisdom: bigger scope collects more light (bucket analogy)
- But scopes have different FOV!

Focal Ratio = Focal Length / Aperture

smaller F/R ► faster light gathering

LIGHT GATHERING



Canada-France-Hawaii Telescope

- 3.6m aperture
- 13.5m focal length

$$F/R = 3.75$$

Takahashi Epsilon 130D Astrograph

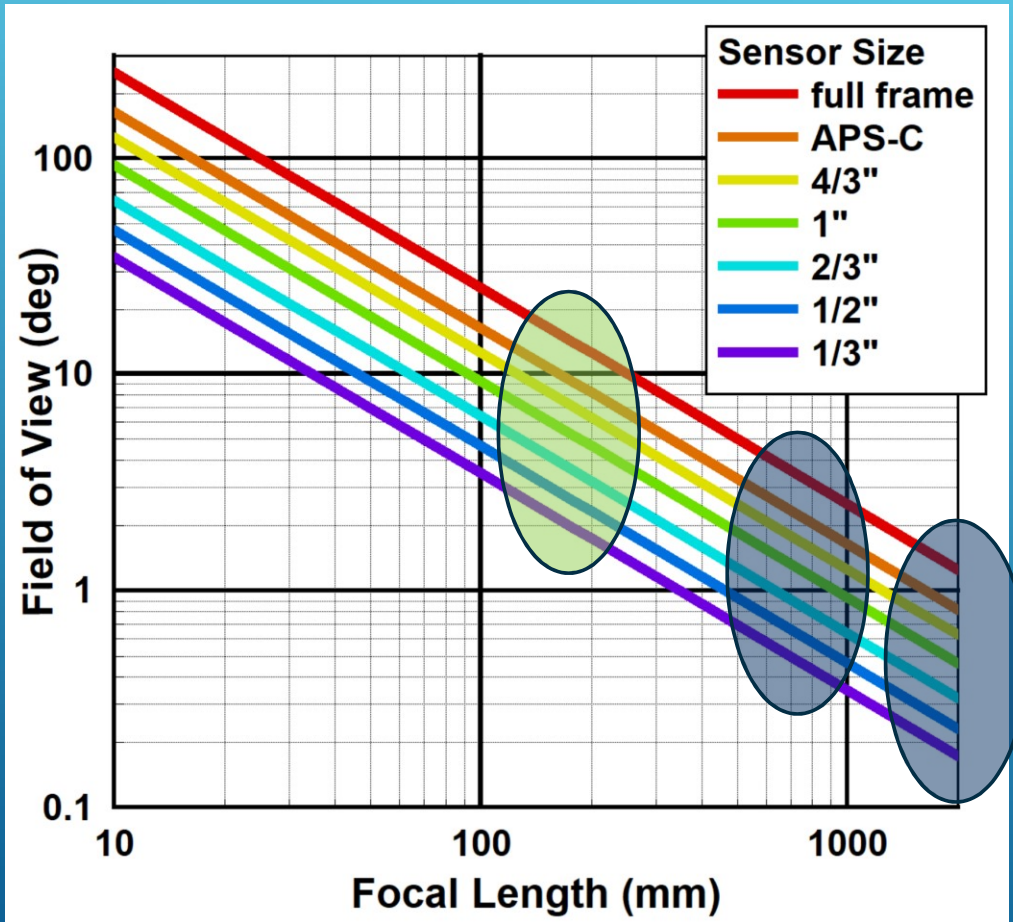
- 130mm aperture
- 430mm focal length

$$F/R = 3.31$$

$$FOV = 31\times$$



FIELD OF VIEW



- Short F.L. = big FOV
- Tracking burden much less
- Put objects in context

THE BIG PICTURE - EXAMPLE #1

NGC7635 Bubble Nebula

**TPO
Ultrawide
f.l. =
180mm**

**10" RC
f.l. =
1625mm**



THE BIG PICTURE - EXAMPLE #2

NGC6888 Crescent Nebula

Tamron
camera
lens
f.l. =
180mm

10" RC
f.l. =
1625mm



THE BIG PICTURE - EXAMPLE #3

M8 Lagoon Nebula

**TPO
Ultrawide
f.l. =
180mm**

**10" RC
f.l. =
1625mm**



COST

- Small size = low material costs
- Easier to make small quality optics
- ~1/5 price of other fast imaging scopes

MAKE	MODEL	COST (CAD)
William Optics	Redcat	\$1017
Askar	FMA230	\$850
Skywatcher	EVOGuide	\$370 + \$130 FF
TPO	Ultrawide	\$500
Askar	FMA180	\$490
Askar	FMA135	\$355
FAST IMAGING SCOPES		
Celestron	RASA 8"	\$2250
Celestron + Starizona	C8 + Hyperstar	\$2670
Borg	55FL APO	\$2280
Takahashi	E130D	\$3405
Orion	8" Newt f/4	\$890+CC

CONCLUSIONS

- Affordable price
 - Quality optics
 - Easy/more forgiving to use
 - A lot of fun!
-
- QUESTIONS?