

Well it Was Big When We Built It:

Precursors of the TMT Happy and Unhappy

 UC Irvine ~~TCOAT~~

Virginia Trimble

Queen Jadwiga Observatory

Rzepiennik Biskupi Poland

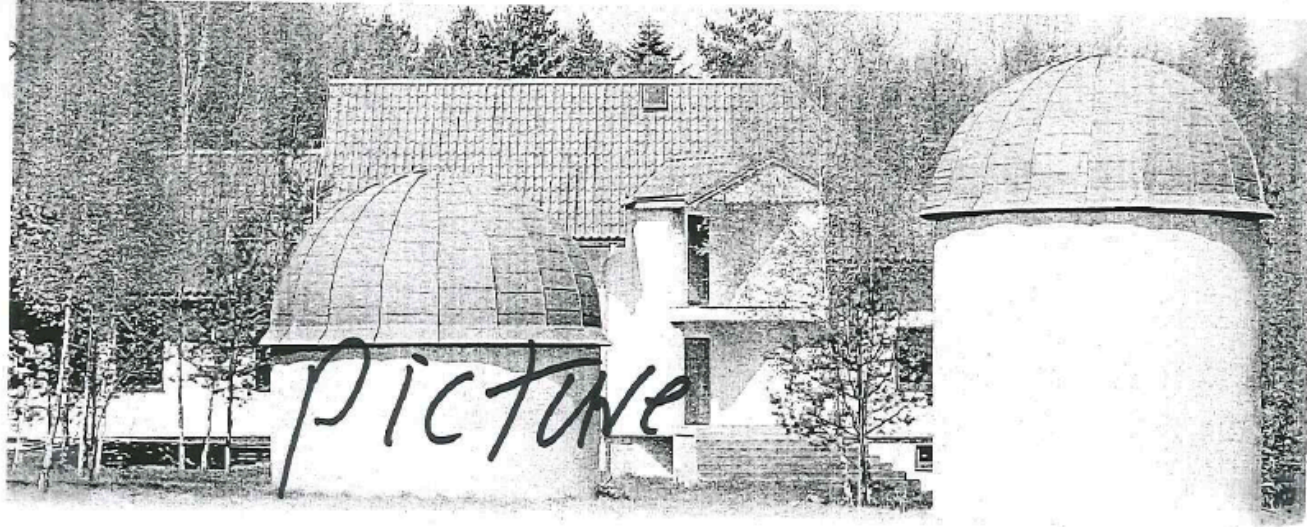
Ordering: Approximately chronological

IRS



TMT DC

June 2015



Goals

Telescope details  
What/Where/When  
Who

largest of type-  
time?

Achievements

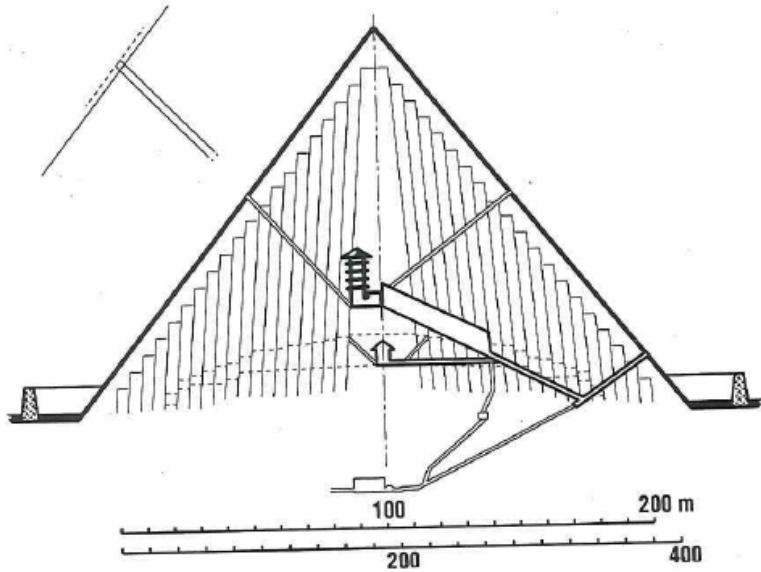


FIGURE 1. Vertical cross-section north-south of Cheops' pyramid.

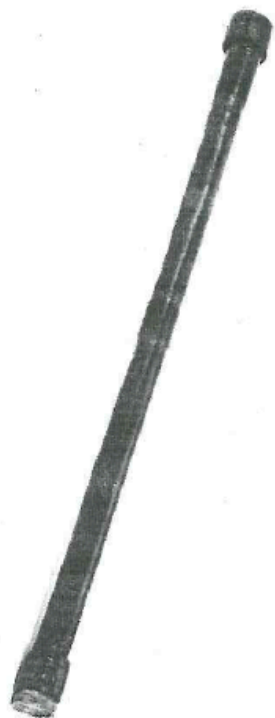
umpteen BCE Giza  
 Cheops  
 air shafts

Ascent of pharaoh's  
 soul to stellar  
 destiny

Confirmation of

- construction date
- precession of the equinoxes

# Spy glass (military + ...)



Moons of Jupiter

Phases of Venus

Mountains on Luna

Milky Way = stars

Sun spots + solar rotation

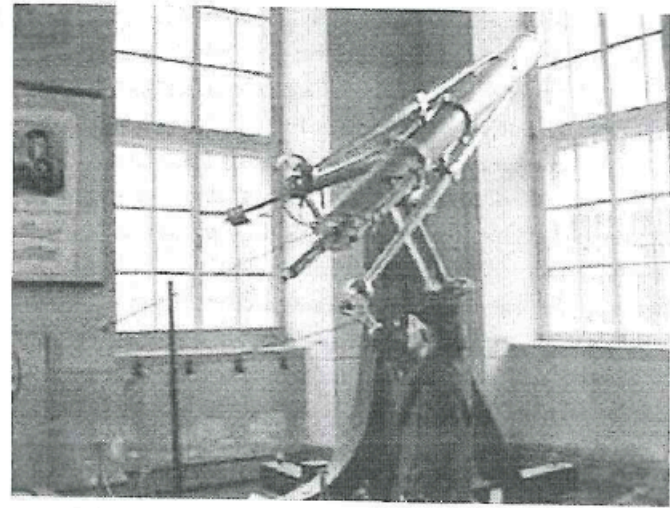
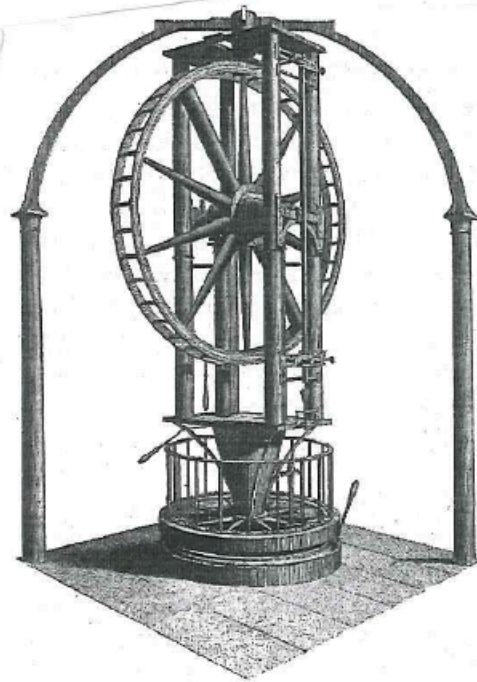
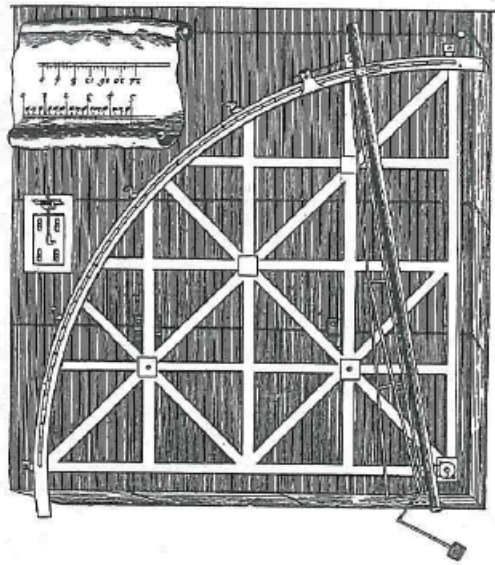
1609 ff 1-2"

Galileo refractors

many + for other

astronomers (not

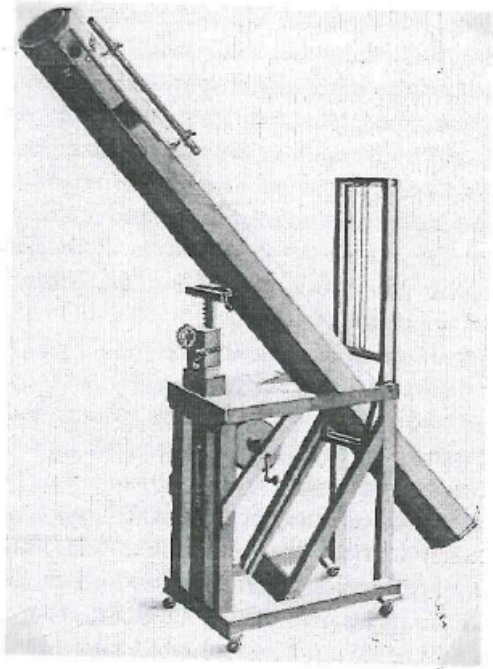
Kepler)



1729 Mural  
quadrant-  
Bradley  
aberration of  
Starlight

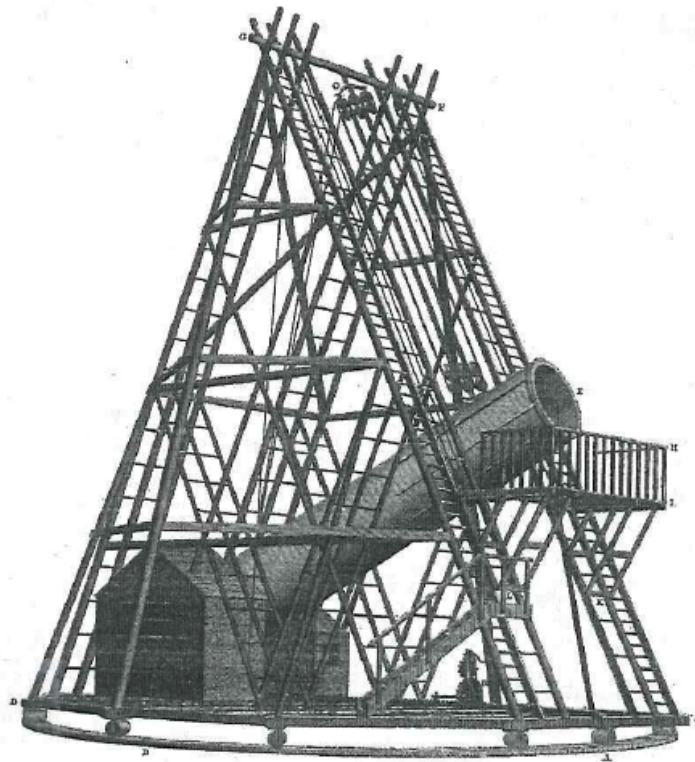
1801 Transit circle  
Disc. of Ceres  
Piazzi

1824 Fraunhofer  
9.5" for Dorpat  
Largest to 1847  
15" Poulkova +  
Harvard  
Struve many  
double stars  
π of Vega (1835-9)



1781 7' 6.5"

Wm Herschel

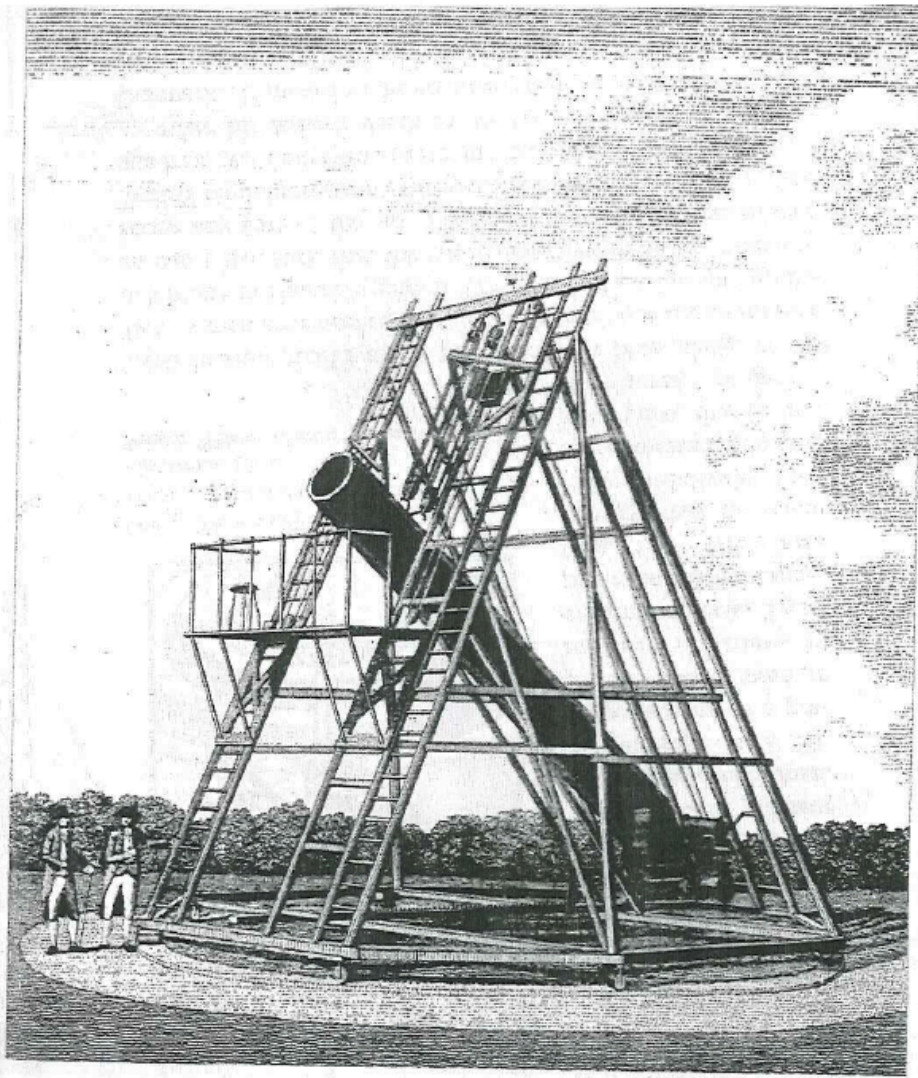


1788 40' 38"

Sky Sweeps  
catalogues  
Comets  
Nebulae

→ MW larger  
than his 1st  
version

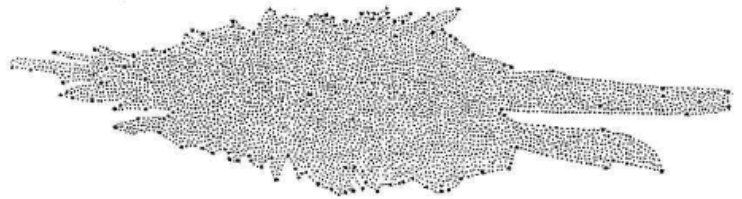
→ Uranus



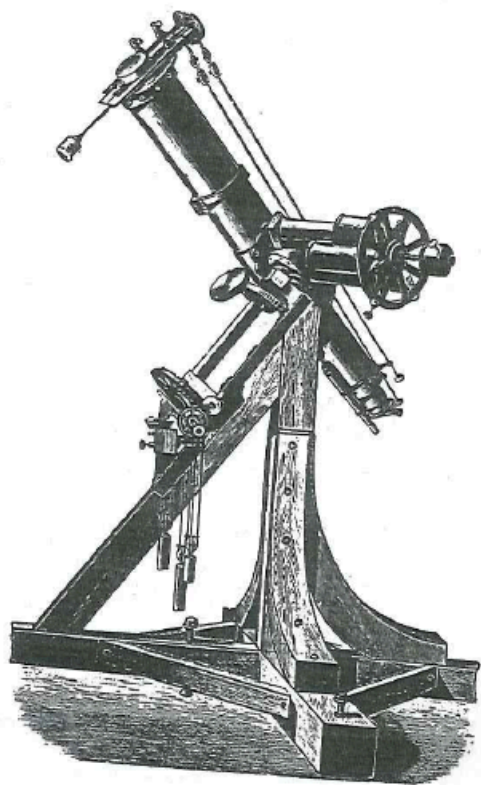
1781 20-foot 18.5"  
Wm. Herschel largest  
reflector, speculum

Sky sweeps, astrometry  
nebulae comets

Shapes of nebulae  
moons of Saturn &  
Uranus  
Star ganging



vs Digges  $\infty$   
Kepler thin shell 7



1829 6.5" heliometer  
after Fraunhofer  
Königsberg

Astrometry, esp.  $\pi$

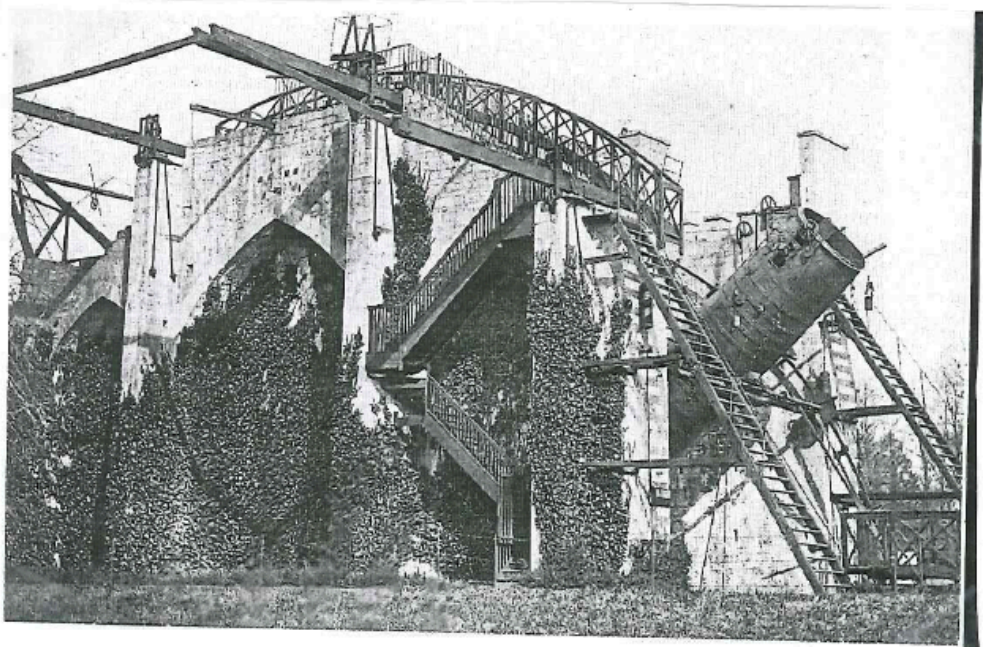
many  $\mu$ 's  
Bessel:  $\pi$  of  $\alpha$  Cyg  
" companions of  
Sirius + Procyon



Imaged Clark 1862  
18.5" then largest

(Procyon B from Lick  
1895 Schaeberle  
Lick 36" REFRACTOR)



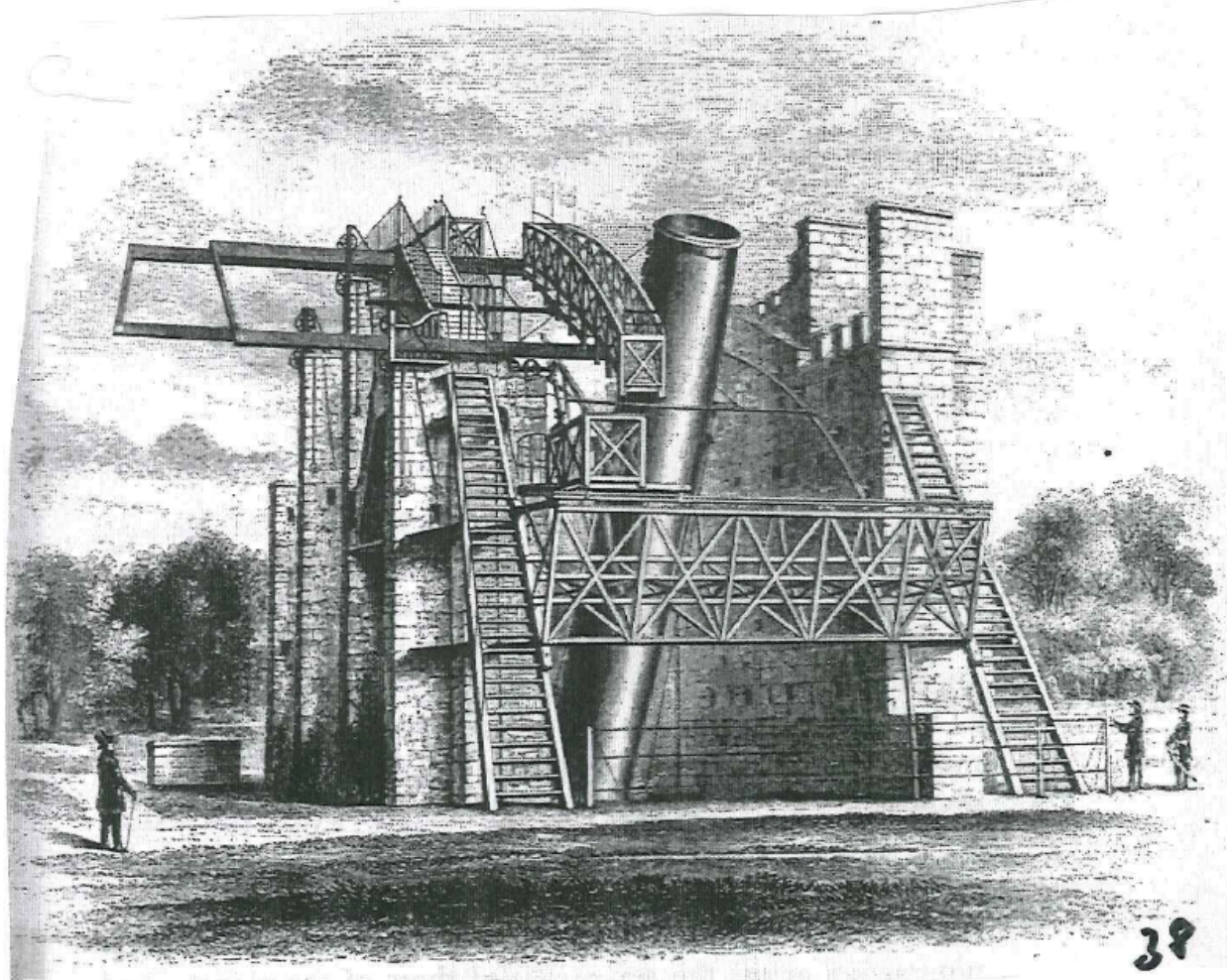


1845 Birr Castle Wm  
3<sup>rd</sup> Earl Rosse Parsons  
72" speculum

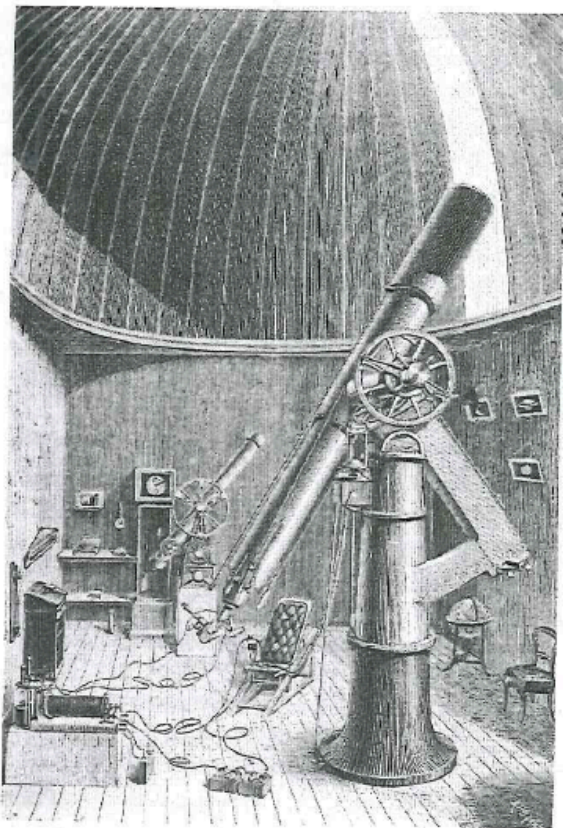
Study & draw Nebulae  
(do they change)

Many resolved  
S structure in  
M51

~~named~~ Crab Neb  
named



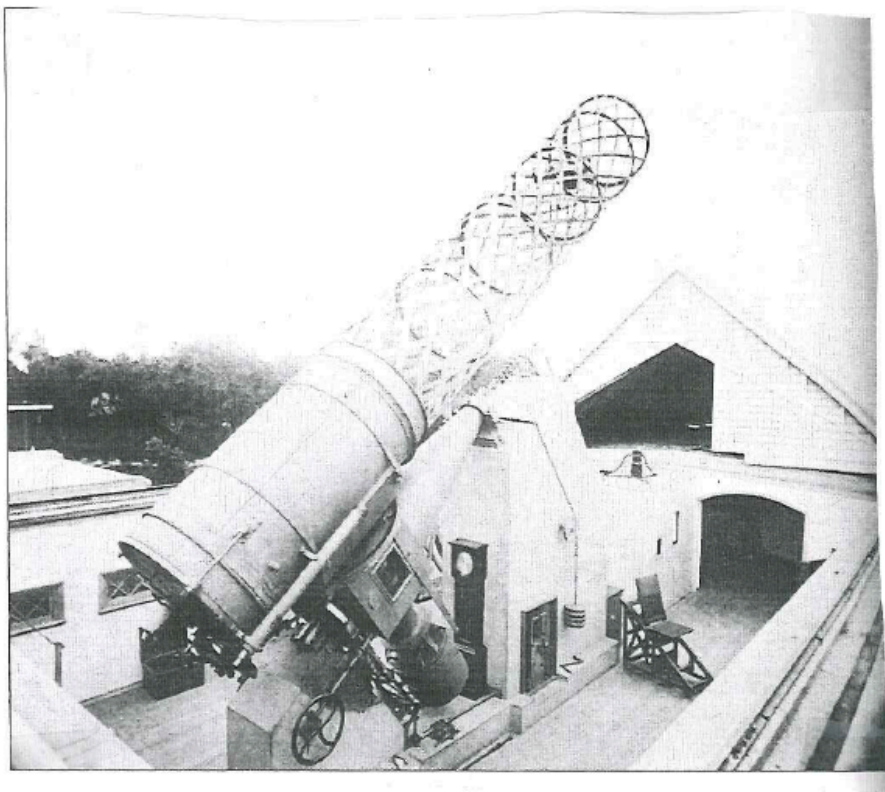
1845 Leviathan of Parsonstown  
in better condition



photograph &  
spectra

Gaseous nebulae  
measured & radial  
velocities

1860 8" Cooke +  
Clarke refractor  
Huggins with  
Spectroscope



Visual study + drawings of  
So. Nebulae

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photom. + spect. of So. S

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1990's MACHO project

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automated for TNO

search 2000

1869 Great Melbourne  
50" Last large speculum

1952-56 Pyrex mirror

to straddle, bearings failed,

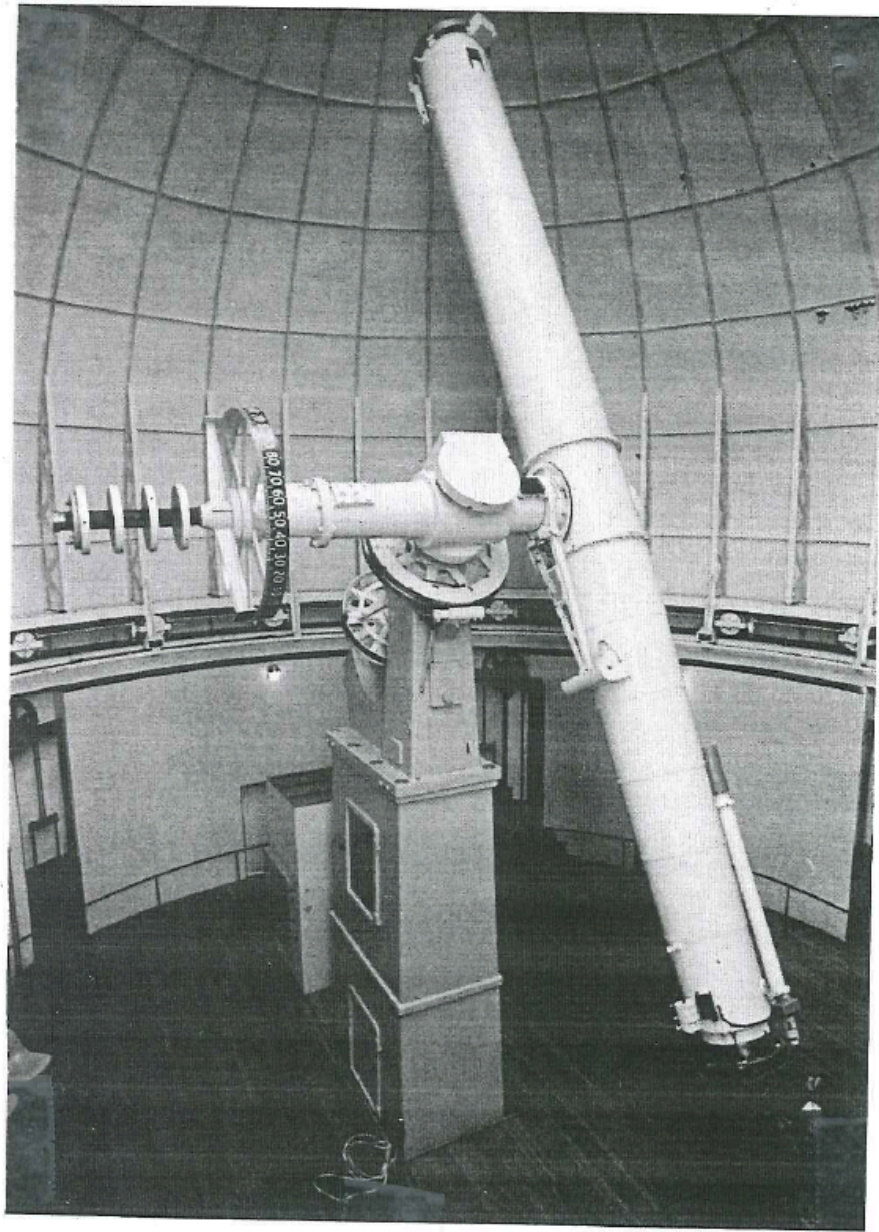
recommissioned late 80's

BURNED 2003









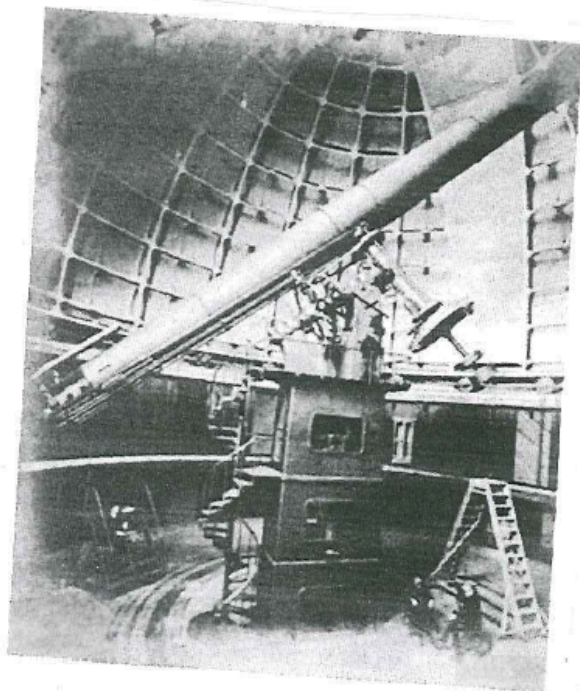
Almanacs &  
Ephemerides

1877 Moons of  
Mars

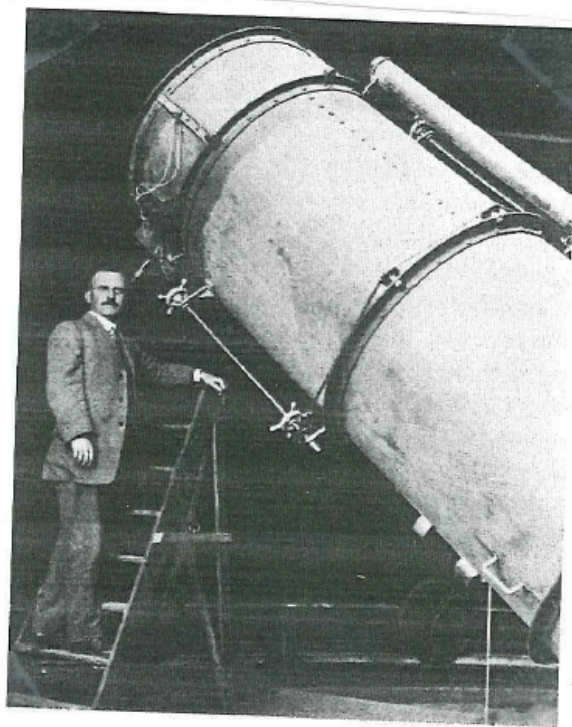
Asaph Hall

1873 USNO Clark 26"  
LARGEST REFRACTOR



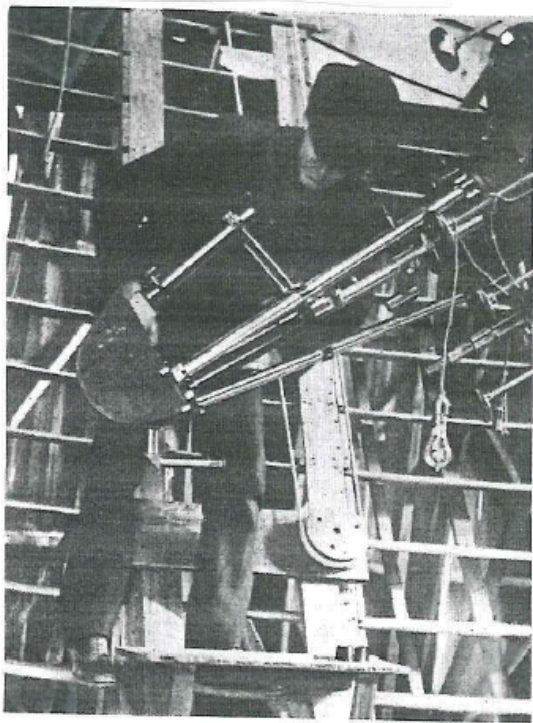


1888 Lick 36"  
Grubb/Clark  
refractor  
briefly largest  
Keeler's V's  
incl Sat rings



1895 36" Lick Crossley  
reflector, rebuilt  
1904 M87 jet  
S spectra (incl. F&V  
S images with mouse  
(carts)  
Trumpier-ISM dust

Goal - our  
site is  
best!

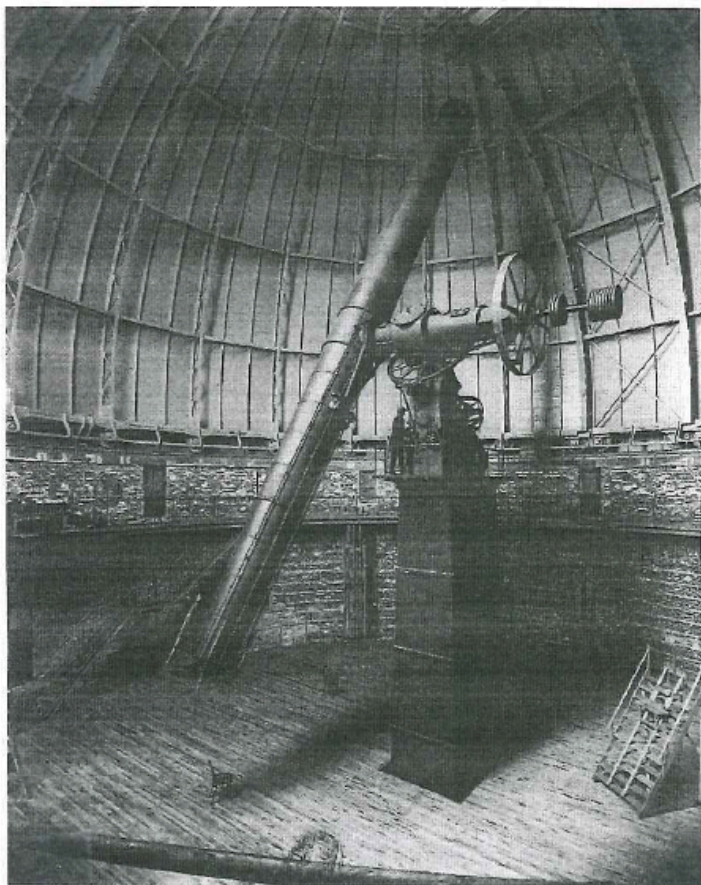


1896 24" CLARK  
Lowell

Martian canals  
9<sup>th</sup> planet  
Solar systems in formation

Pluto  
First 5 redshifts  
high velocity lines - Crab Neb  
expansion - Crab Neb (2<sup>nd</sup>  
real neb changes)

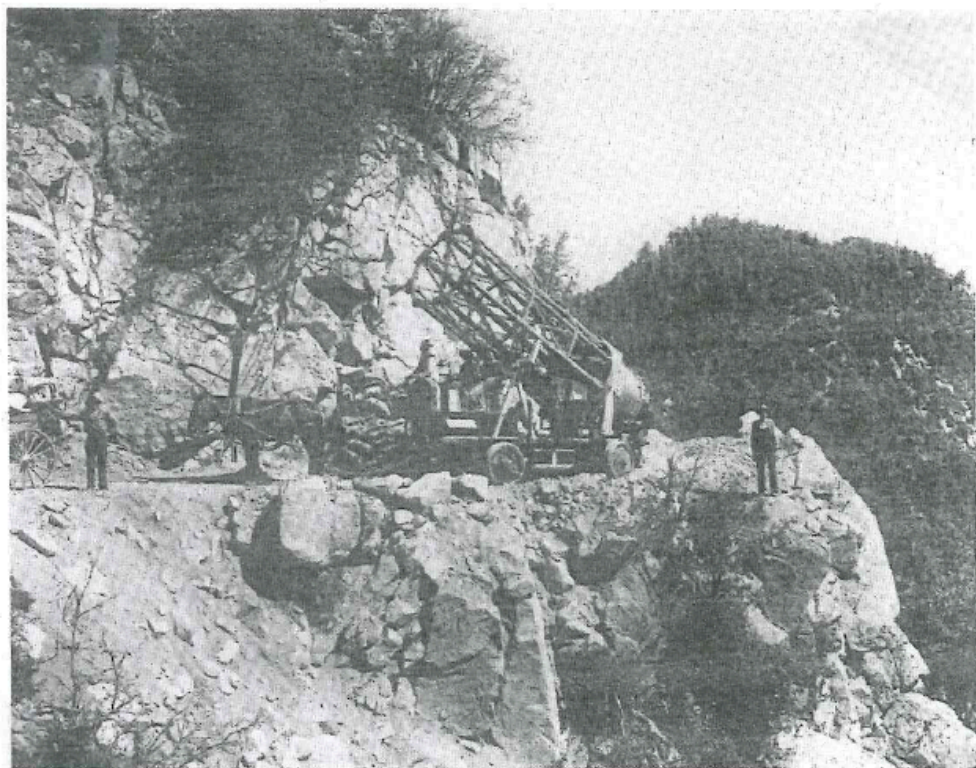
Flassell 1854 giant speculum  
Crab NOT resolvable into  
[S]



ALL PURPOSE  
IMAGING + Spectroscopy

Schlesinger Ur's  
M HK Types  
MW as spiral from  
OB Associations  
(Morgan)

1898 40" CLARK Yerkes  
refractor - largest  
ever [1900 48" Gauthier  
never used]



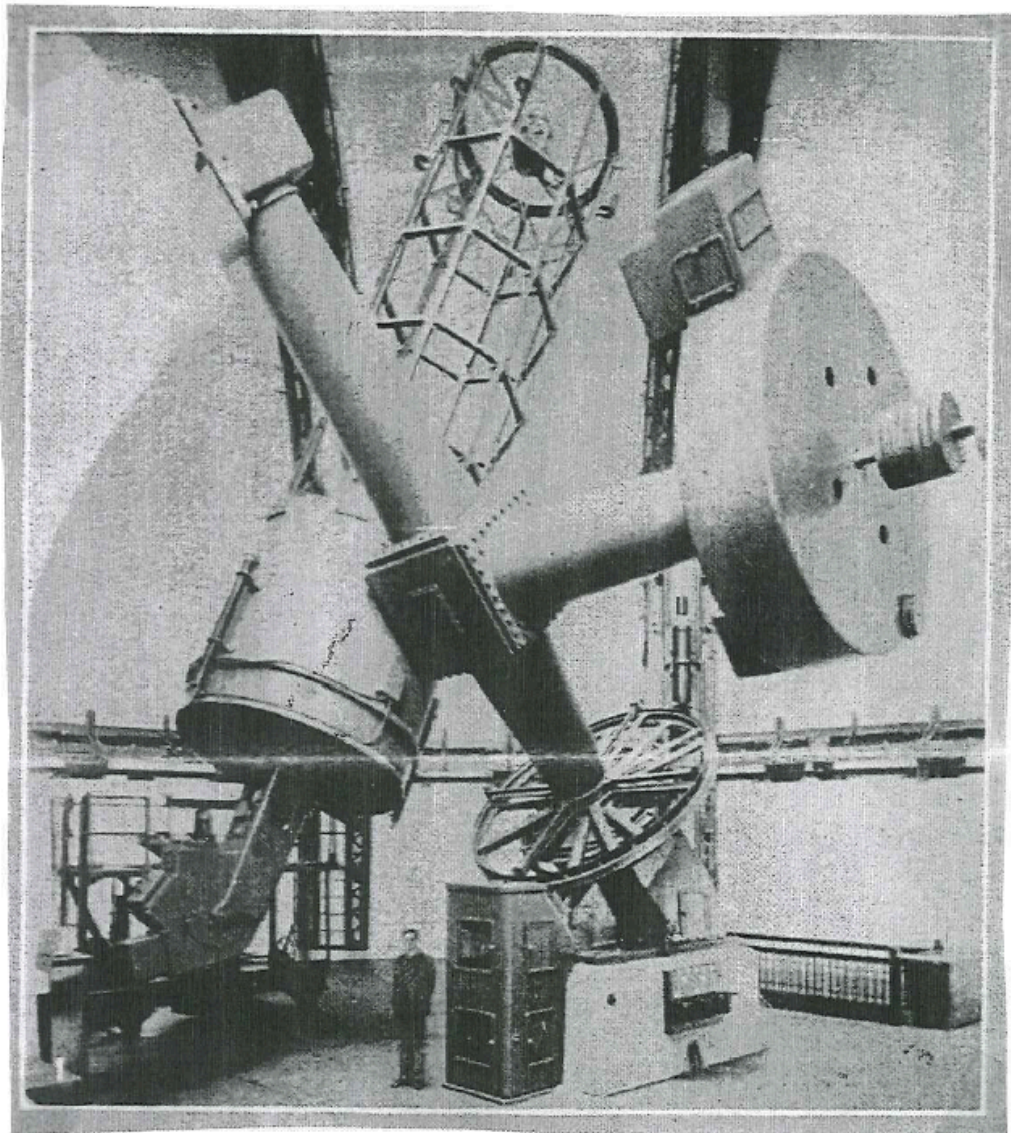
1908 Mt. Wilson 60"  
Largest glass reflector

Understand  
stellar evolution

Shapley  $d^s$  to  
Globular cl; SS not  
Central

Hubble external  
galaxies

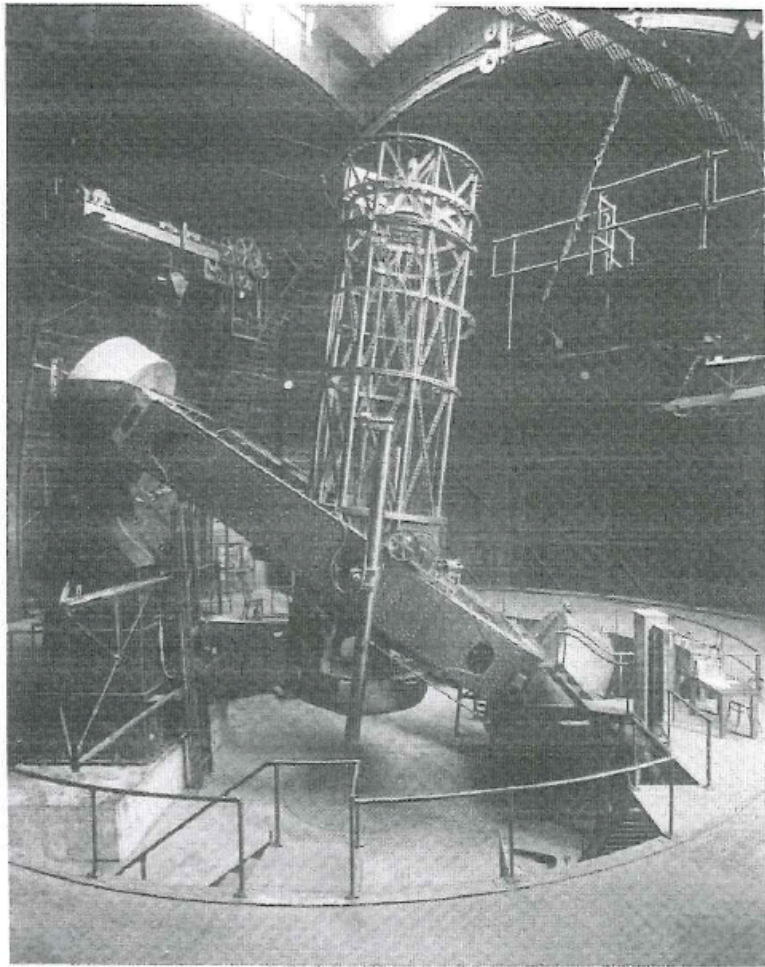
Kapteyn universe  
van Maanen  $S$   
rotation



# Radial Velocity Program

Binary orbits  
evidence for  
MW rotation

1912-17 largest DAO  
72"

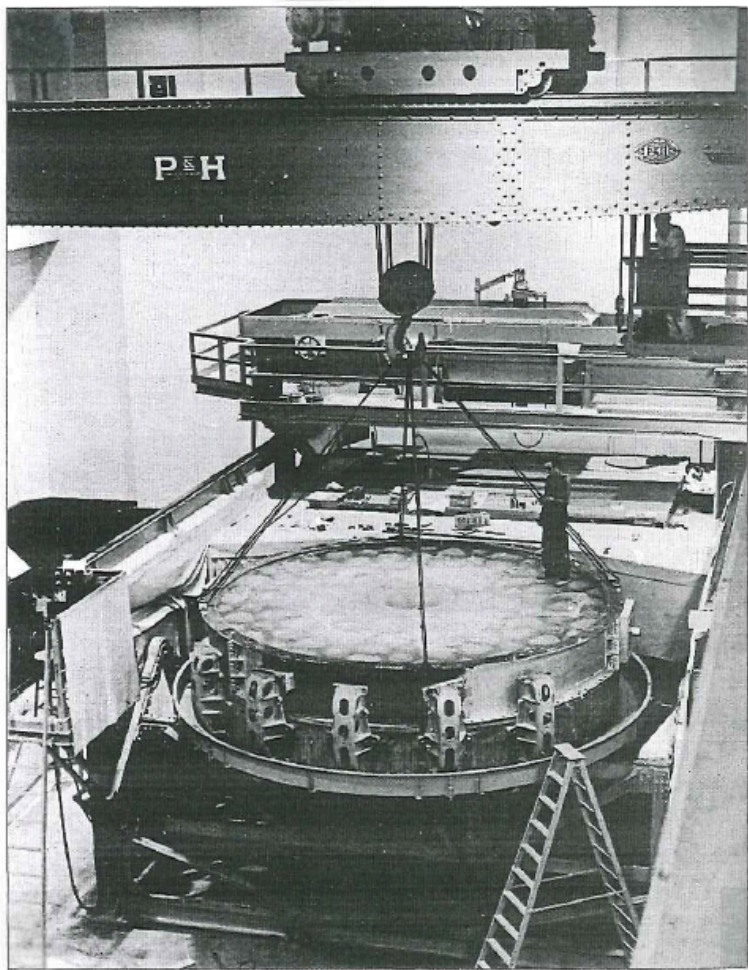


1917 Mt. Wilson 100"  
largest reflector for  
30+ years

"Because we can!"

Hubble types of Galaxies  
Baade's stellar pops.

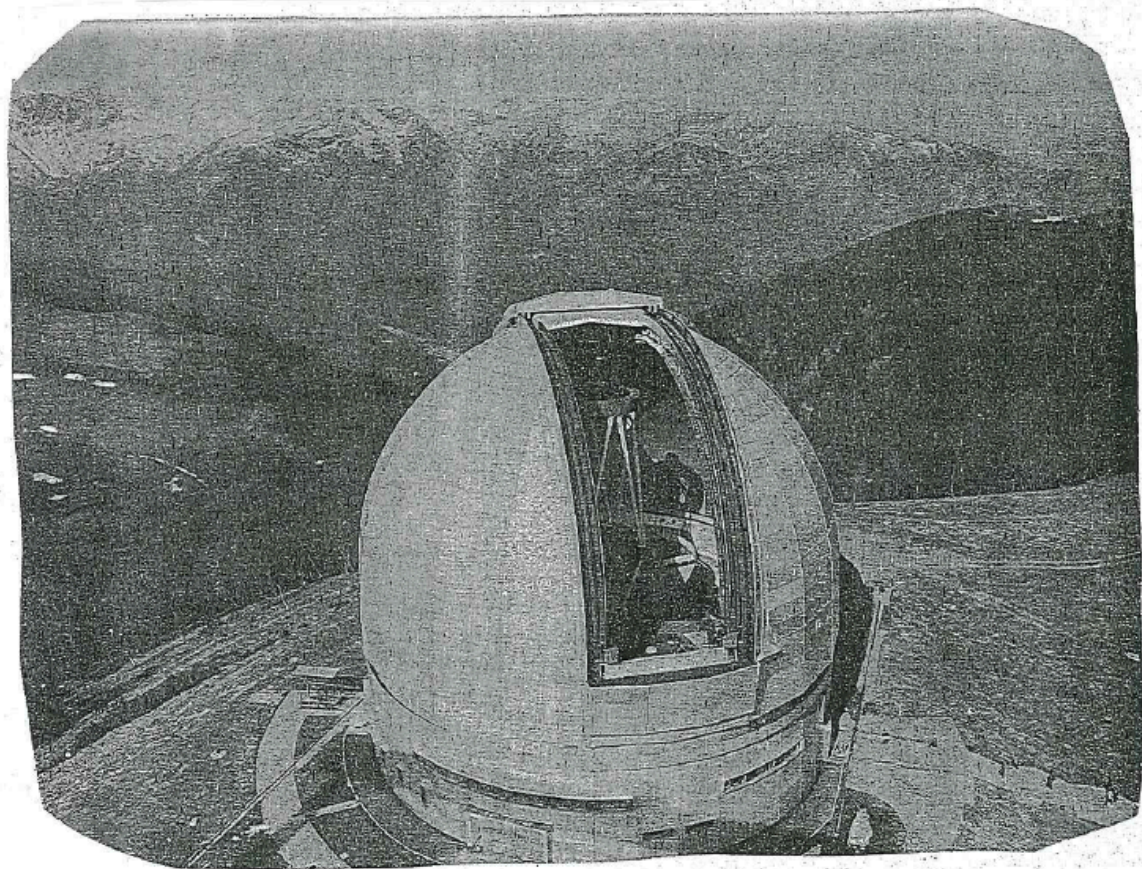
Velocity-distance law



1948 5m Palomar Mt.  
"primum inter pares"  
of 4-m era

$H_0$  90 exoplanets  
radio source opt  $10^5$   
Quasars,  $z = 1.95$  (Gunn-Petros)  
several distance scale  
recalibrations

48" Schmidt remains  
unsurpassed + still  
in use

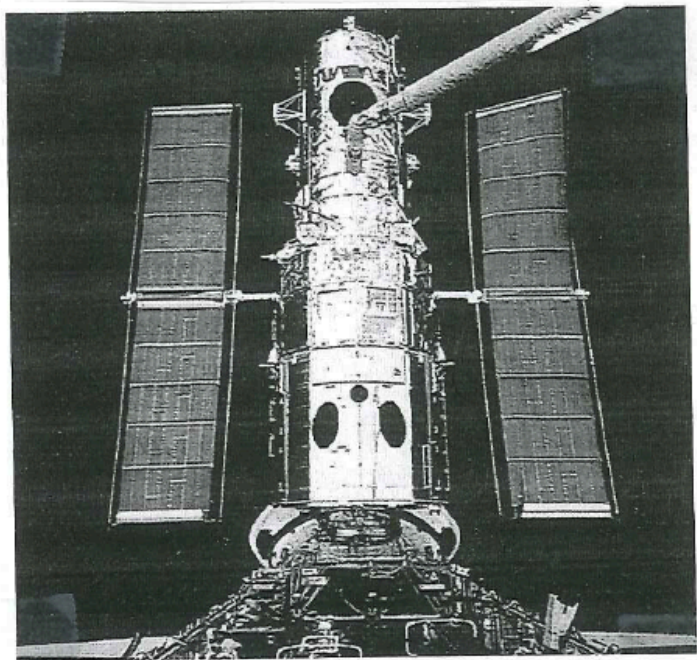


1975 6<sup>m</sup> ALT-AZ (1<sup>st</sup> modern)  
SAO Russia

Beat  
Palomar!

Two dwarf novae  
Seven flare stars  
And a bird,  
That flew across  
Our dome slit  
on the third





1990 HST overhead  
largest in space  
until....

accurate  $H_0$   
image exoplanets

HDF - Galaxies

different in past

- everybody has a BH
- BH - bulge relation

⋮