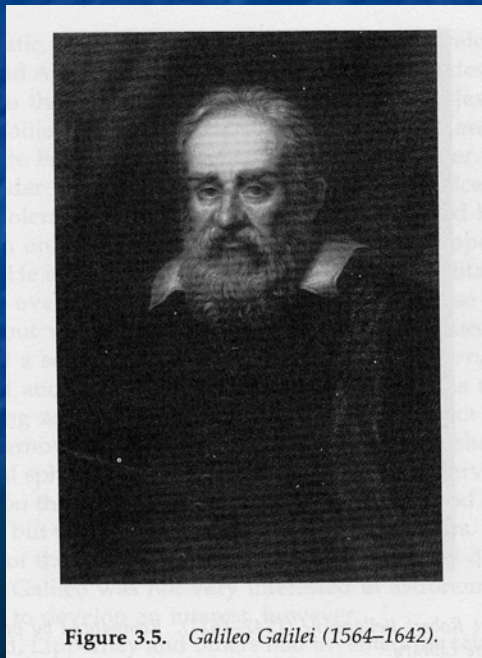


# The Leviathan and the Whirlpool Nebula

- Trevor Weekes
- Harvard-Smithsonian Center for Astrophysics

## New Eyes on the Universe: 400 Years of Telescopes



# Many Steps from Galileo to the James Webb Telescope

One such step made in 19<sup>th</sup> Century  
by the Third Earl of Rosse (1800-1867)  
at his observatory in Birr Castle, Ireland

Motivation to build large  
telescopes: the study of  
Nebulae.  
Could they all be resolved into  
stars?  
The Herschels had cataloged  
the nebulae in Northern and  
Southern Hemispheres using  
largest telescopes then  
available.  
Results inconclusive!



Landlord  
Magistrate  
Engineer  
Chemist  
Astronomer

# Lord Rosse's Telescopes

Third Earl of Rosse  
(1800-1867)  
Birr Castle, Ireland



He built two 36 inch telescopes which were better than Herschel's 48 inch.

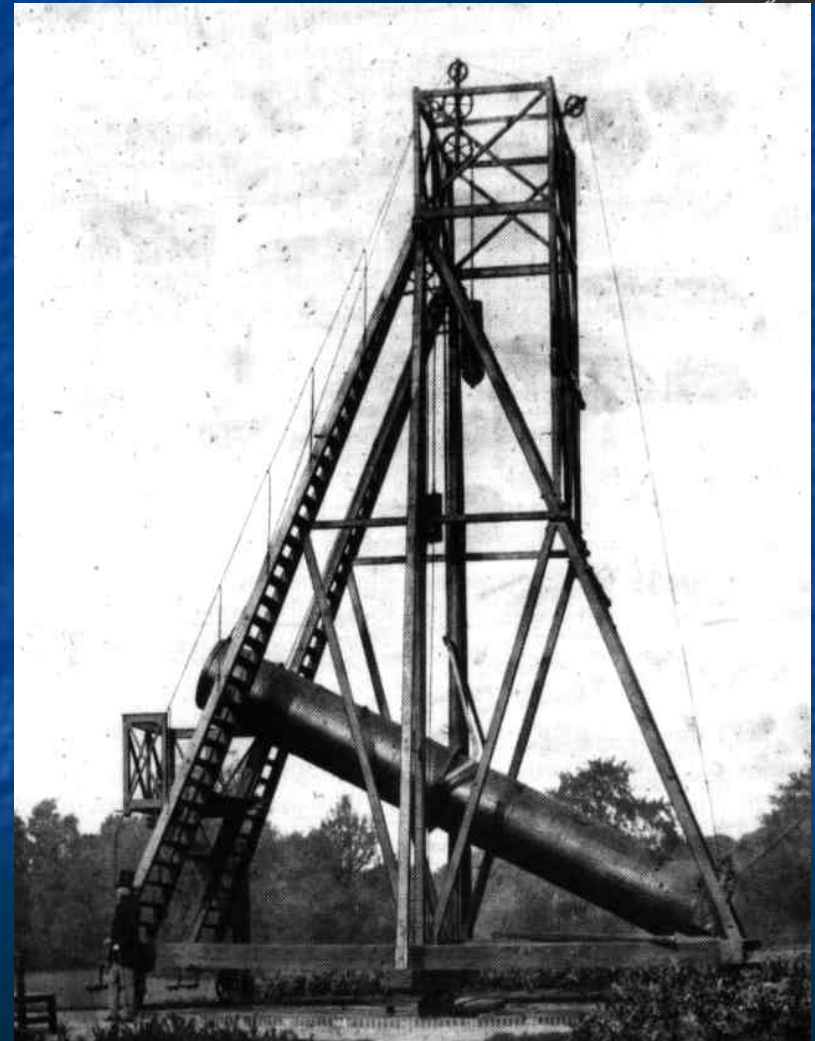
Designed by Rosse himself.

Built entirely on his estate in Birr.

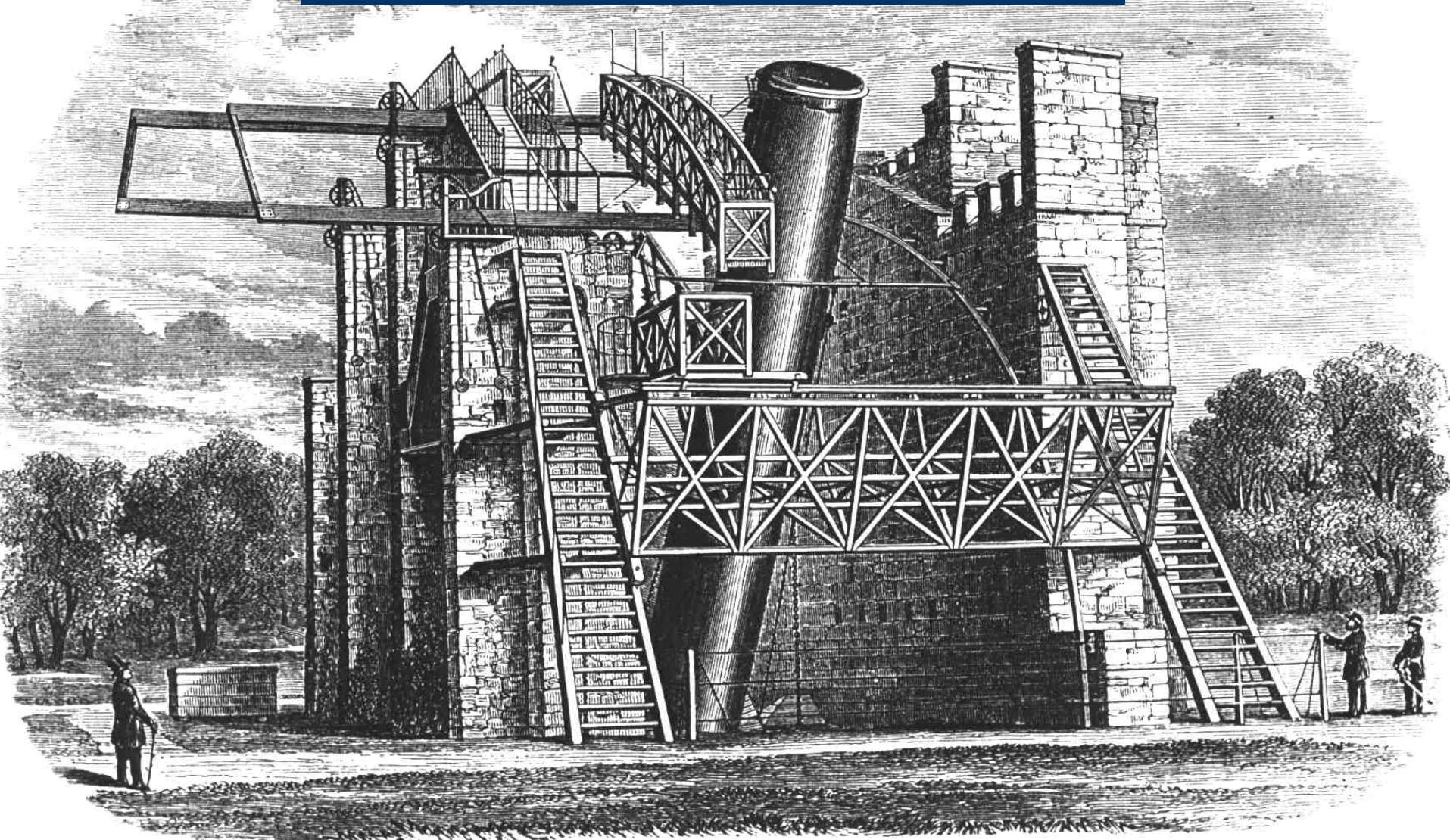
All funding from family fortune.

But with 36 inch it was still not possible to determine the nature of the nebulae...more light needed!

In 1840 he started to build a 72 inch telescope.....the Leviathan.



# The Leviathan of Parsonstown (Birr)



1845: This 72 inch telescope was to be the largest telescope built until the 100 inch on Mount Wilson, California in 1910.

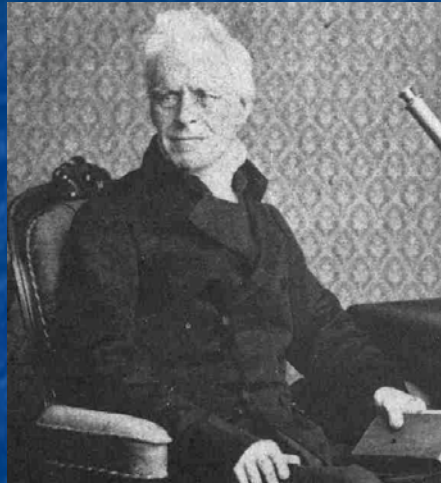
- In Spring, 1845 the first Spiral Nebula, Messier 51, was discovered with the Leviathan:
  - Questions:
    - Who dunnit? Was it Lord Rosse alone?
    - If so, why was it accepted so readily?
      - No objective data recorded; no observing logs or notebooks
      - No other telescope had the sensitivity to verify the discovery
- *Recent paper by Omar Nasim at History of Science Conference, Pittsburgh (Nov. 2008) suggests credit for discovery should be shared by Lord Rosse, Rev. Rowan Robinson and Sir James South*

## The P.I.

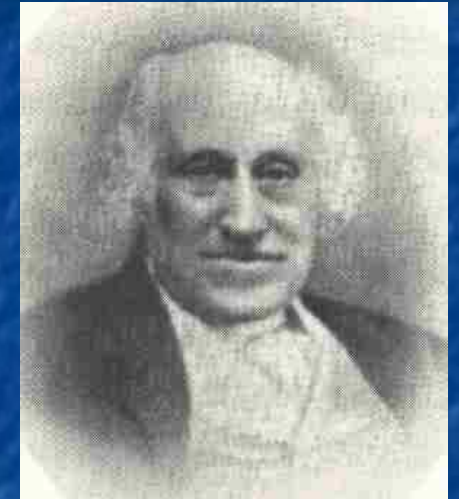
The Co-I.'s: Invited to witness  
first light (similar role for 36 inch)



Third Earl of Rosse  
Gentleman-Astronomer  
Birr Castle, Ireland



Rev. Romney Robinson  
Director, Armagh Observatory,  
Ireland  
Professional Astronomer

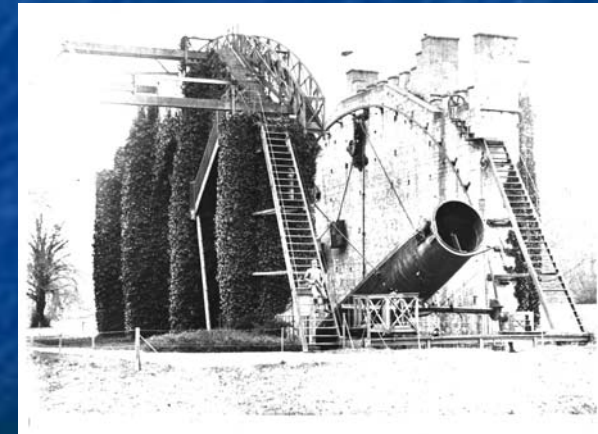


Sir James South,  
Gentleman-Astronomer  
Future President, R.A.S.

Colorful Victorian Eccentrics all!

# Calendar

- 1844, December: Telescope ready
  - Robinson and South invited for Commissioning
- 1845, February: First Light!
  - Robinson and South arrive
  - Weather "of the worst astronomical character"
- 1845, March: Observations
  - Observations by Rosse, Robinson, South
  - Weather good
  - Some 40 nebulae examined
  - Robinson and South depart
- 1845, April: Rosse observes "alone"
- 1845, June: Discovery of the first Spiral M.51 reported by Rosse at meeting of British Association for the Advancement of Science in Cambridge



# Reports from Robinson and South

- Robinson: written report to Royal Irish Academy, April 1845
  - Mostly concerned with resolvability of nebulae
  - Mentions M.51 but only in that context
- South: Letter to "The Times", April 16
  - Mostly concerned with technical quality of telescope
  - Mentions M.51 but concentrates on M.5 ("exhibited a sidereal picture in the telescope such as man before has never seen, and which for its magnificence baffles all description")
- Conclusion: Spiral Nature of M.51 was not seen in March, 1845
  - Not looking for it?
  - Too many cooks?



# First Image of Spiral Galaxy

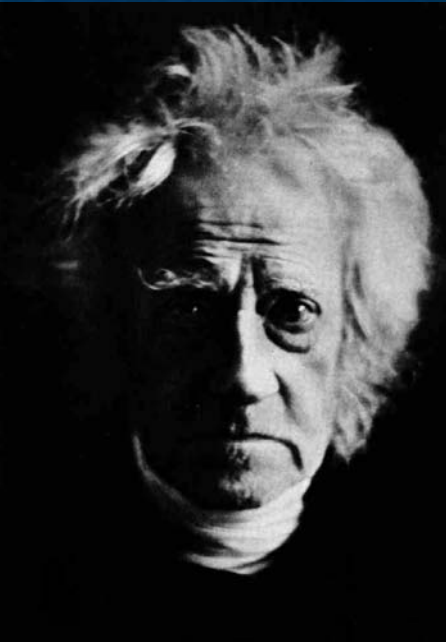
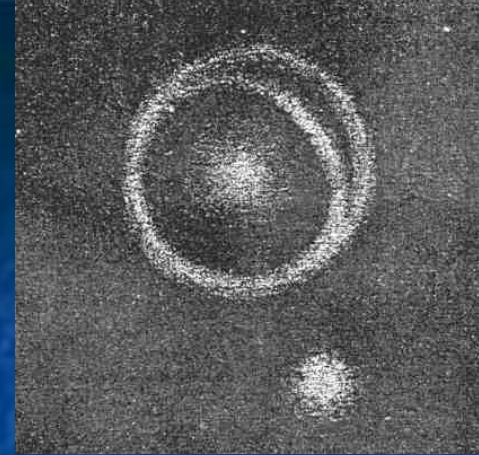


Lord Rosse's handwritten inscription reads: " Fig. 25 Herschel, 51 Messier, sketched April 1845, carefully compared with original on different nights, but no micrometer employed. Handed round the Section at the Cambridge meeting."

Hand-drawn figure distributed by Lord Rosse at B.A.A.S. meeting, June 1845

# "Publication"

Previous Herschel  
image of M51



The Herschels were the acknowledged authorities on nebulae

"L'étude du ciel nebuleux parait etre le domaine presque exclusive des Herschel" Struve

- Paper presented by Lord Rosse at B.A.A.S. and image circulated
- Sir John Herschel 1792-1871  
President of B.A.A.S. in 1845
- The telescope "an achievement of such magnitude...that I want (for) words to express my admiration of it"  
Herschel Presidential Address
- Discovery of Spiral Nebula accepted by scientific community
- Image appeared in print in a book by Nichol in 1846, in journal article by Rosse 1850

# Confirmation



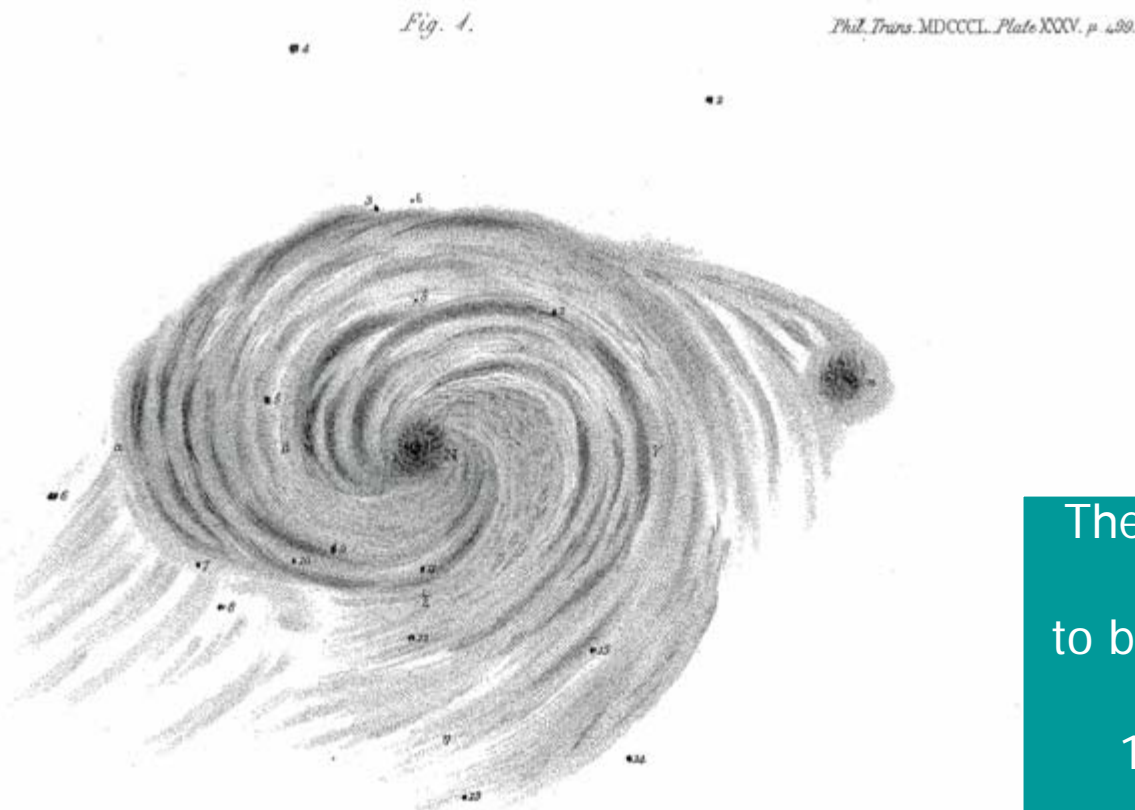
- Confirmed by Robinson in 1848 using the Leviathan.
  - He "re-examined 51 Messier...in which Lord Rosse had first seen it (spiralicity), and fully verified it"
  - Named it the Whirlpool Nebula
  - No other telescope could see it
- This Discovery was accepted on the basis of a single subjective observation
  - Rosse previously President of B.A.A.S.
  - Noble Lord....even if an Irish one!

The 4th Earl in his 1880 paper says:

"1845, Apr. During this month M.51 was for the first time examined with the 6 foot and its spiral character immediately noticed, but no record is left of these early observations".

# Lord Rosse was the sole discoverer of the first Spiral Nebula, M.51 in 1845

Not noticed by Robinson, Rosse and South in March, 1845



The Discovery of the Spiral Nebula is important because it was to be the most important discovery made with the Leviathan. 16 spirals were detected with the Leviathan