





## The Universe in the Classroom

**Dr Sarah Roberts**  
Faulkes Telescope Project  
Cardiff University



## Real Time Astronomy




“Time Domain Astrophysics” – science limited by time constraints

## Faulkes Telescopes

- £10 million donation from the Dill Faulkes Educational Trust
- £1 million PPARC
- £600K DfES

**Why?**

- Inspirational projects in maths, science and ICT
- Address falling interest in these areas



**Exciting! Inspiring! Educational!**

# Las Cumbres Observatory

Funding FTP Sept. 05 – July 09

Additional core networks:

Education - 5 clusters of 0.4m (x 2)

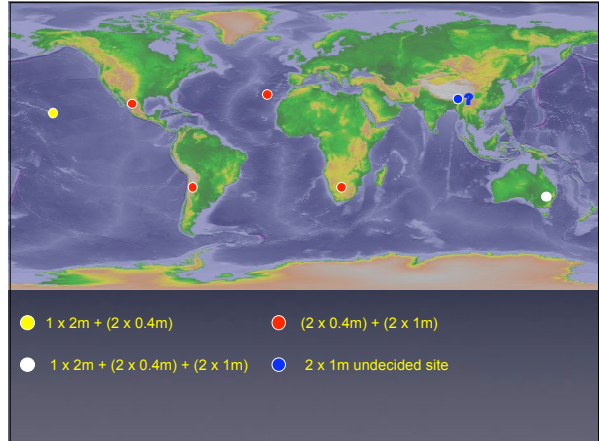
Research - 5 clusters of 1.0m (x 2)

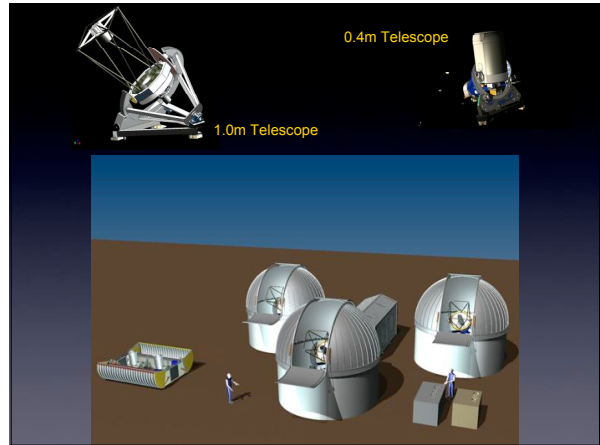
~\$100 million programme

Eventually – free access globally



Wayne Rosing





**UK Education**

**FT/LCO Initiatives:**

- Projects and Activities
- Twinning schools
- Themed Observing Days
- Teacher Training
- Online Training
- Down to Earth

Impact Calculator

[www.down2earth.eu](http://www.down2earth.eu)

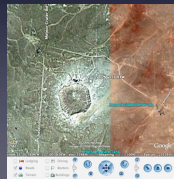
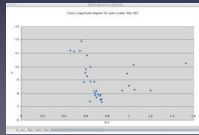
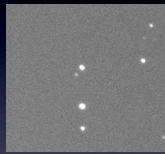
**In schools:**

- After-school Astronomy clubs
- GCSE Astronomy groups
- School workshops - Arts/Science week



## Projects and Activities

- Measuring impact craters in Google Earth/Mars
- Earth and Beyond
- Light and Optics
- Asteroids
- Ancient Cosmic Explosions
- Astronomical Imaging
- Galaxies
- Open star clusters
- Supernovae
- Themed Observing

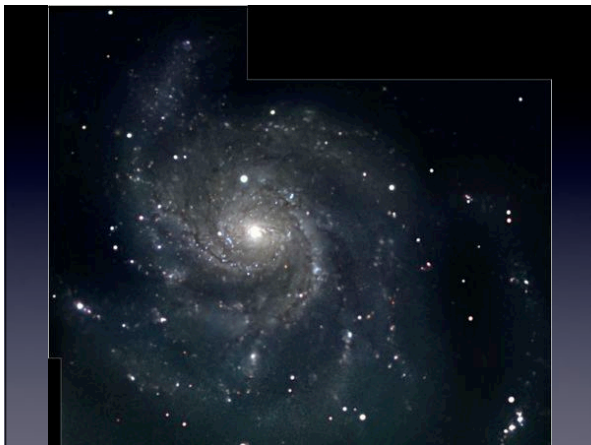


## Themed Observing Days

Collaborative projects for a number of schools through the day

Projects include:

- Mosaic of M101
- Lifecycle of Stars poster
- Asteroid Rotation



## Lifecycle of Stars

- 10 schools (UK and Poland) - specific objects to observe showing stars at different stages
- Schools process their own images, and/or have their images on final poster



### The Life Cycle of Stars

The infographic illustrates the stages of a star's life:
 

- Star Formation:** A cloud of gas and dust collapses under gravity to form a protostar.
- Main Sequence:** The star spends most of its life here, fusing hydrogen into helium in its core.
- Red Giant:** As hydrogen is depleted, the star expands and cools.
- Planetary Nebula:** The outer layers of the star are ejected, leaving a hot core.
- White Dwarf:** The final remnant of the star, which slowly cools over billions of years.

## Asteroid Rotation

- 10 schools from UK & Hawaii observed 2 asteroids in one night
- Magnitude of asteroids measured with Astrometrica and light curves produced

The graph shows the light curve of asteroid (216) Kleopatra. The x-axis represents Julian Date (JD) from 2453000 to 2453020. The y-axis represents R-band magnitude (R-Mag) from 17.00 to 17.50. The data points show a clear periodic variation in brightness, characteristic of a rotating irregularly shaped body.

## Superfast Rotators - First Success

The graph displays the light curve for asteroid 2008 GP3. The x-axis is Phase (0.0 to 1.0) and the y-axis is H Magnitude (25.3 to 25.9). Data points are shown for observations on April 12 (blue circles) and April 11 (red circles). The rotation period is 11.78 minutes and the amplitude is 0.3 mag.

from images by:  
 Paulet High School, Lord Wilson School, TU-Darmstadt, R. Miles and G. Fallace (BAA-ARPS)

## Fastest Rotating Asteroid Ever!

- FTS observations by British amateur astronomer
- Superfast rotator - 42.7s
- Mass approx. 5000 tonnes, 15-20m across
- Part of new collaborative project to survey properties of small NEAs

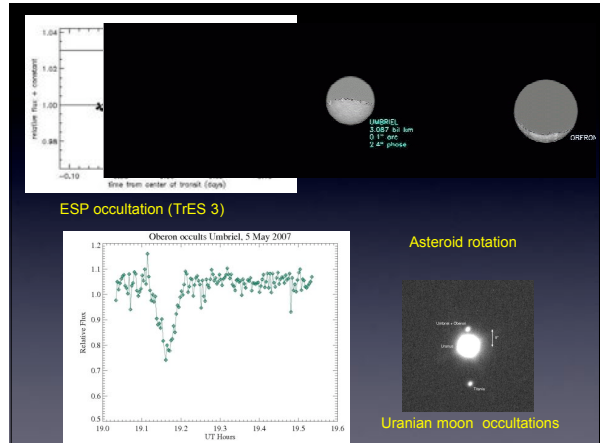
The graph shows the composite lightcurve for asteroid 2008 HJ. The x-axis is Phase (0.0 to 1.0) and the y-axis is V Magnitude (35.0 to 37.0). The rotation period is 42.7 seconds. The data points are from observations on April 28 and April 29.



## Future Asteroid Projects

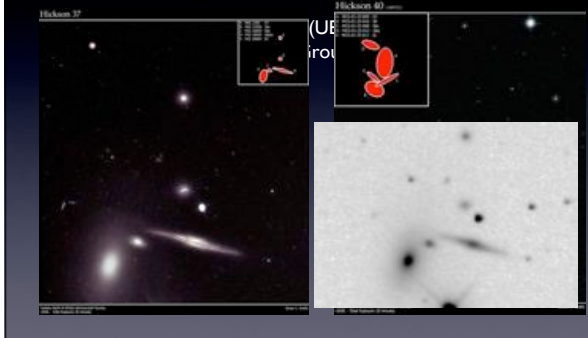
In collaboration with the British Astronomical Association:

- Astrometry
- Photometry - fast rotating NEOs
- Parallax measurements of NEOs
- Opposition brightening effect of asteroids - smaller LCO telescopes
- Colour determination of asteroids
- Comet light curves
- Binary asteroid lightcurves



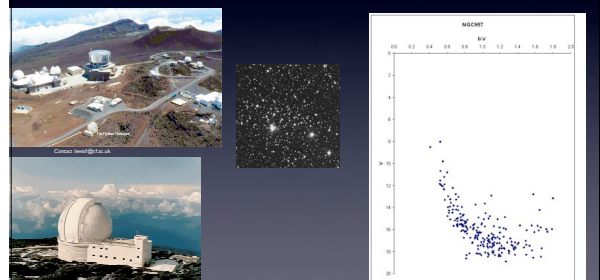
## Hickson Compact Groups

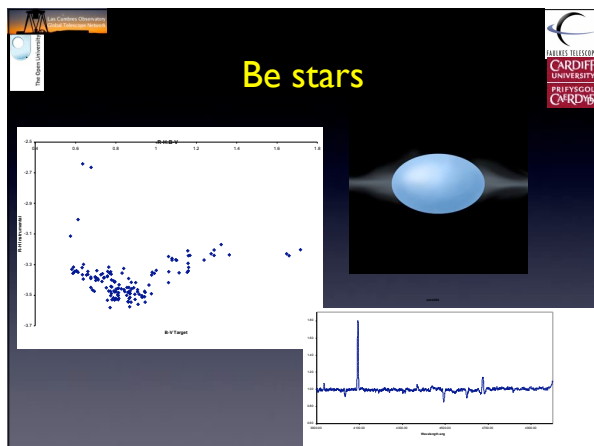
In collaboration with Bristol Astronomical Society



## Observing Open Clusters with the Faulkes Telescope and the William Herschel Telescope

Fraser Lewis<sup>1,2,3</sup>, Vanessa Stroud<sup>1,2,3</sup>, Sadie Jones<sup>4</sup>,  
Paul Roche<sup>1,2,3</sup>, Ignacio Negueruela<sup>5</sup>





## International Education

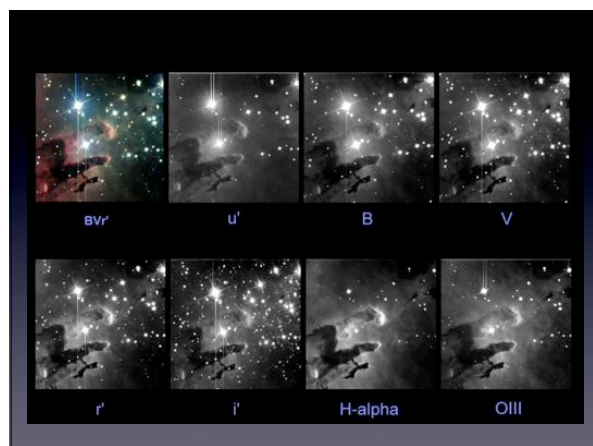
- Poland
- Russia
- Portugal
- USA
- Australia
- France
- Holland
- Germany
- Italy
- Spain
- China
- India
- Slovakia

The screenshot shows the 'Portal of Excellence' website interface, which includes a grid of photos of students in various educational settings and a list of international partners under the heading 'New Partners'.

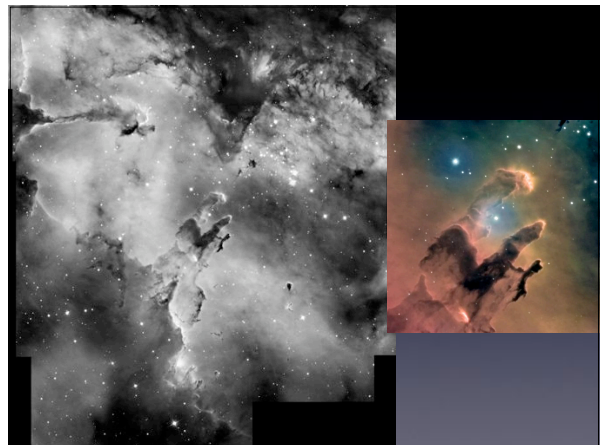
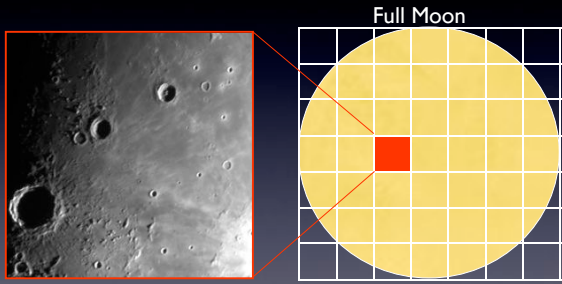
## The Filters

- Filter set - UBVRI
- H alpha filter
- O III narrow band filter
- Neutral density

The photograph shows a camera filter wheel with several filters installed, including a yellow filter, a blue filter, a green filter, a red filter, and a clear/neutral density filter.



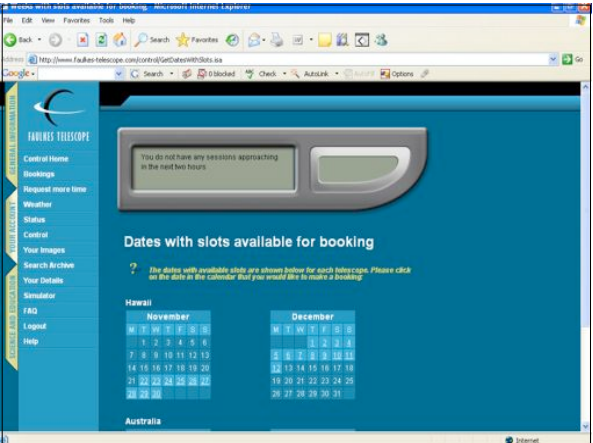
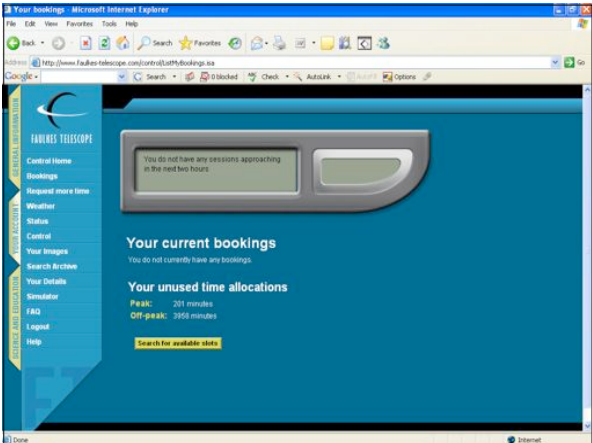
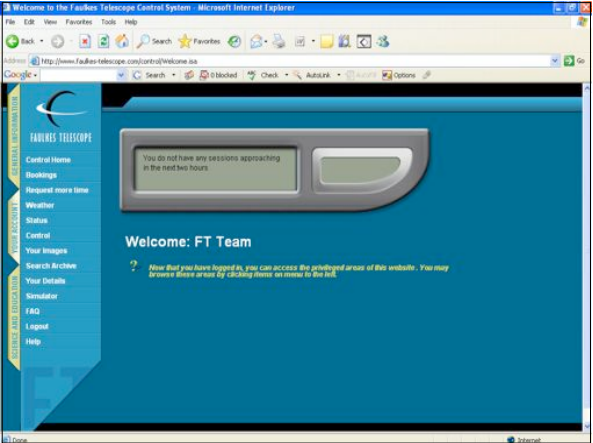
Field of view = 4.6 arcmins

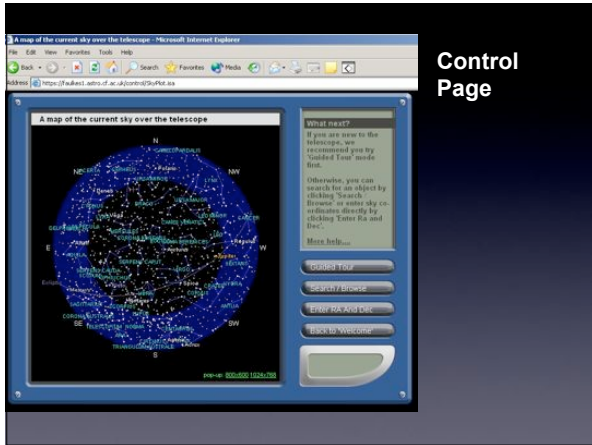




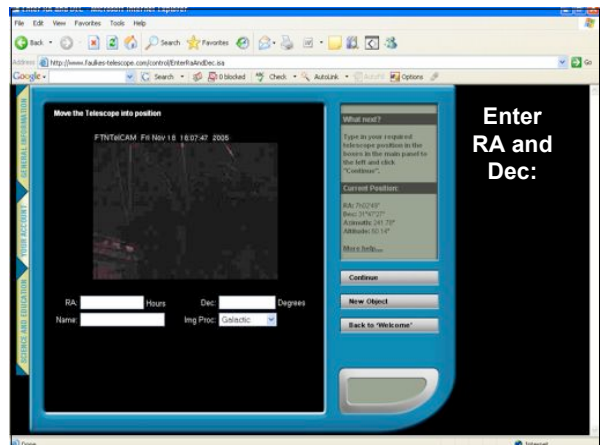
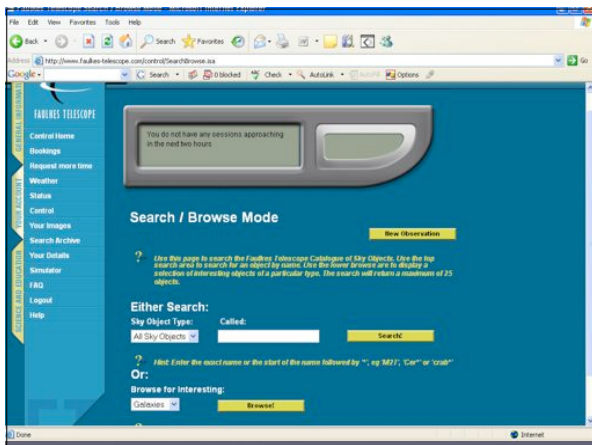
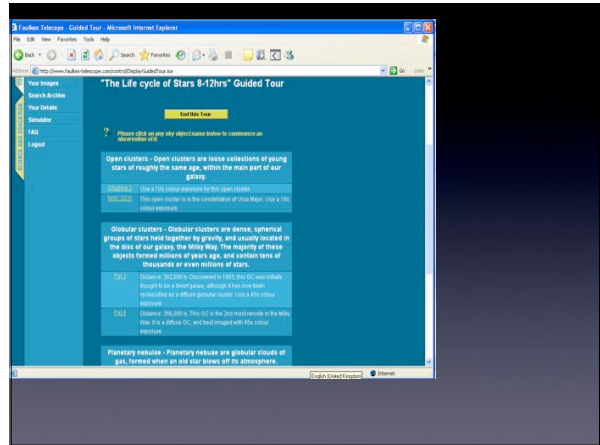
How are the telescopes accessed?

- Over the internet...

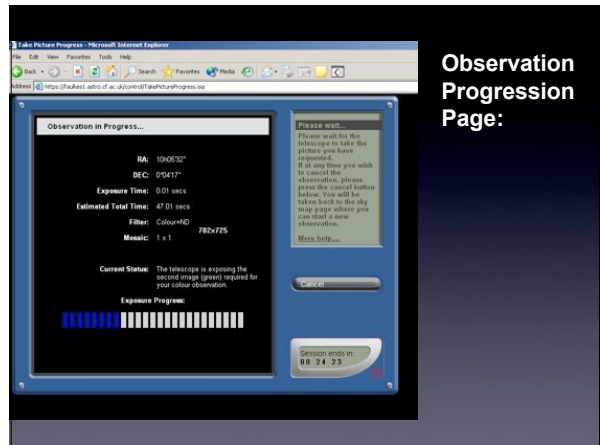
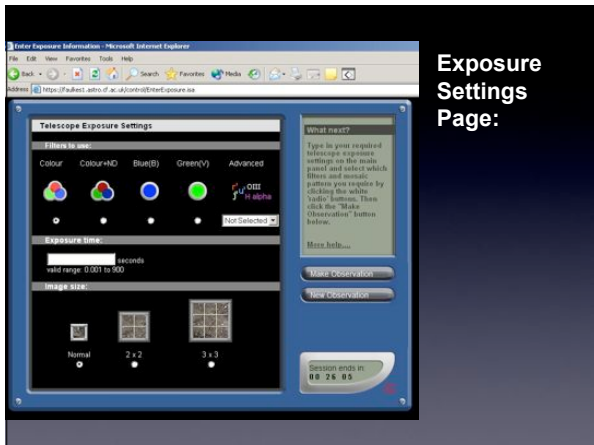
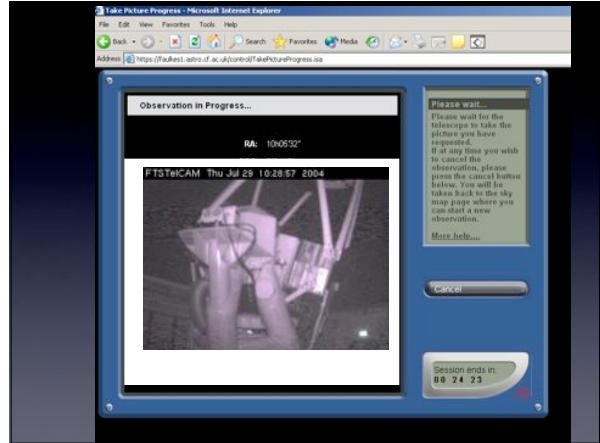
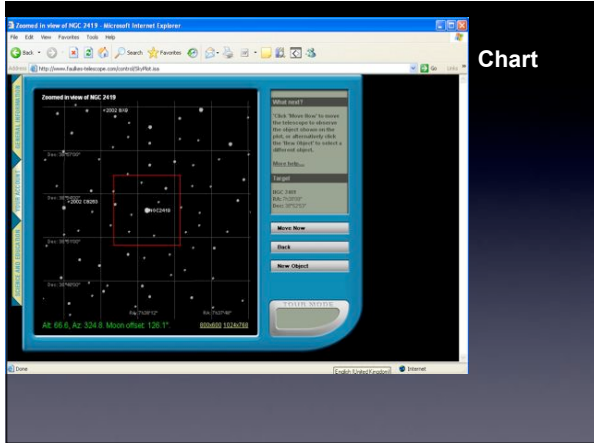


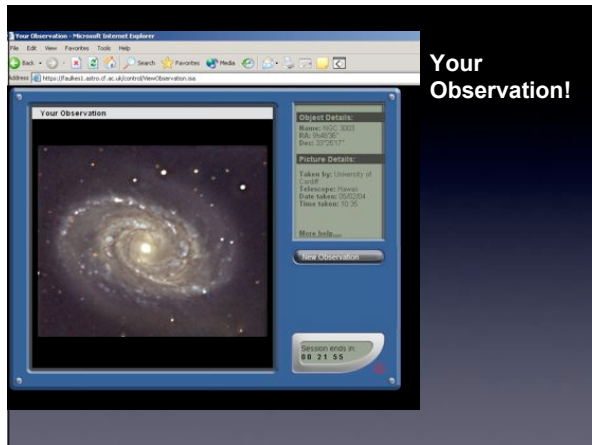


Control Page



Enter RA and Dec:

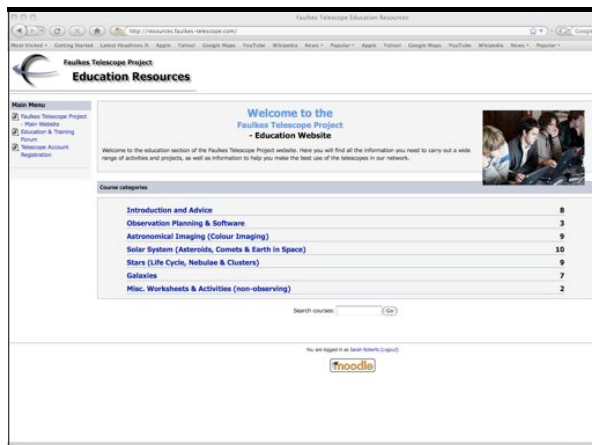




Your Observation!

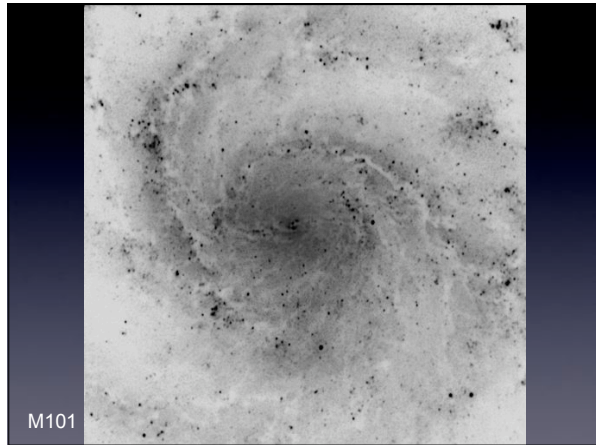
## Online Training and Resources

- Courses currently online:
  - Introductory Courses
  - Themed Observing Programmes
  - Astronomical Imaging
  - Asteroids
  - Variable Stars
  - Lifecycle of Stars
  - Science Learning Centre Courses









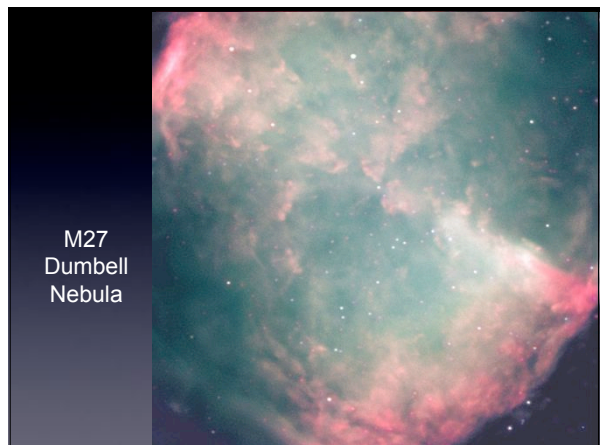
M101



M101



M57  
Ring  
Nebula



M27  
Dumbbell  
Nebula

