Education with Gaia and the Faulkes Telescopes

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Faulkes Telescope Project
National Schools’ Observatory
Liverpool John Moores University
The Open University
Robotic telescopes allow us to obtain images from (several) distant good quality sites

Only 3 * 2-metre ‘scopes that do this for education
Faulkes Telescope Design
2-metre ‘scopes 10’ x 10’ FOV
1-metre ‘scopes 26’ x 26’ FOV

Pipeline-processed FITS
20 filters (including Bessel BVR, SDSS ugri, H$\alpha$, H$\beta$, O III)

All controlled from one interface
Opportunity to set up timed observations and cadences
The Interface

Add a target

Target name: (e.g. "M82" or "Eagle Nebula")
GX339-4
Low Mass X-ray Binary according to Simbad

Sidereal:
Yes

Right Ascension: (e.g. "05:34:31.940")
17:02:49.360

Declination: (e.g. "+22:00:52.200")
-48:47:22.800

Telescope class: 2.0 meter Spectral

Wavelength filter: Bessell-V

Duration (seconds): (e.g. 30)
60

Exposures: (1 or more)
1

Binning: (1-2) Recommended is 2.
2

Target Of Opportunity (interrupts currently running observations)?

Add  Clear form  Cancel  Help

So simple, even a child teacher could use it
Add Cadence

To schedule repeated observations of the same target with a specific period of hours between frames, provide a start date/time, end date/time, period for the cadence (in hours), and a jitter (in hours). All times/dates are in Universal Time.

Cadence start:
2015-11-09 00:00:00

End:
2015-11-30 00:00:00

Period: (in fractional hours)
24

Jitter: (in fractional hours)
24
Las Cumbres Observatory Global Telescope

With 9 * 1-metre 'scopes
Exoplanet transits (6\textsuperscript{th} formers)

CoRot 2b: David Hardy & Thomas Ham (Cardiff schools), July 2012
Lightcurve of NSV 855 (delta Scuti, dwarf Cepheid) (u’grad project)
3 hour lightcurve of magnetic CV
Discovery of 21 minute period – perhaps the white dwarf’s spin? (u’grad project)
LMXB Monitoring to Date

~40 LMXBs (NS and BH donors) for up to 10 years

Weekly monitoring of ‘active’ systems (V, R, i’)

Less regular monitoring of truly quiescent systems (i’ band)

Collaborators
Dave Russell, Federico Bernadini, Karri Koljonen (NYUAD)
Rob Fender (Oxford)
Paul Roche (FT, Cardiff)
Phil Charles (Southampton)

http://www.faulkes-telescope.com/XRB
V 404 Cyg optical precursor

Bernadini, Russell (New York Uni Abu Dhabi)
A nearby and ‘easy-to measure’ black hole!

Black Holes In My School (BHIMS, Rosa Doran, NUCLIO, GTTP)
More (Gaia) Specific Results

Some suggested by Morgan Fraser

Following up ASASSN SNe targets

15ng
15ov
15oz
15rw
15rx
15sf
ASASSN-15oz (~250 images in 4 filters over 7 ‘scopes on 5 sites)
15oz dataset being analysed by schools

Photometry
(using Windows-based, free software and Excel)

See Sophie’s and Anna’s talks for discussion of resources, opportunities and curriculum links

e.g. astronomy clubs, extended projects

collaboration between schools

spectroscopy (using FLOYDS on 2-m)
Developing online IBSE (Inquiry Based Science Education) resources for EU-funded Go-Lab project alongside partners including ESA, CERN.
“Down 2 Earth” project – impacts, comets, asteroids and meteorites

Multi-disciplinary and inquiry-based
Thanks for listening
Please come find me or e-mail me your ideas

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http://faulkes-telescope.com
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http://education.down2earth.eu
http://www.golabz.eu/
http://schoolsobservatory.org.uk/
http://astrocymru.org.uk/
4 Types of Behaviour
Low-mass X-ray Binaries (LMXBs)

Donor main sequence or dwarf star

Accretion by Roche lobe overflow

System’s luminosity dominated by disc

Long-lived ($\sim 10^7 – 10^9$ years)

Usually found in globular clusters and Galactic bulge