Using Real Data in Education

Fraser Lewis

Faulkes Telescope Project

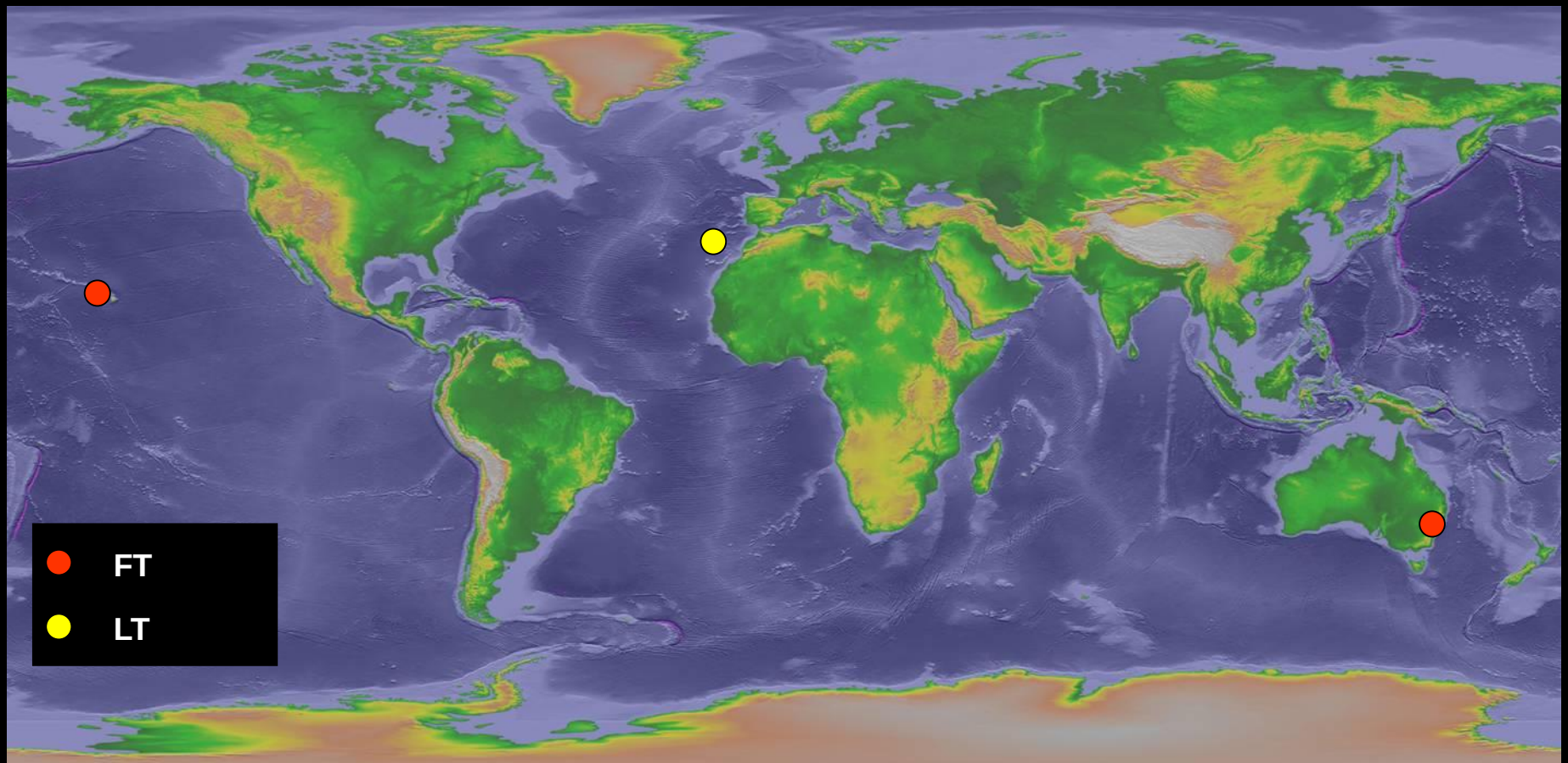
National Schools' Observatory

Liverpool John Moores University

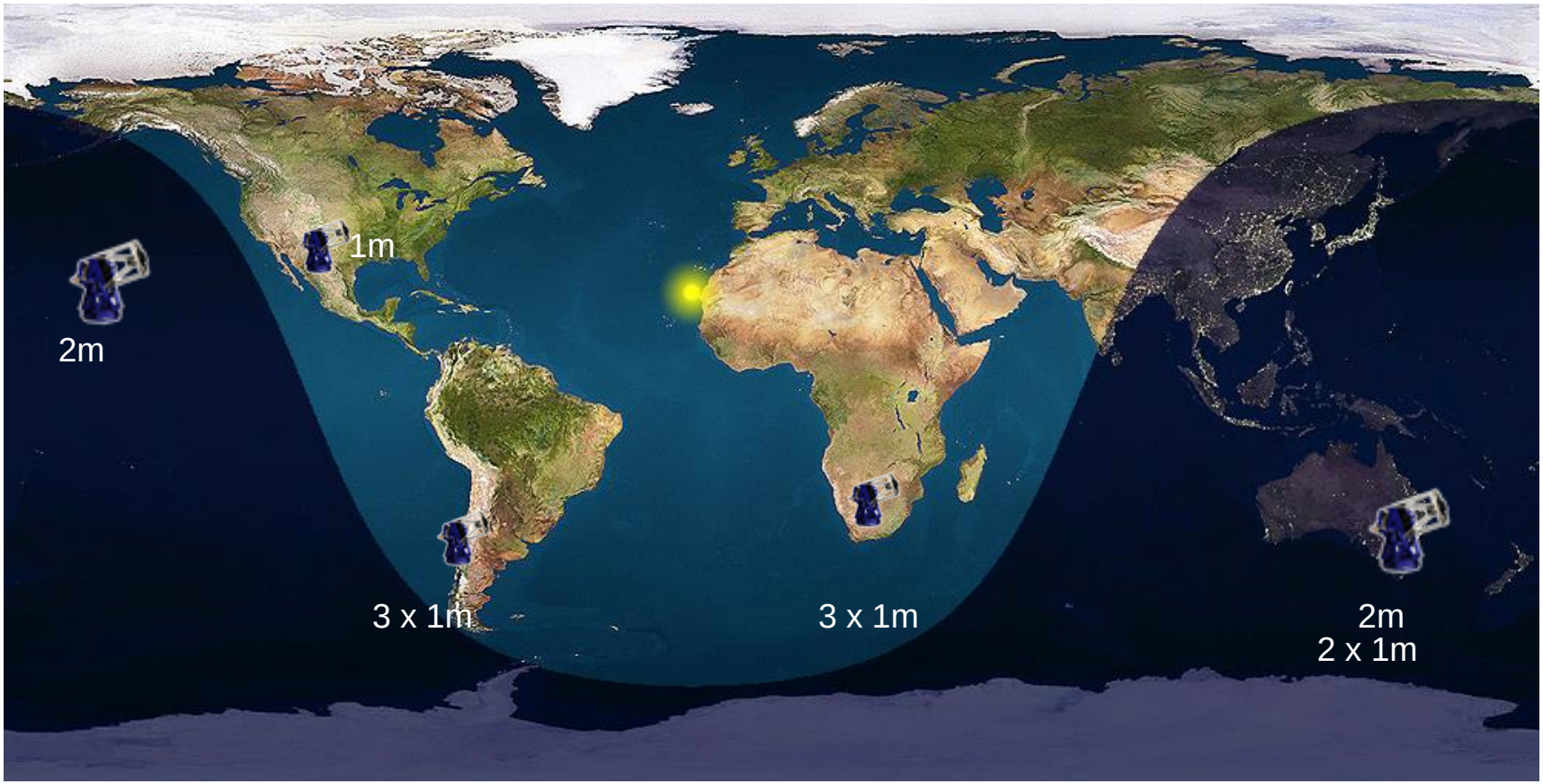
The Open University

Robotic telescopes allow us to obtain images from (several) distant good quality sites

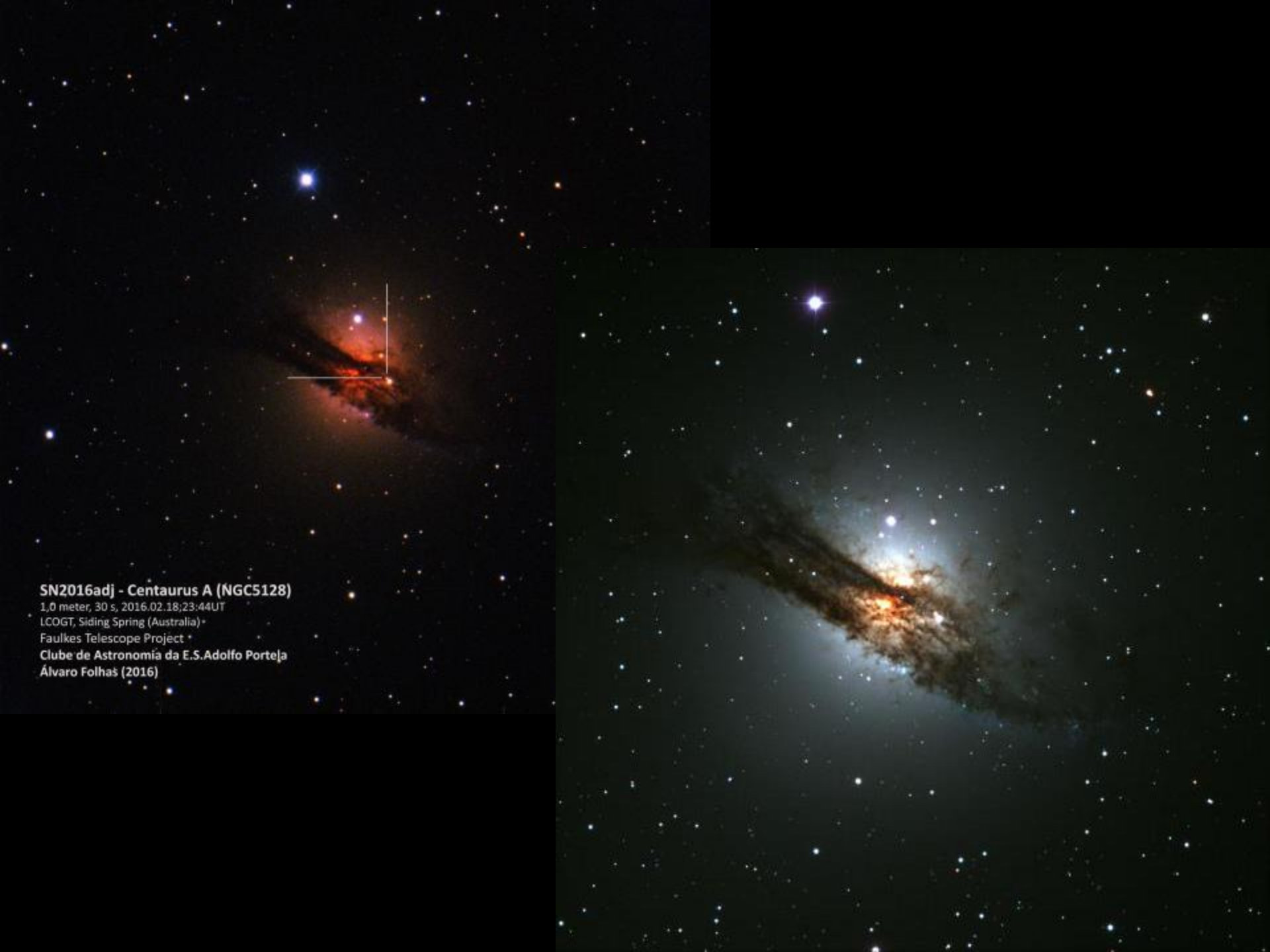
Only 3 * 2-metre telescopes that do this for education



Also 9 * 1-metre telescopes (5 more soon; wider FOV)



Las Cumbres Observatory


SN2016adj - Centaurus A (NGC5128)
1,0 meter, 30 s, 2016.02.18;23:44UT
LCOGT, Siding Spring (Australia)
Faulkes Telescope Project
Clube de Astronomia da E.S.Adolfo Portela
Álvaro Folhas (2016)

Spotting a Supernova

Background Material

Gaia Science Alerts

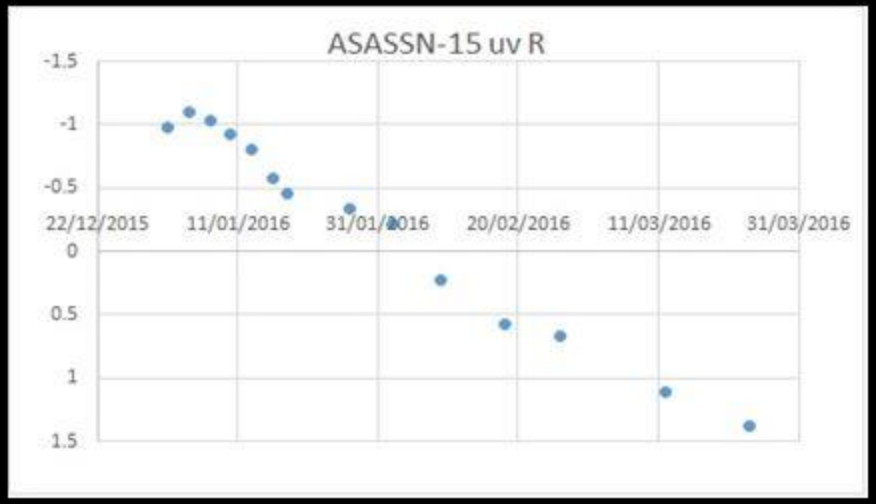
The detection of transient astronomical objects in real-time

Not all stars emit light with a constant brightness and radiation output, many of them **change in brightness very suddenly** and often unexpectedly, over a variety of timescales. We call these objects **transients**.

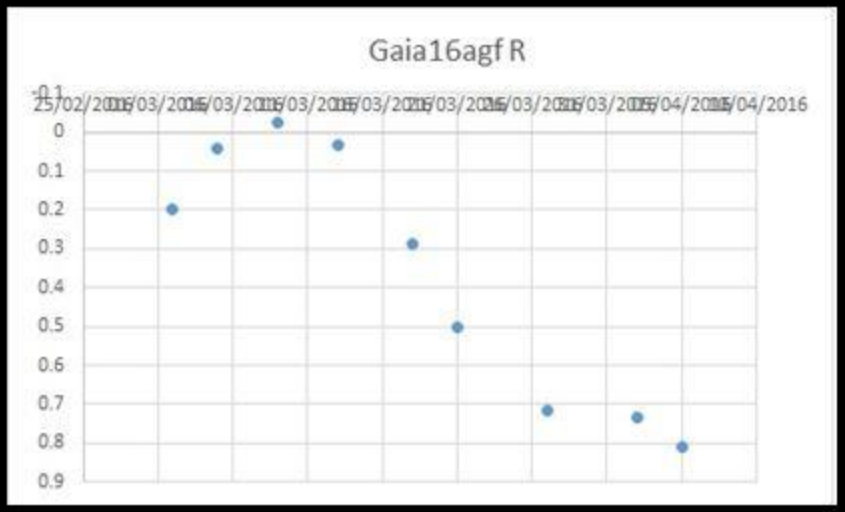
Every day, the Gaia team announces several **science alerts** which indicate new discoveries of transient objects. The discoveries themselves are made in Cambridge University at the data processing centre at the Institute of Astronomy. Here, they lead the UK's involvement within the Gaia Data Processing and Analysis Consortium (DPAC).

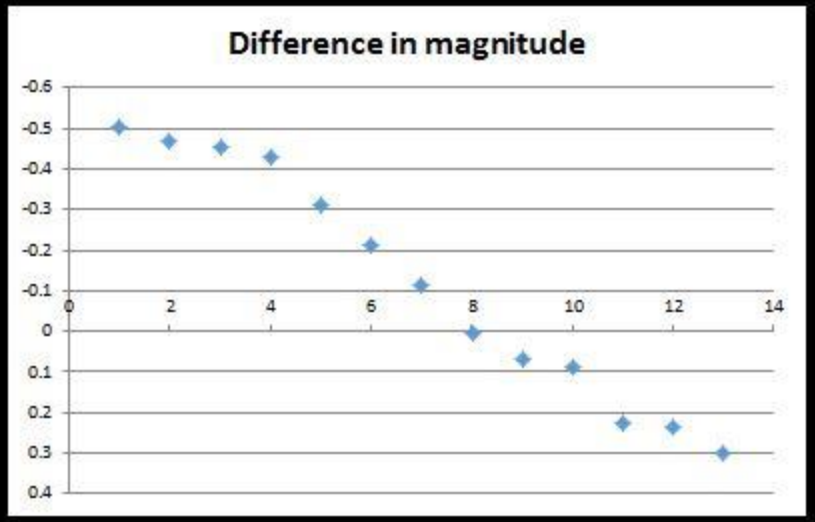
As most transients – and indeed stars – that Gaia sees are so far away from us and appear so faint, we are unable to see them with the naked eye alone. Gaia is mapping one billion stars, whereas fewer than ten thousand stars are bright enough to be seen with just the naked eye – and most of those only with very dark sky conditions!) However, these objects can be seen from the ground by harnessing the power of **robotic telescopes** such as the Faulkes Telescopes. Gaia's science alerts (GSA) provide accessible data that **schools** and amateurs can use to make their own follow-up observations to confirm these transient objects and gather more information about their **properties and characteristics.**

http://resources.faulkes-telescope.com/course/view.php?id=144


ASASSN-15 uv R
-1.5
-1
-0.5
0
0.5
1
1.5
22/12/2015
11/01/2016
31/01/2016
20/02/2016
11/03/2016
31/03/2016

SN 2016P Red - Light Curve
11/01/2016
21/01/2016
31/01/2016
10/02/2016
20/02/2016
01/03/2016
11/03/2016
21/03/2016
0
0.5
1
1.5
2
2.5
3


Gaia16agf R
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9


Difference in magnitude
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0
2
4
6
8
10
12
14

The Expansion and Age of the Universe

Using type Ia supernovae to calculate the expansion and age of our Universe

We can use type Ia supernovae to help us determine how quickly our Universe is expanding and also, how old it is! This activity involves combining you own data with other scientific data to calculate these values.

If you have completed the Spotting a Supernova activity, you can use your results to **contribute to the data** in this activity.

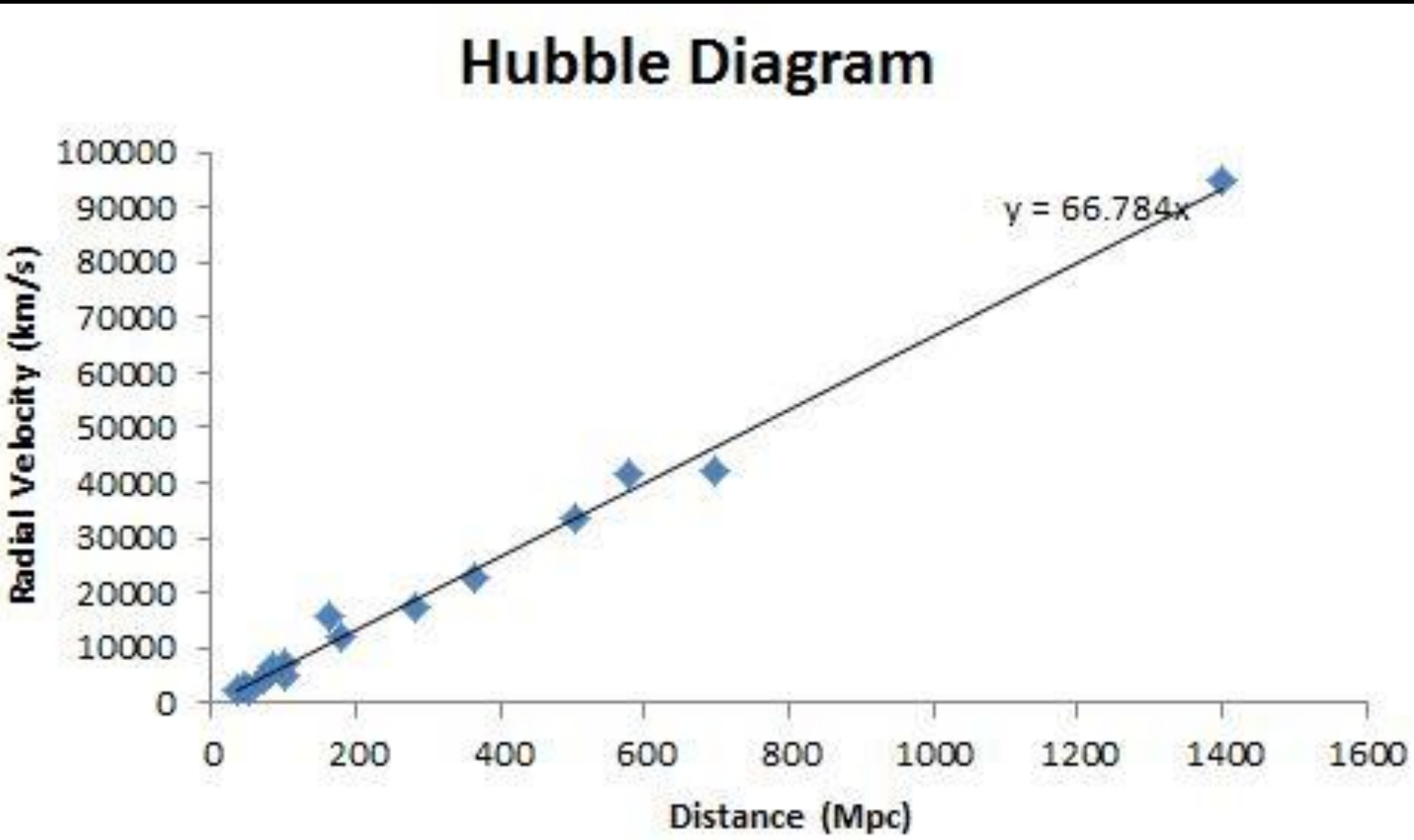
If you haven't, you can still complete this activity with the data provided.

Measuring Peak Magnitudes of Type Ia Supernovae

Now that you are familiar with carrying out photometry, let's take a look at some data from some other type Ia supernova targets.

Step 1: First of all, you will need a table to record your results in. Use the space below to design a table that you can use to record the parameters listed below. When you are happy with it, copy it

http://resources.faulkes-telescope.com/course/view.php?id=144


Hubble Diagram
y = 66.784x
Radial Velocity (km/s)
Distance (Mpc)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
0
200
400
600
800
1000
1200
1400
1600

Ideal Target Checklist

Supernova (Type Ia)

Bright

Recent

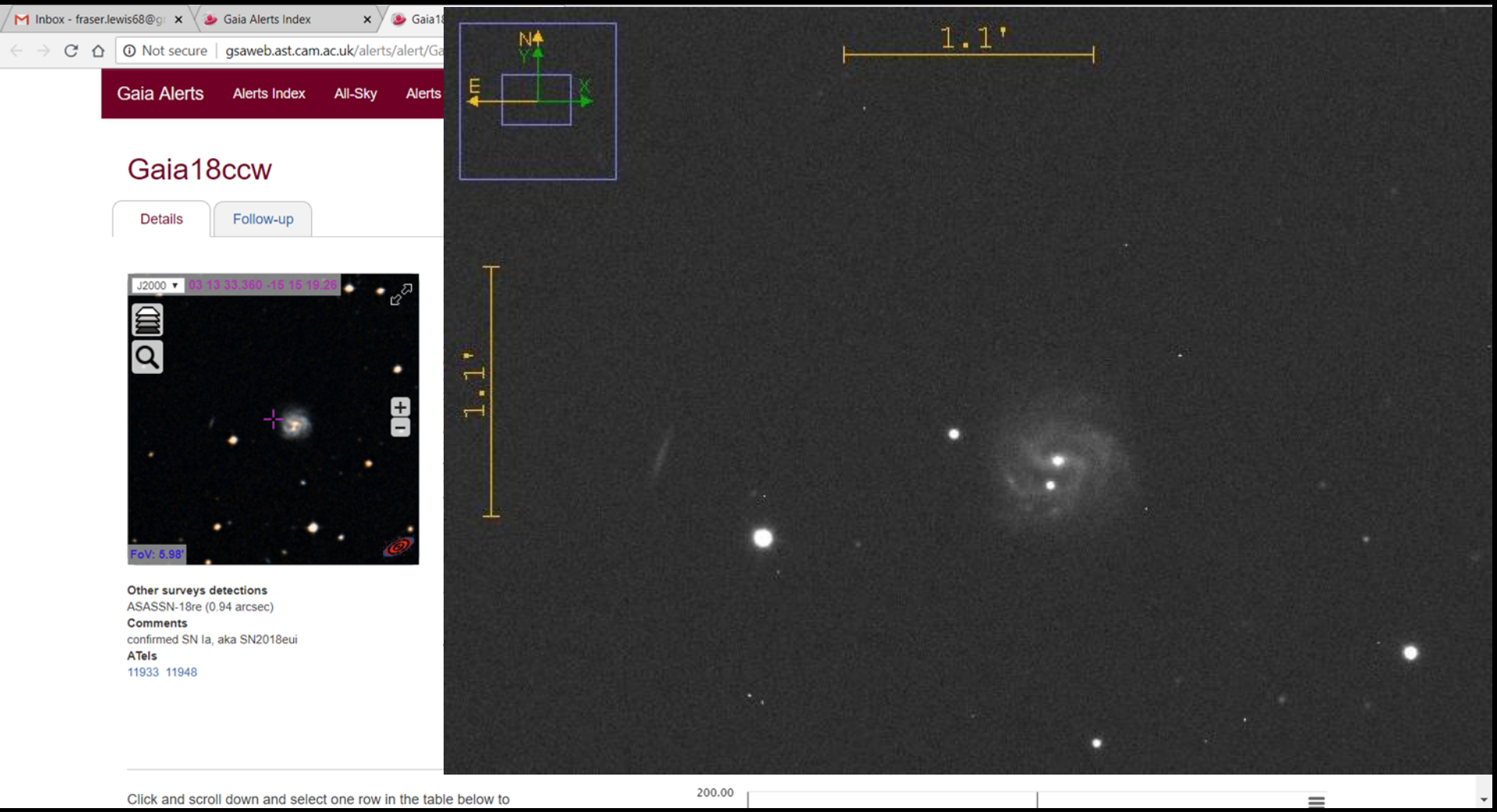
Visible (for next few weeks)

In spiral galaxy

Easy to photometrise

Can we make (some of) this a coding challenge and use Python to create a list from the Gaia Alerts .csv ?

Gaia18ccw (selected at GHOU by educators)



Targets

Gaia18cvx (bright Type Ic SN)

Gaia18crw (bright Type Ia SN)

Gaia18cjk (with Pawel, Lukasz; bright microlens)

Gaia16aye (obviously)

Gaia16agf (nice training dataset)

AT2018gep, SN2018cow, SN2018bsz, Gaia18beg (with Rupak Roy)

New in 2018

The return of real-time observing

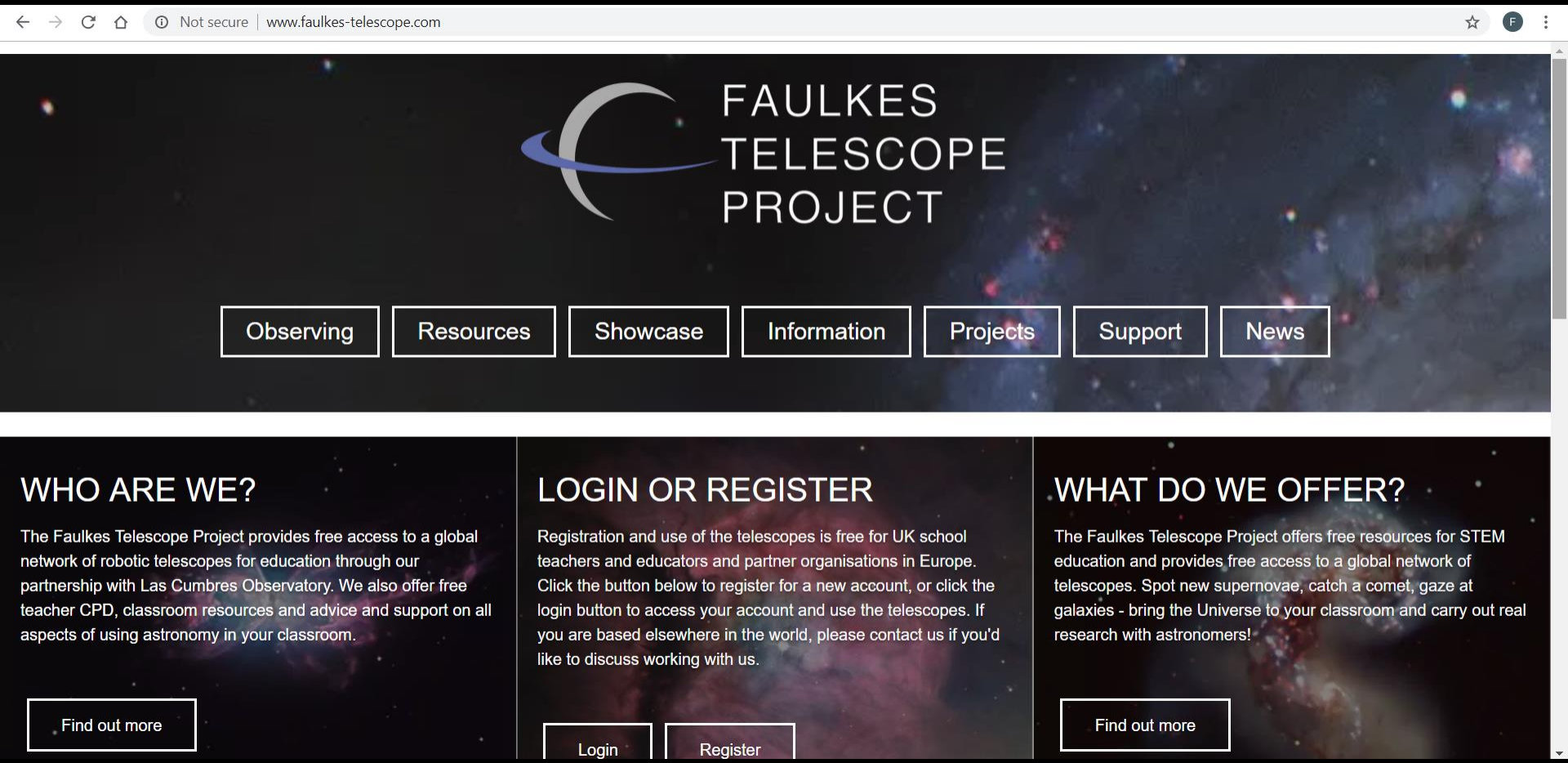
USP for 2-metre telescope

Schools get exclusive control of telescopes for 30 minute blocks

NRES (Network of Robotic Echelle Spectrographs)

High resolution (R ~ 50,000) spectrographs on 1-metre telescopes

New (since yesterday !)



14 Years of Monitoring ~40 Low-Mass quiescent X-ray Binaries (LMXBs) working with Dave Russell (New York University Abu Dhabi)

Donor main sequence or dwarf star

Accretion by Roche lobe overflow

System's luminosity dominated by disc

Long-lived (~10^7 – 10^9 years)

Usually found in globular clusters and Galactic bulge

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TWO BRIGHT MINI-OUTBURSTS END THE 12−YEAR LONG ACTIVITY OF THE BLACK HOLE CANDIDATE SWIFT J1753.5−0127

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Draft version August 1, 2018

Gaia18asi (aka MAXI J1820+070)

[Previous | Next | ADS]

A bright mid-infrared excess in MAXI J1820+070

ATel #11533; *David M. Russell, M. Cristina Baglio (NYU Abu Dhabi), Joe Bright, Rob Fender (Univ. Oxford), Thabet Al Qaissieh, Alejandro Palado, Aldrin Gabuya (Al Sadeem Observatory, Abu Dhabi), Daniel Asmus (ESO, Santiago & Univ. Southampton), Tomaso Belloni (INAF-OAB), Marion Cadolle Bel (MPCDF), Piergiorgio Casella (INAF-OAR), Chiara Ceccobello (Chalmers Univ. of Technology, Sweden), Stephane Corbel (DAP-AIM, CEA, Paris Diderot Univ.), Maria Diaz Trigo (ESO, Garching), Elena Gallo (Univ. Michigan), Poshak Gandhi (University of Southampton), Jeroen Homan (Eureka Scientific), Karri Koljonen (FINCA, Univ. Turku), Fraser Lewis (Faulkes Telescope Project & Astrophysics Research Institute, LJMU), Sera Markoff (Univ. Amsterdam), James C. A. Miller-Jones (ICRAR-Curtin Univ.), Kieran O'Brien (Durham Univ.), Thomas D. Russell (Univ. Amsterdam), Payaswini Saikia (NYU Abu Dhabi), Gregory Sivakoff (Univ. Alberta), Tariq Shahbaz (IAC & ULL), Roberto Soria (NAOC, Chinese Academy of Sciences & ICRAR-Curtin Univ.), Alex Tetarenko (Univ. Alberta), Mario van den Ancker (ESO, Garching)*

on ***12 Apr 2018; 20:57 UT***

Credential Certification: David M. Russell (dave.russell5@gmail.com)

Subjects: Radio, Far-Infra-Red, Infra-Red, Optical, X-ray, Binary, Black Hole, Transient

Referred to by ATel #: 11539, 11540, 11723

Tweet Recommend 0

MAXI J1820+070 (ASASSN-18ey) is a black hole candidate X-ray binary (e.g. ATel #11399, #11418, #11420). It is currently in a bright, hard spectral state (ATel #11423, #11427, #11439). Here, we report photometric mid-IR (5-12 μm) observations of the source with the VLT Imager and Spectrometer for the mid-InfraRed (VISIR; Lagage et al. 2004, The Messenger, 117, 12) mounted on UT3 of ESO's Very Large Telescope. The observations were made on 2018 April 8 (07:21-08:08 UTC) and April 9 (08:54-09:41 UTC) in clear conditions (MJD 58216-7). We also report on contemporaneous radio and optical data. MAXI J1820+070 is clearly detected (S/N > 200) in all four mid-IR filters. The following preliminary observed flux densities (F_ν) were calculated using observations of standard stars taken on the same nights:

Related

12068 MAXI J1820+070 continuing its rapid evolution toward the hard state

12064 Swift observes MAXI J1820+070 in transition from the soft to the hard-intermediate state

12061 AMI radio detection of the black hole candidate MAXI J1820+070 during the soft to hard transition.

12057 MAXI/GSC detection of a rapid increase in the hard X-ray flux of MAXI J1820+070

11951 Detection of a 55 Hz high-frequency QPO in MAXI J1820+070 with NICER

11936 Optical timing observations of MAXI J1820+070 with IFI+IQUEYE and AQUEYE+ soon after state transition

11899 Short-lived episodes of emission line splitting in the candidate black hole X-ray binary MAXI 1820+070

11887 LOFAR observations of MAXI J1820+070 (ASASSN-18ey) during its recent state transition

11855 Polarimetric monitoring of the MAXI J1820+070 in optical and near-infrared wavelengths

11833 Declining near-infrared flux from the black-hole candidate MAXI J1820+070 (ASASSN-18ey) in transition

11831 (Sub)-millimetre Observations of MAXI J1820+070 (ASASSN-18ey) Suggest Jet Quenching on July 6

11827 AMI-LA 15.5 GHz observations of radio flaring from the black hole candidate MAXI J1820+070 in transition

11824 Other low-frequency optical QPO-like features in MAXI

Ad closed by Google

Emirati astronomer collaborates with NYUAD on black holes research

Thabet Al Qaissieh built an observatory as a hobby and is now working with one of the most prestigious universities in the world

John Dennehy

June 18, 2018

Updated: June 18, 2018 04:34 PM

202 shares

Emirati astronomer Thabet Al Qaissieh built Al Sadeem Observatory at his family's farm in Al Wathba. Antonie Robertson / The National

EDITOR'S PICKS

MENA

Breaking the Silence about Israel's occupation of Hebron

MENA

WATCH: Where is Saudi journalist Jamal Khashoggi?

OTHER SPORT

What Next

Providing training datasets and instructions on selecting suitable targets

Providing instructions on observing and reducing data (Python ?)

Uploading data on behalf of schools (but with their hashtag)

And doing all of this via Windows (e.g. Excel, AstroImageJ) FREE software

PLEASE HELP ! If you have teachers or schools that you believe would be interested, please let me know ?!

Please come find me or
e-mail me your ideas

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