LIVERPOOL JOHN MOORES UNIVERSITY

UK Research and Innovation

UKRI Future Leaders Fellowships

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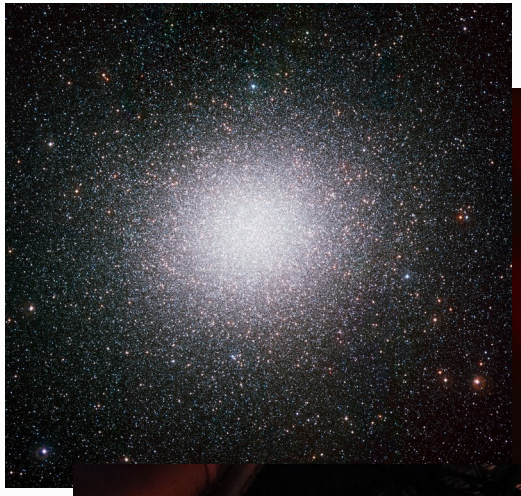
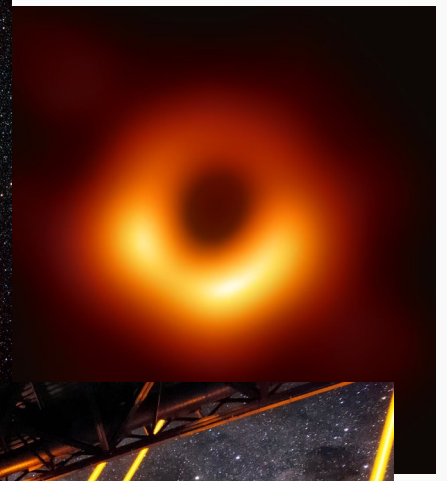
Outline

- The fellowship scheme
- My own fellowship
- The application process

About me

- Astrophysicist
- PhD in 2013
- moved to Liverpool in 2017
- postdoc at ARI until 2020
- awarded FLF in 2020
- main research interests
  - star clusters
  - black holes
  - integral-field spectroscopy





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- combines 9 research bodies
  - 7 research councils
    - e.g., Science & Technology Facility Council – STFC
  - Innovate UK, Research England

Science and Technology Facilities Council

Future Leaders Fellowships

- UKRI’s flagship fellowship programme
- available across all research bodies/councils
  - interdisciplinary projects are encouraged
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- up to GBP 1.5M can be requested for:
  - long-term funding (4+3 years) for applicant
  - funds for hiring own staff (postdocs, technicians, ...)
  - travel money
  - funds for research equipment

Who can apply?

- From UKRI homepage
  - “early career researchers and innovators who are transitioning to or establishing independence”
  - “Applicants who have already achieved research/ innovation independence will therefore not be competitive.”
  - “Senior academics and innovators are not permitted to apply.”
- no hard constraints (e.g. max years out of PhD)
- need to demonstrate scientific excellence, leadership skills

Who can apply?

-
-
-

Size of the scheme

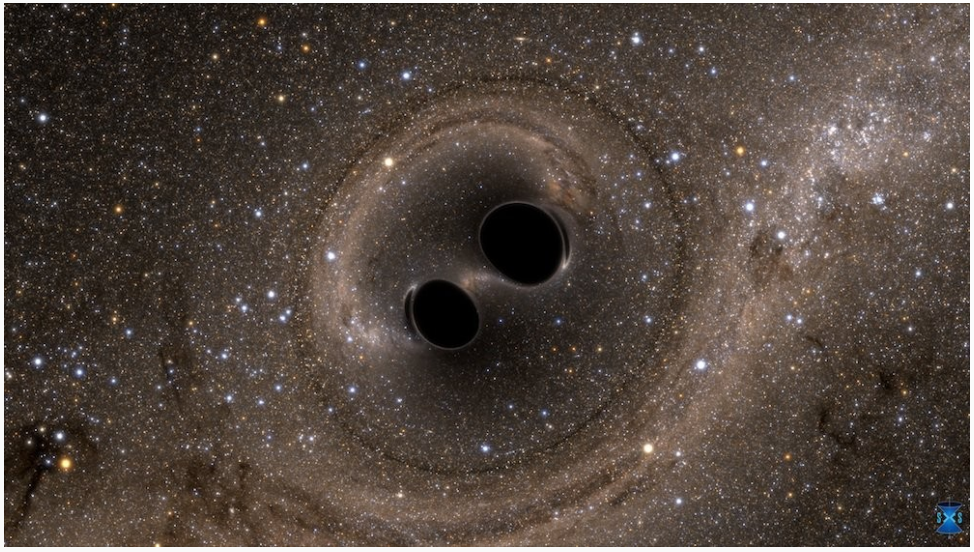
- 6 application rounds between 2018 and 2021
- Round 1-4 numbers:
  - Round 1: 41 FLFs awarded
  - Round 2: 78 FLFs awarded
  - Round 3: 88 FLFs awarded
  - Round 4: ~100 FLFs awarded
- Round 5: interviews happening this week
- Round 6: application deadline was Feb. 2021
  - total fund for Round 6: GBP 900M

My own fellowship

- “Star clusters as the nurseries of black holes”
  - started in Nov. 2020
  - UKRI funding for PI and 4-year postdoc
    - Note: only funds for first 4 years are specific in application
  - PhD student funded through LJMU/STFC
    - Note: asking for funds for PhD students not possible; duty of the host institution

Motivation

- 2015: First detection of gravitational waves from merging black holes
  - Nobel prize in physics 2017



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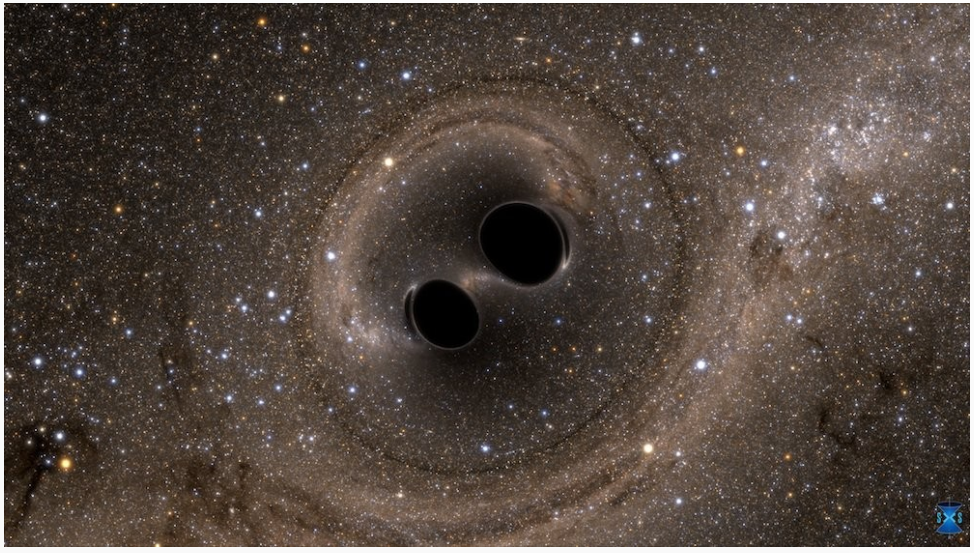
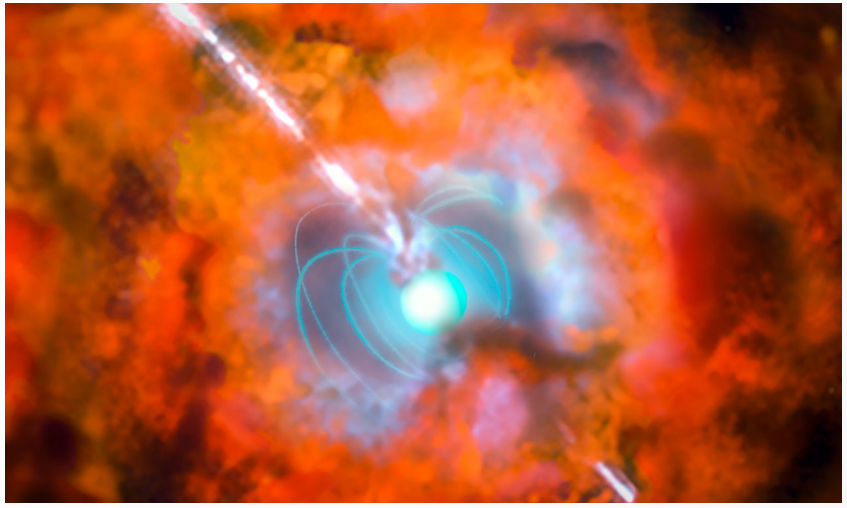


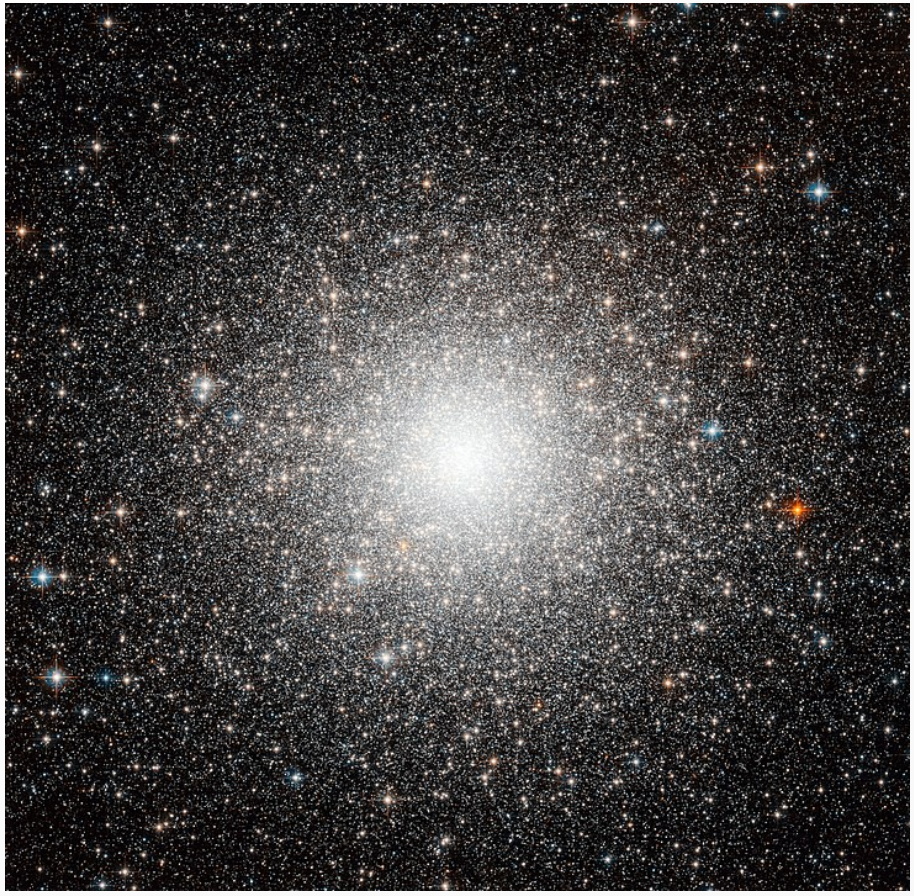


- We know black holes form when stars collapse
- But a merger takes two!
- Where do black holes find each other?

Star clusters

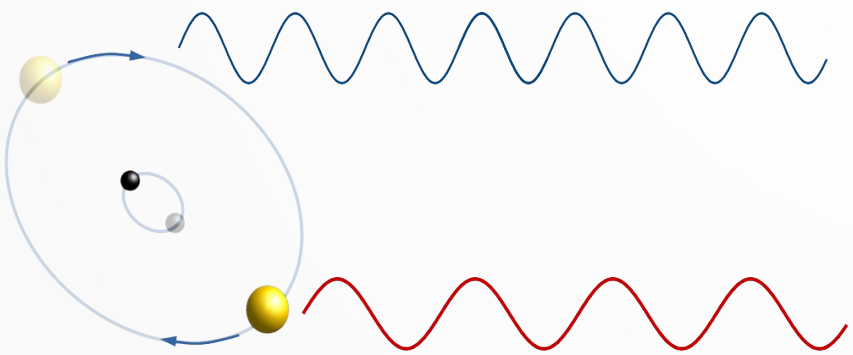
- densely packed
- gravitationally bound
- up to 10^7 stars

- mass segregation leads to BHs meeting in centres
- but sparse observational evidence for BHs



How to find something you don't see?

- Doppler spectroscopy



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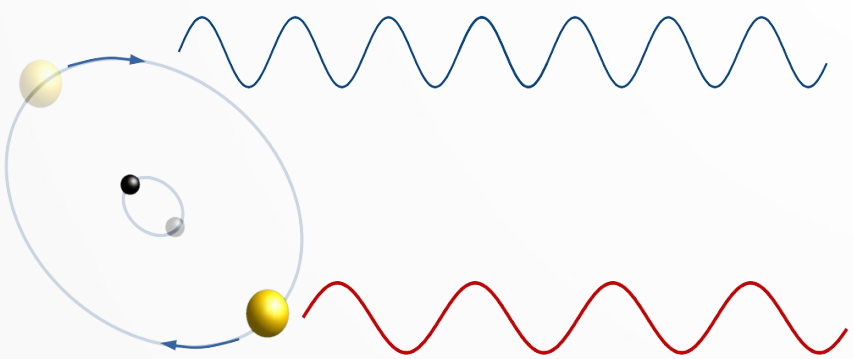

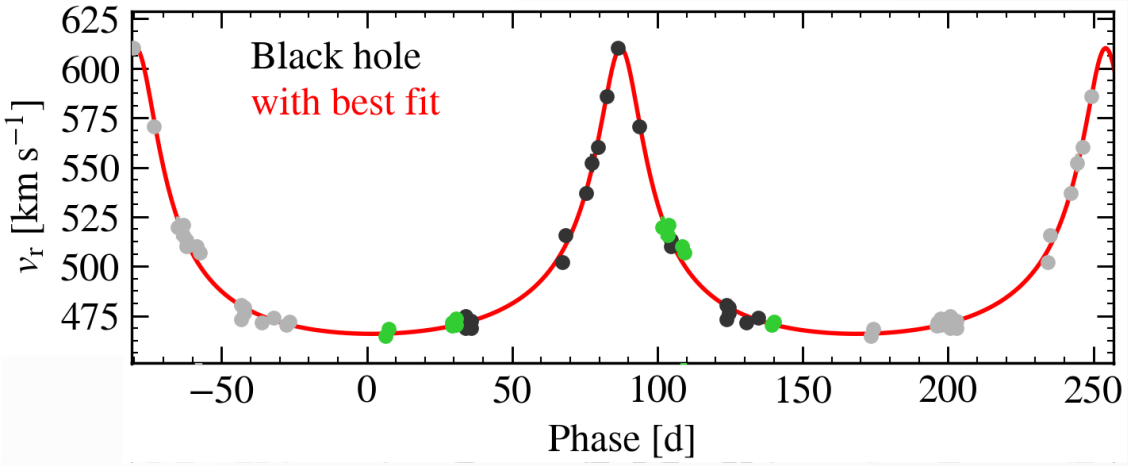

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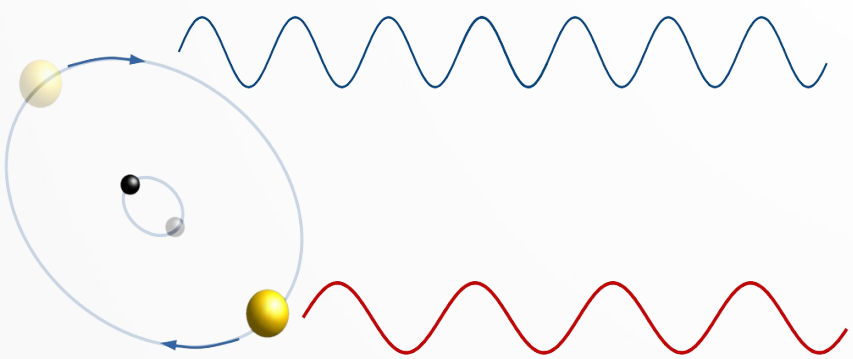

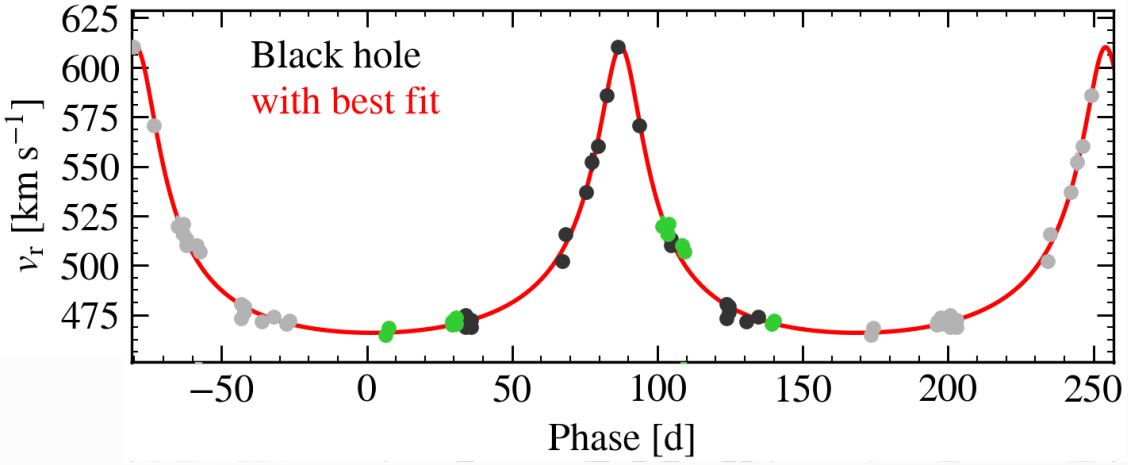

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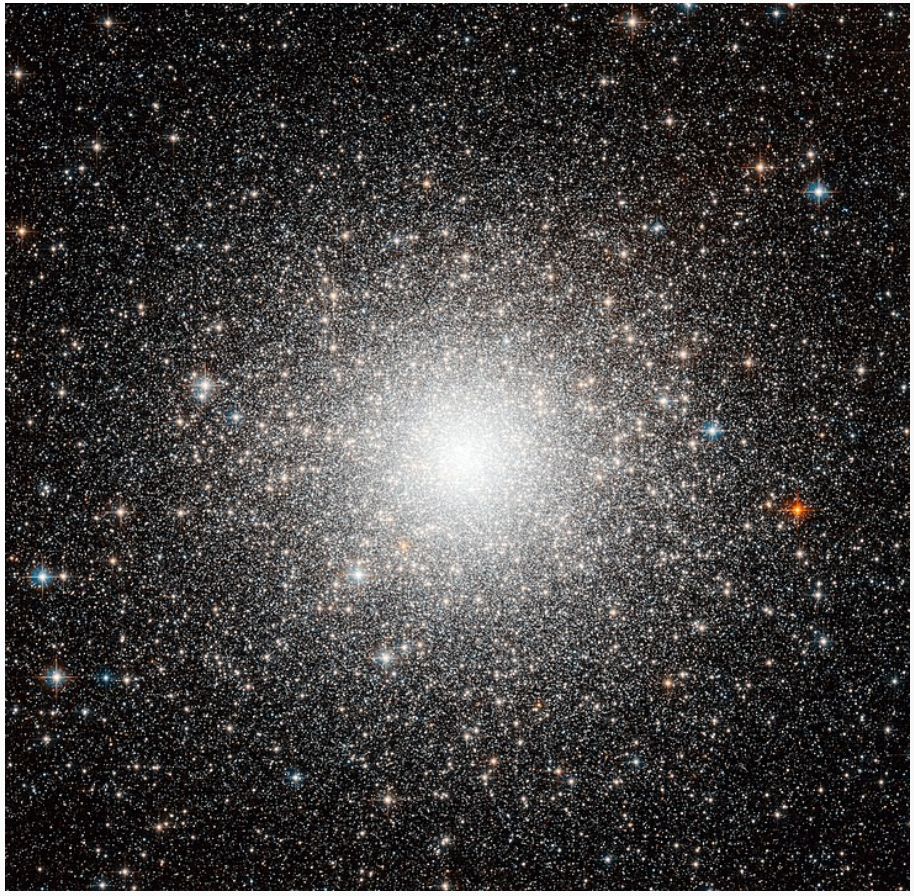
- First dynamical detection of a black hole
- work led by PhD student (Giesers et al. 2018,2019)

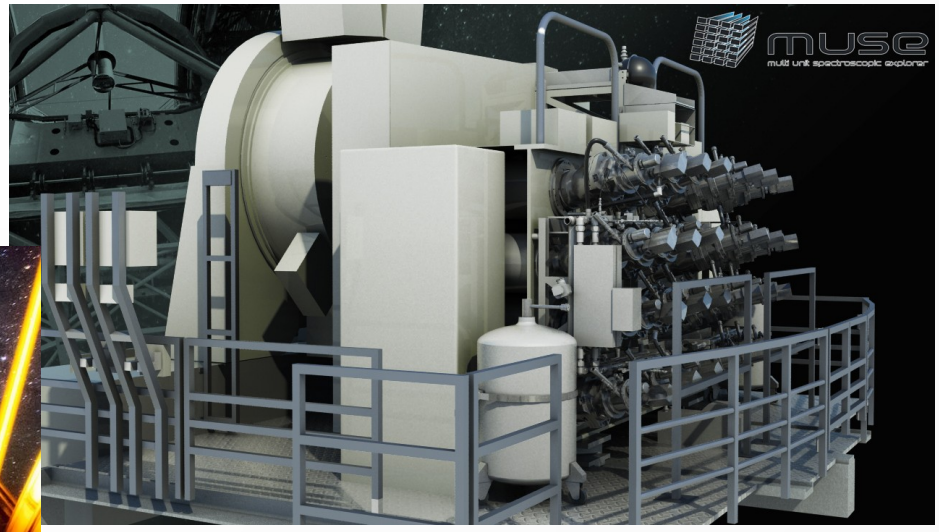
The needle in the haystack

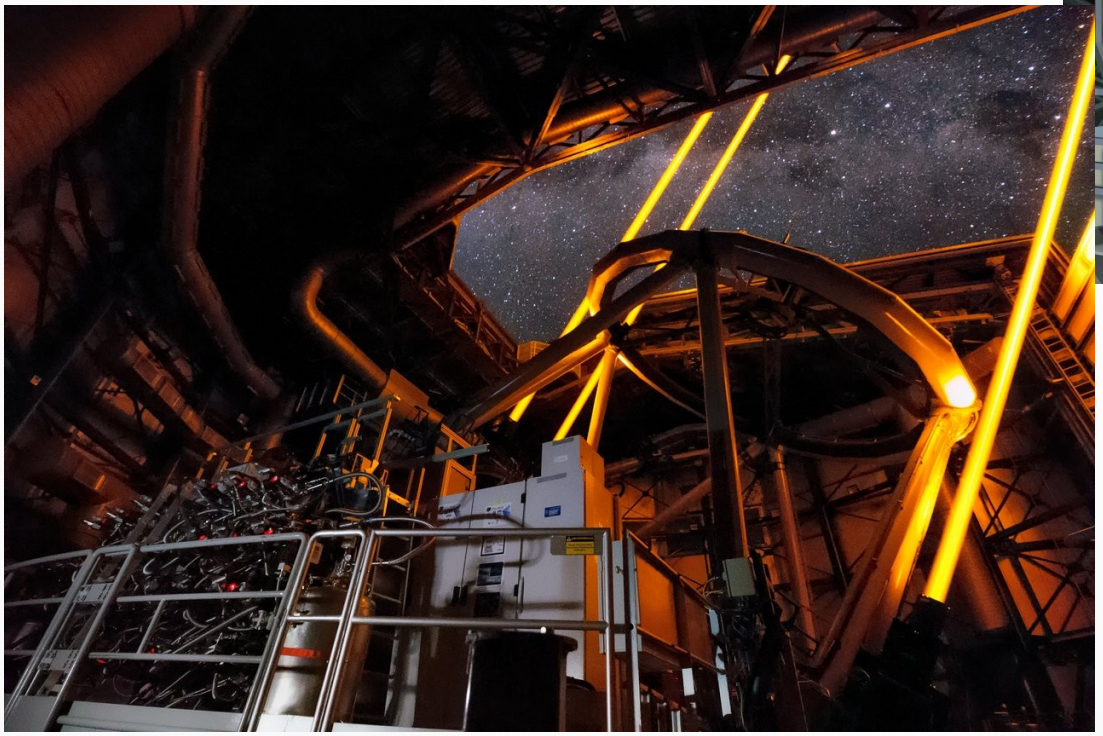
- prediction:
  - 10s-100s of black holes in a clusters
- but millions of stars to observe
- spectroscopy is time consuming
- need ground-breaking technology



Integral-field spectroscopy

- MUSE spectrograph





- proposed: ~ 2000
- first light: 2014

The power of MUSE

- each pixel is a spectrum
- velocities for 1000s of stars simultaneously

- Main part of my PhD
  - software development
  - code to extract star spectra from MUSE data

The MUSE cluster survey

- Guaranteed Time Observations (GTO)
  - granted in exchange for providing MUSE to community
  - 255 nights in total

- ~40 GTO nights dedicated to star clusters
- designed survey together with professor during my first postdoc
- became official principal investigator (PI) in 2018
  - crucial for FLF success (I think)

Added value

- “If we give you an FLF, what will you do with it that you couldn’t do during a postdoc?”

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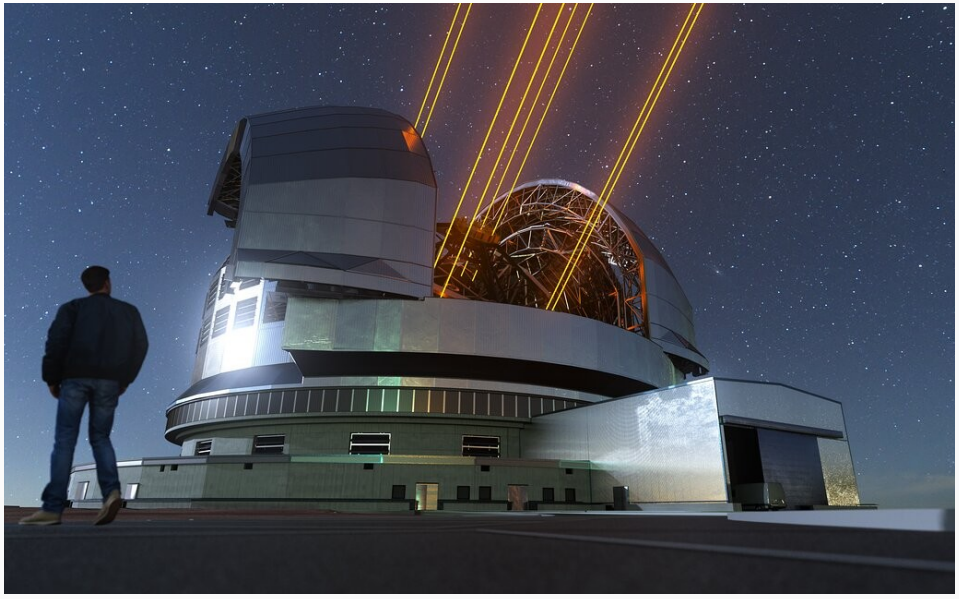
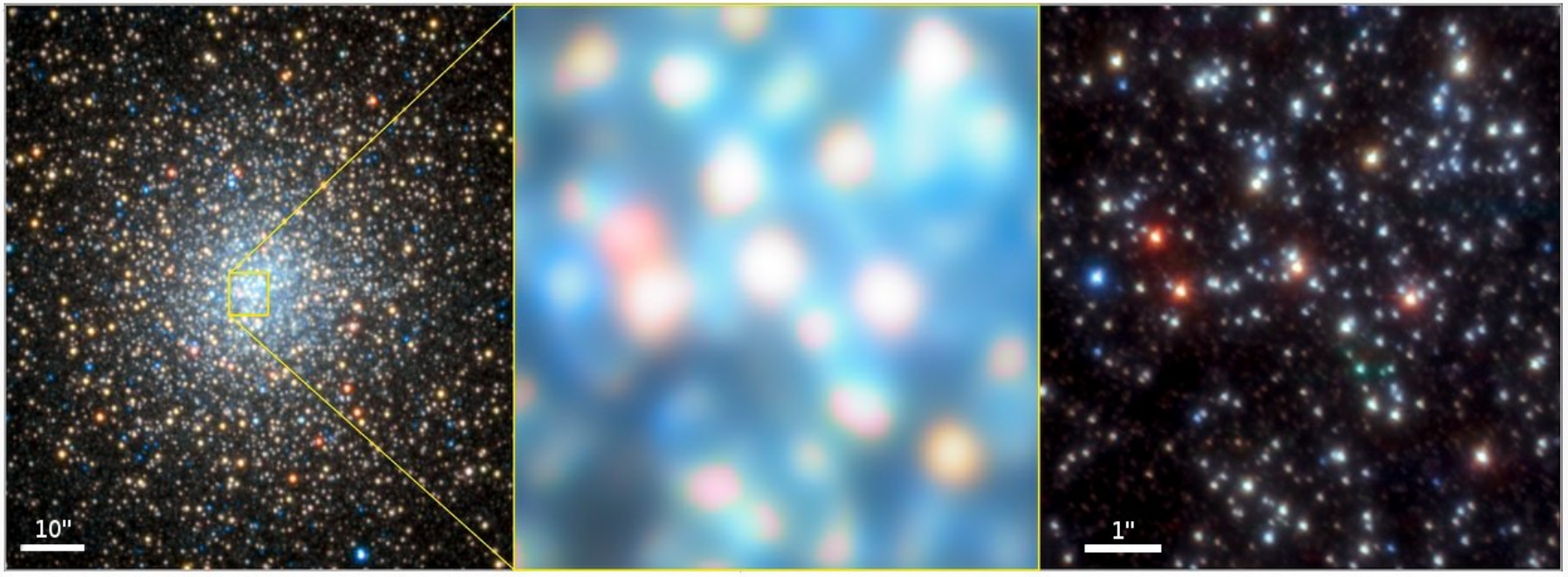
- “If we give you an FLF, what will you do with it that you couldn’t do during a postdoc?”
- Getting ready for the Extremely Large Telescope
  - world’s largest optical telescope
  - first light 2025
  - worth GBP ~1 billion
  - heavy UK involvement



Adaptive optics

- real-time correction for atmospheric turbulence
- used by MUSE



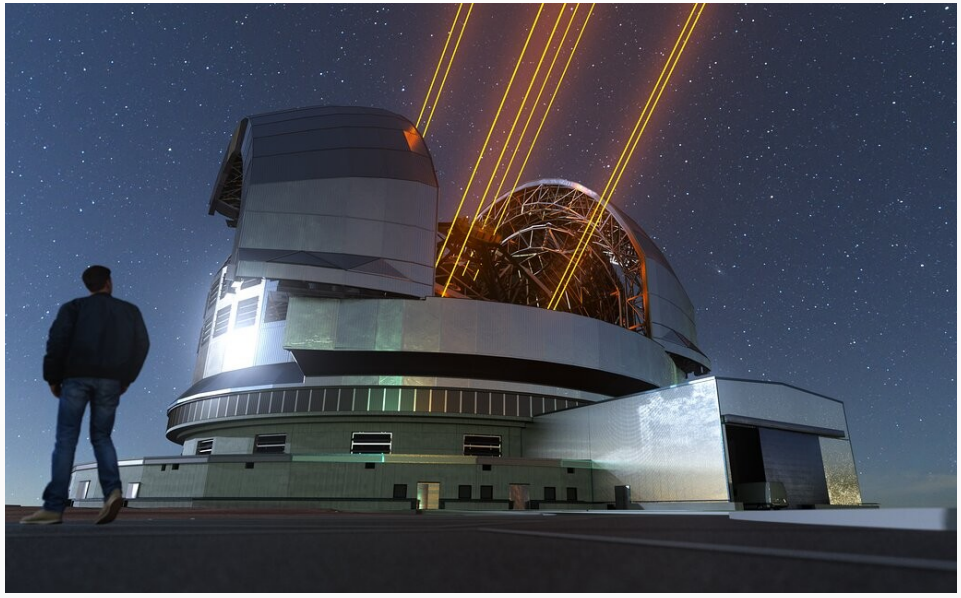
NGC 6388 observed with MUSE without adaptive optics

Zoom into cluster centre without adaptive optics

Zoom into cluster centre with adaptive optics

Adaptive optics for the ELT

- ELT will (almost) fully rely on adaptive optics
- crucial to have analysis software available when telescope sees first light
- software development requires long-term funding
- can use FLF for this
- benefit from first ELT data



The application process

- 1) Finding a host institution
  - all applications need to be approved/submitted by host institution
  - typically, universities have internal deadlines for applicants interested in applying through them
  - e.g. internal application at LJMU
    - person specification (500 words)
    - summary of research proposal (500 words)
    - list of publications

The application process II

- 2) Proposal submission
  - 2-stage process: outline proposal and full proposal
  - core of the application: **7-page research plan**
  - other parts include
    - pathways to impact
    - data management plan
    - justification for requested resources
  - important: named collaborators need to provide letters of support

The application process III

- 3) Response to reviewers
  - each proposal reviewed by 3 or 4 international experts in the field
    - score application on a scale from 1 (worst) to 6 (best)
  - reviews are sent to applicant
  - applicant has one week and 3 pages to respond
    - important to address every negative comment

The application process IV

- 4) Interview
  - 30 minutes sharp
  - 5-6 panel members, names communicated
  - interview starts with 5min. presentation
  - then, questions on 3 different aspects
    - the science case
    - career development
    - leadership potential

Resources:

https://www.ukri.org/our-work/developing-people-and-skills/future-leaders-fellowships/

https://www.ukri.org/opportunity/future-leaders-fellowships-round-6/

Questions?

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Thank you!