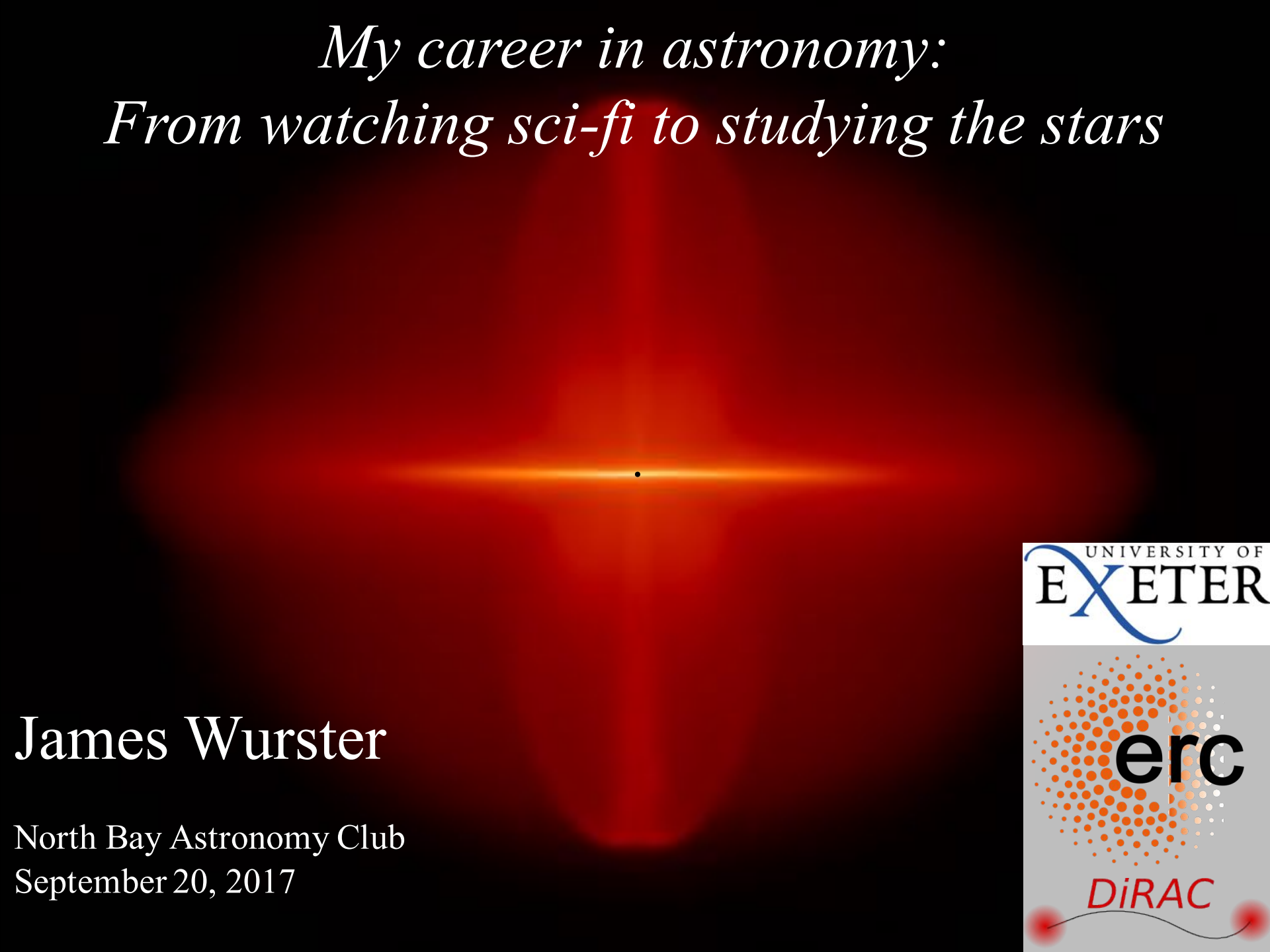
My career in astronomy: From watching sci-fi to studying the stars



James Wurster

North Bay Astronomy Club
September 20, 2017

UNIVERSITY OF EXETER

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DiRAC

How did I get interested in Astronomy

Education: What is required for a PhD?

- Undergraduate
  - Math, physics and astronomy
  - Mostly course-work
  - (Paid) summer research options
  - 4 years

- Graduate school
  - Masters
    - Course-work + original thesis
    - 2 years
  - PhD
    - Course-work + original thesis
    - 4 years

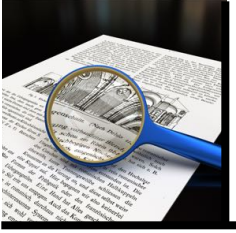
Education: What is after a PhD?

- Research Fellow/Post-Doc
  - 1 – 3 positions of 2 – 5 years
  - Research intensive
  - Teaching/supervising optional/recommended

- Lecturer, Professor
  - Permanent(ish) position
  - Research intensive
  - Teaching intensive
  - Administration intensive

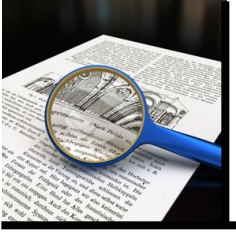
Link to amateur clubs

- University astronomy departments often collaborate with the local amateur astronomy clubs
  - Academics speak at amateur meetings
  - Amateurs bring telescopes to university events and staff them



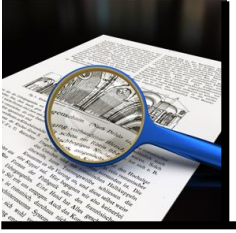
Presenting our work

- Form an idea



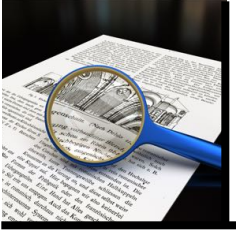
Presenting our work

- Form an idea 
- Perform the research  



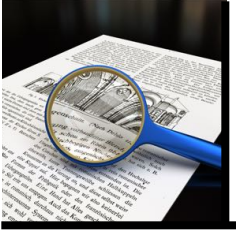
Presenting our work

- Form an idea 
- Perform the research  
- Write the results 



Presenting our work

- Form an idea 
- Perform the research  
- Write the results 
- Submit the paper to a peer-reviewed journal 



Presenting our work

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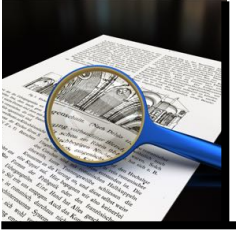
- Paper is reviewed by an anonymous referee 



Presenting our work

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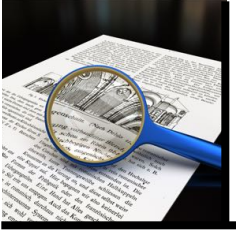
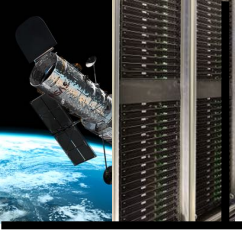
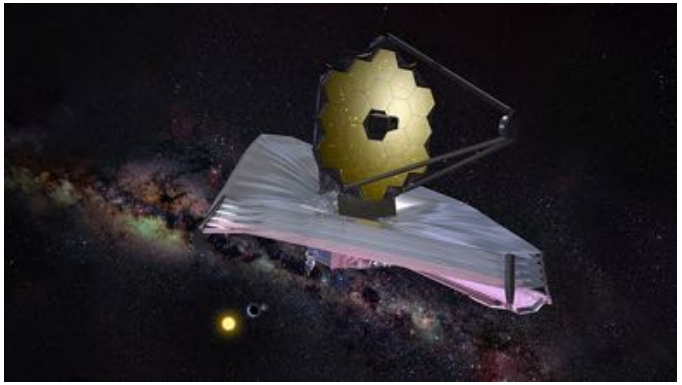


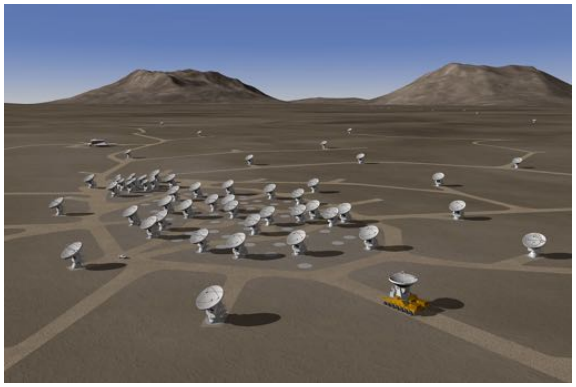
Presenting our work

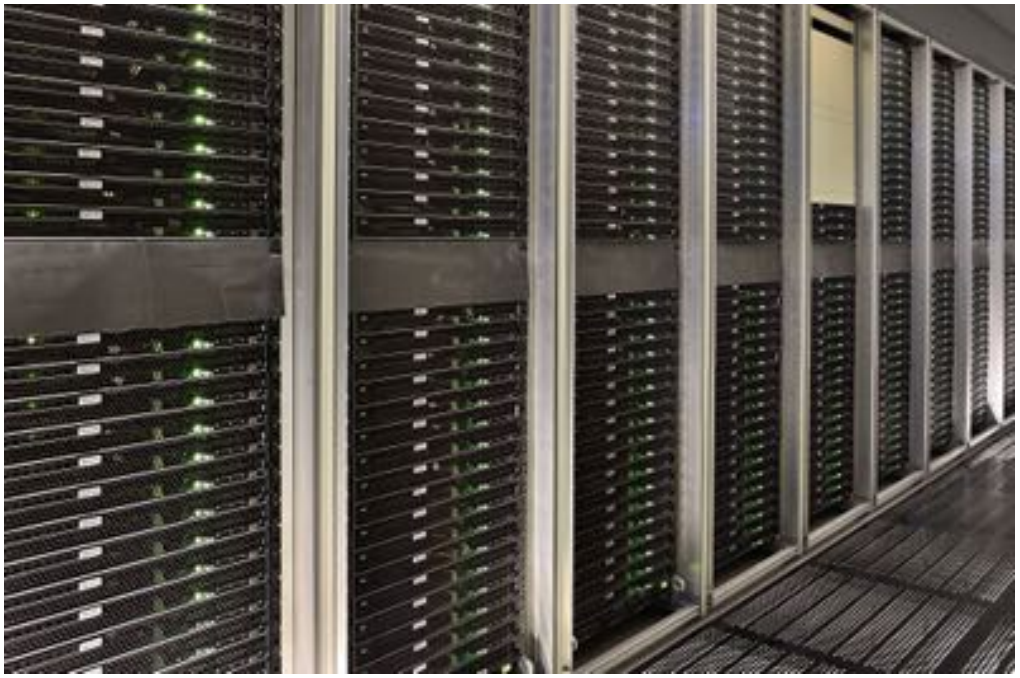
- Form an idea 
- Perform the research  
- Write the results 
- Submit the paper to a peer-reviewed journal 
- Paper is reviewed by an anonymous referee 
- Revise paper based upon referee's recommendations/requests 
- Paper is published! 



Observational vs Theoretical Astronomy



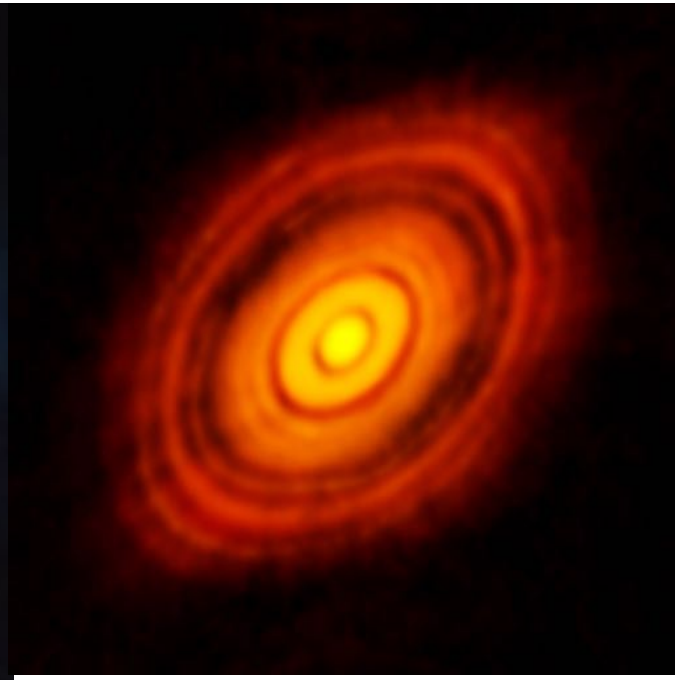




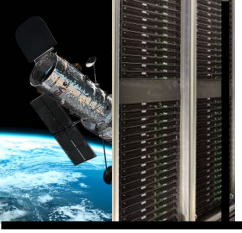
Observational vs Theoretical Astronomy

- HL Tau
  - 450 ly (120pc) from Earth in Taurus Molecular Cloud
  - Young (< 100 000 yr) system

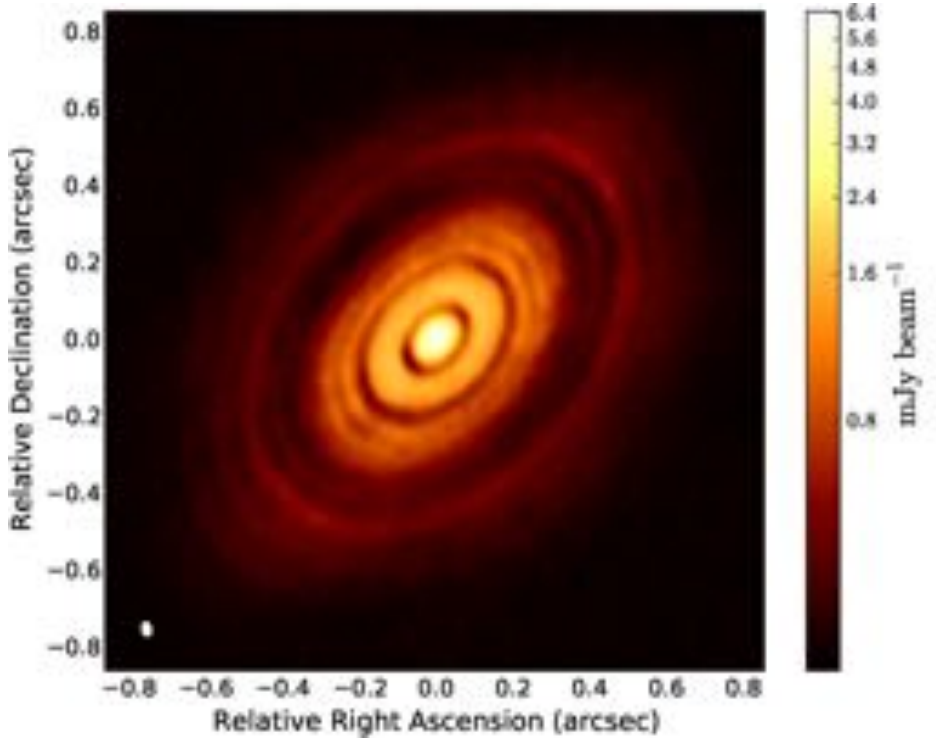
HL Tauri and surroundings (credit: NASA/HST)



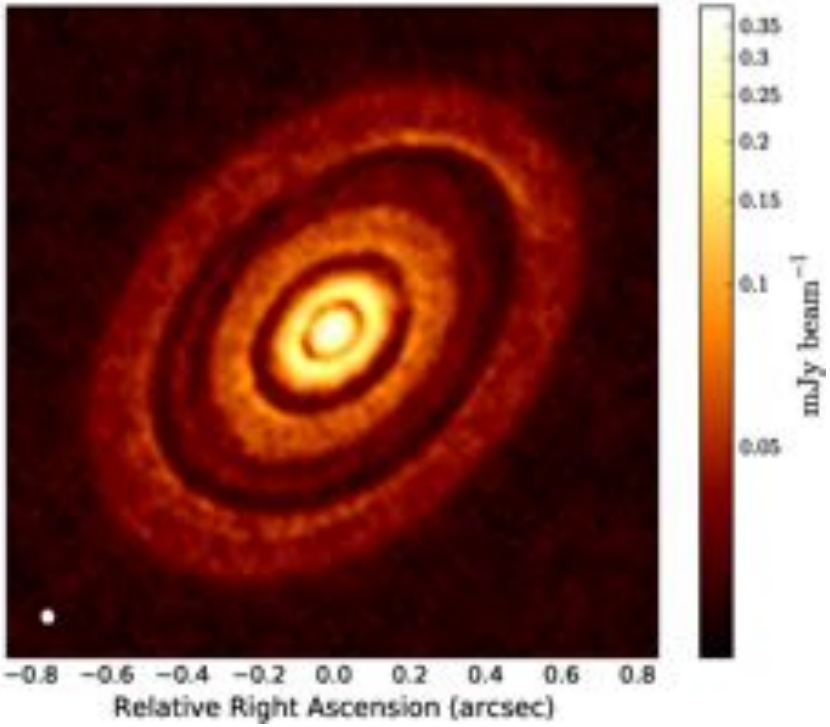
HL Tau: Dust disc (credit: ALMA)



Observational vs Theoretical Astronomy

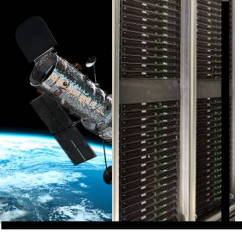


ALMA observations



Numerical simulation

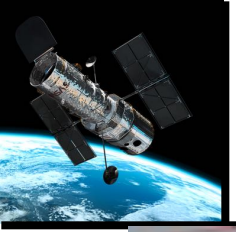
Credit: Giovanni Dipierro, Daniel Price, Guillaume Laibe, Kieran Hirsh, Alice Cerioli and Giuseppe Lodato. On planet formation in HL Tau. MNRAS 453, L73–L77 (2015)



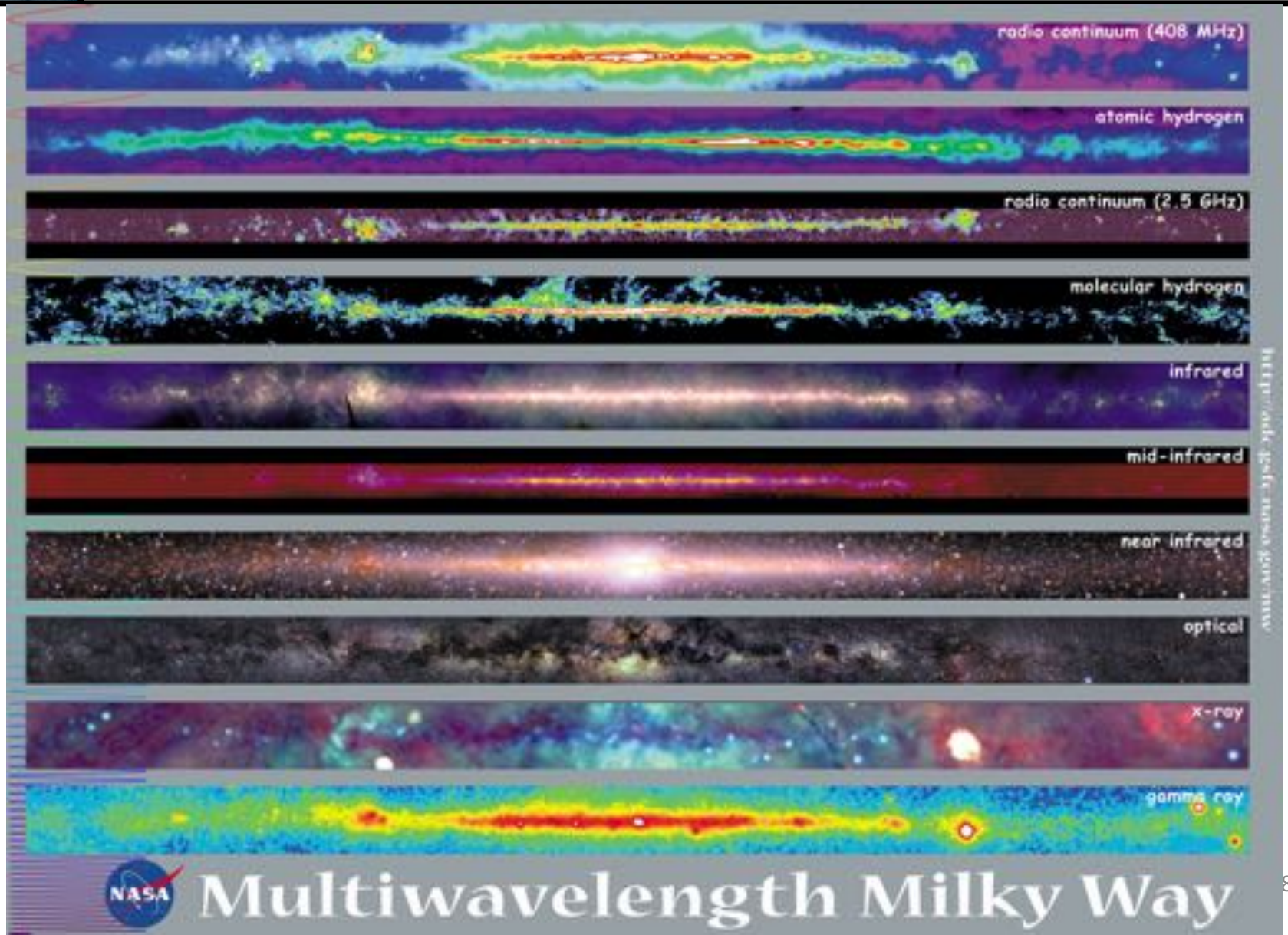
Observational vs Theoretical Astronomy

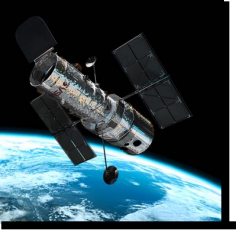
Visualization by Frank Summers (Space Telescope Science Institute). Simulation by Chris Mihos (Case Western Reserve University) and Lars Hernquist (Harvard University).
Posted on YouTube and Astronomy Picture of the Day (apod.nasa.gov)

Observational Astronomy

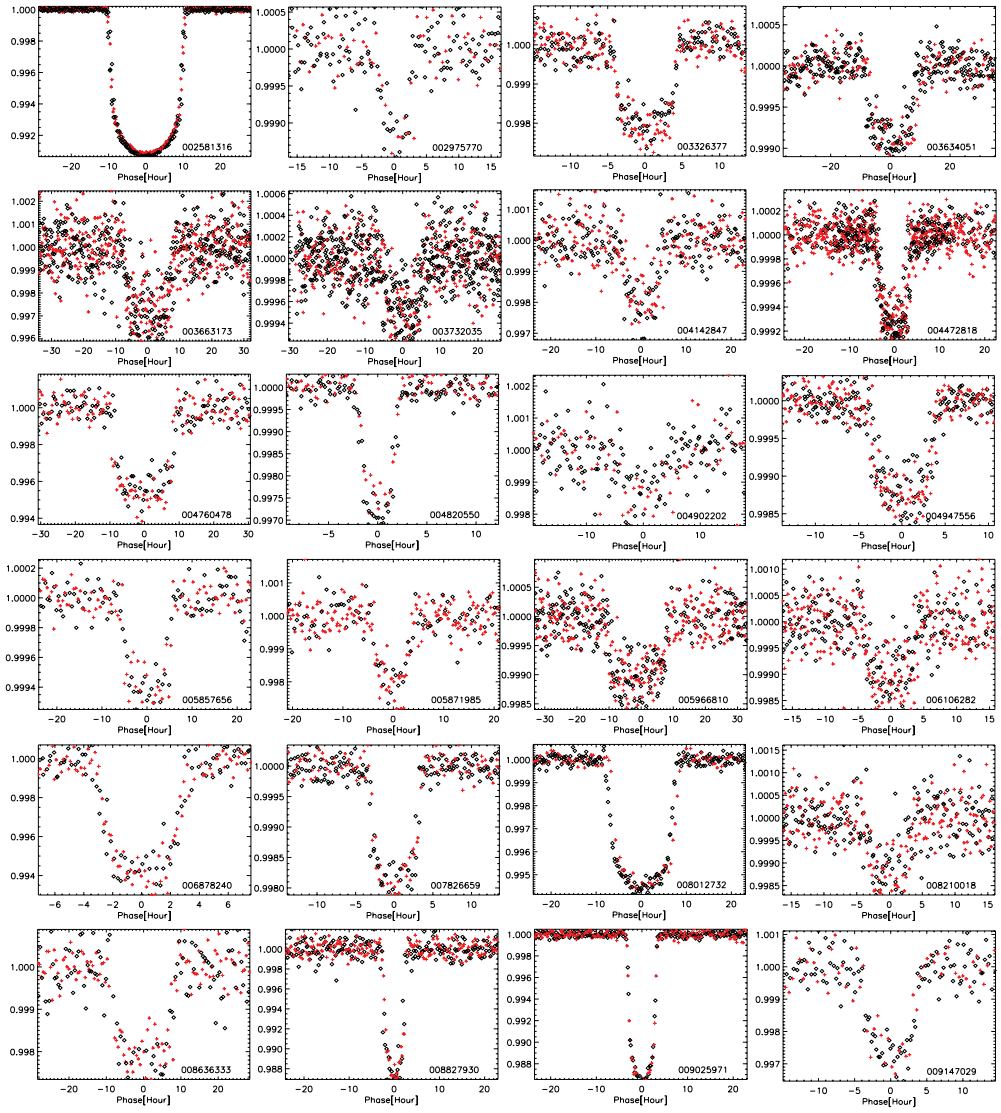


Observational Astronomy



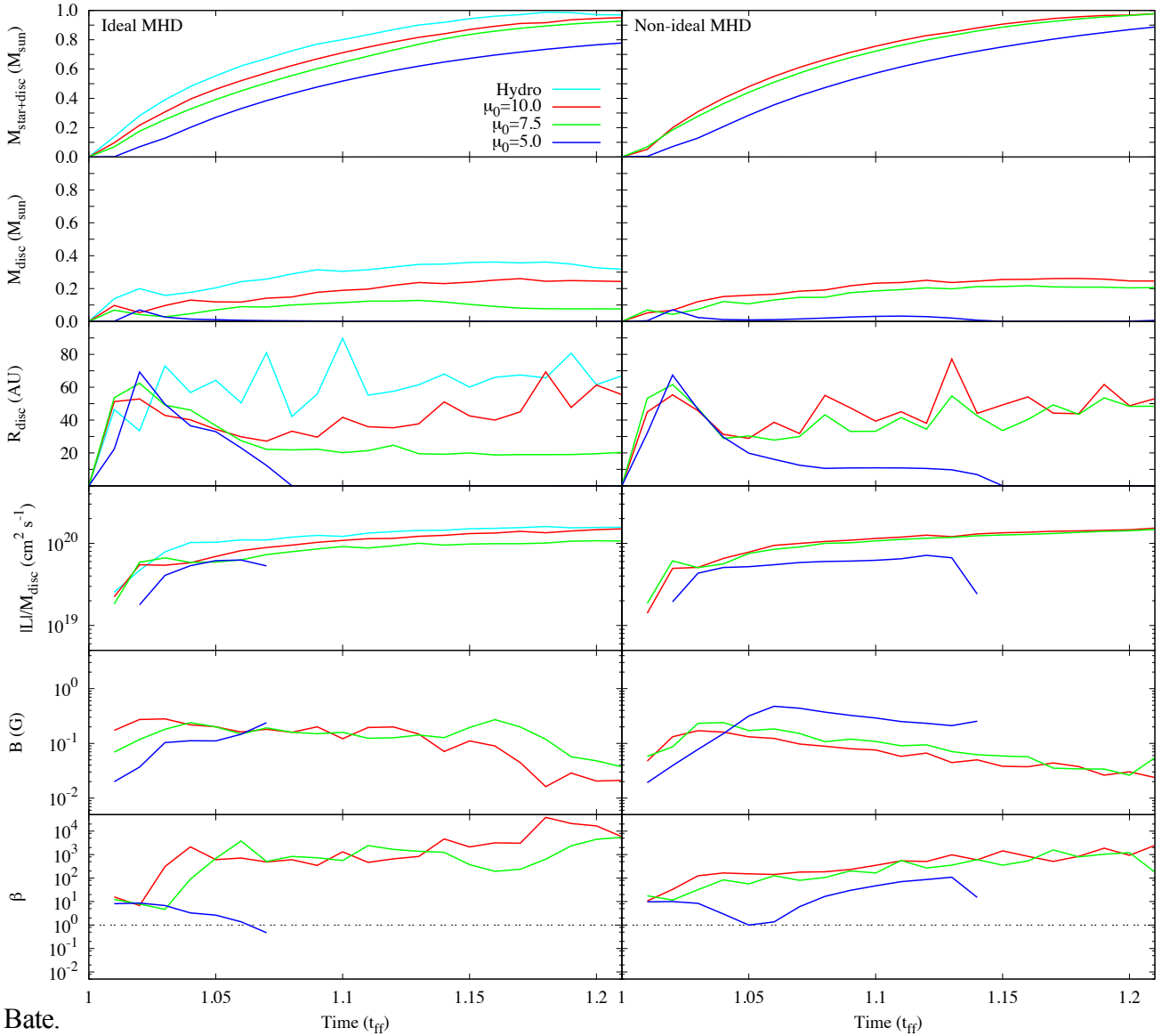


Observational Astronomy: Exo-planets



Credit: Wang et al. PLANET HUNTERS. V. A CONFIRMED JUPITER-SIZE PLANET IN THE HABITABLE ZONE AND 42 PLANET CANDIDATES FROM THE KEPLER ARCHIVE DATA. The Astrophysical Journal, 776:10 (18pp), 2013 October 10.

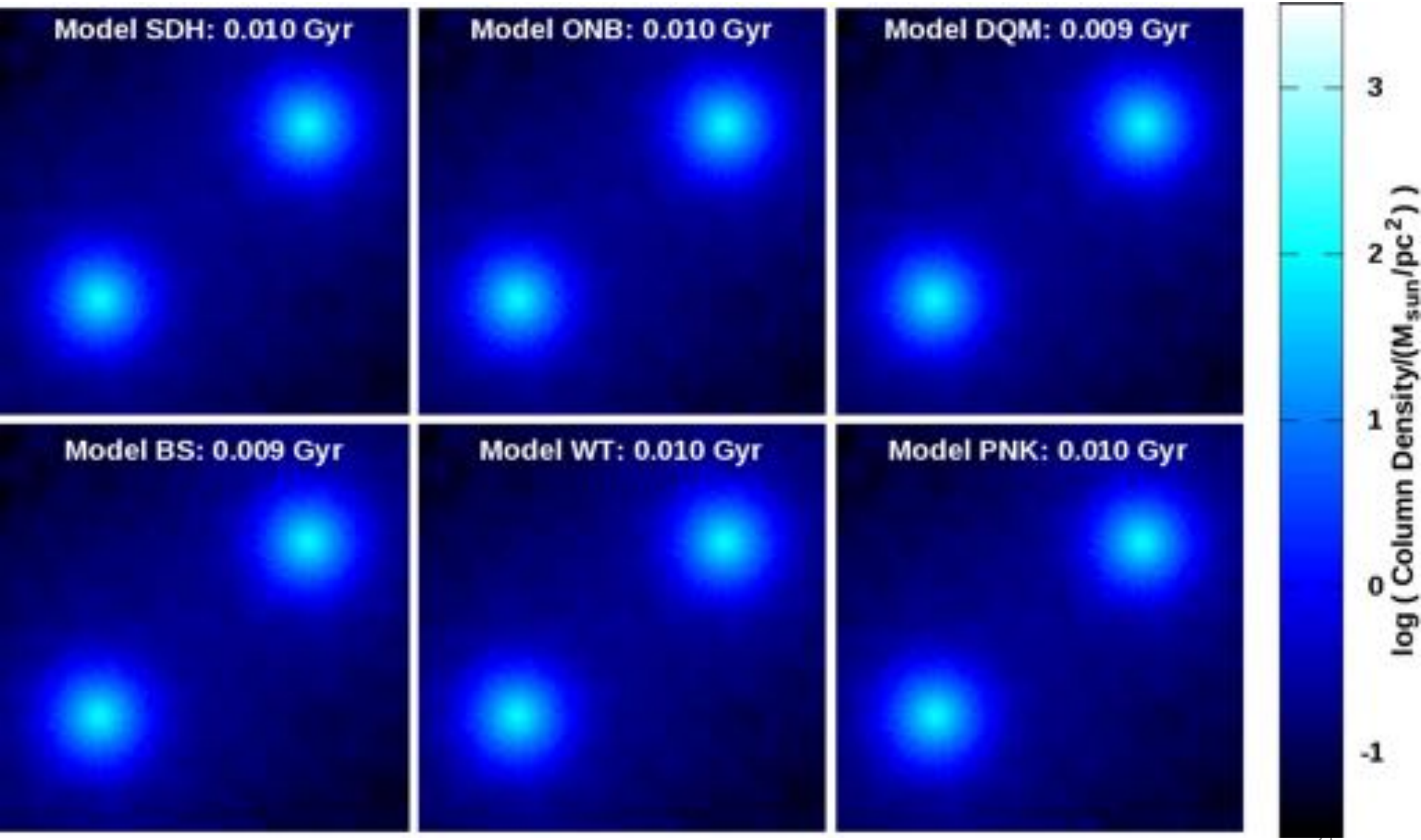
Theoretical Astronomy



Credit: Wurster, Price & Bate.

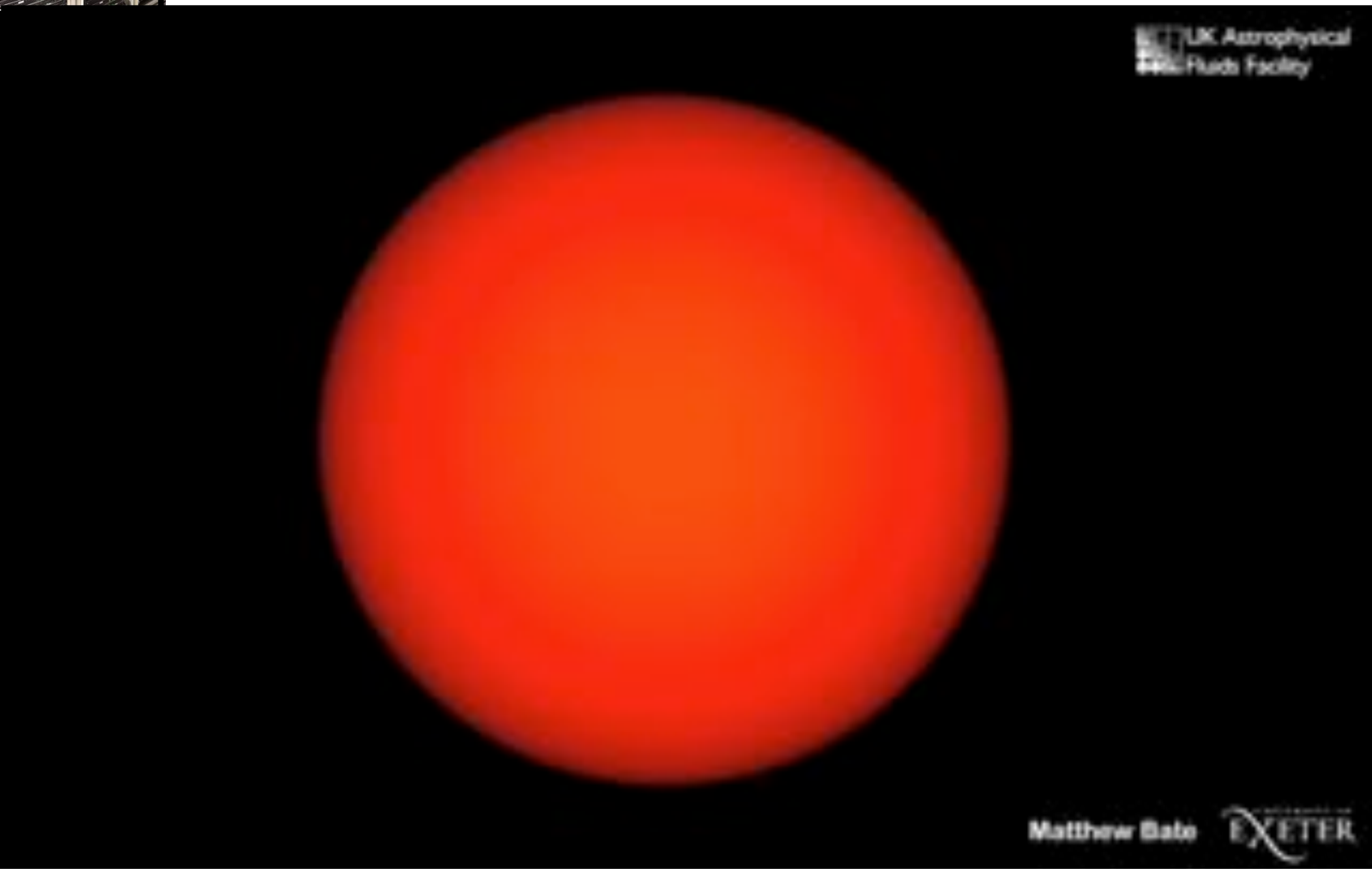
Can non-ideal magnetohydrodynamics solve the magnetic braking catastrophe? MNRAS 457, 1037–1061 (2016).

Theoretical Astronomy: AGN Feedback



Credit: Wurster & Thacker. A comparative study of AGN feedback algorithms. MNRAS 431, 2513–2534 (2013).
Credit: Wurster & Thacker. Accretion disc particle accretion in major merger simulations. MNRAS 431, 539–553 (2013).

Theoretical Astronomy: Star cluster formation



James Wurster
http://www.astro.ex.ac.uk/people/wurster/