MANCHESTER 1824
The University of Manchester

Labyrynth of the unexpected

- Conference wrap-up

Mike Garrett

Sir Bernard Lovell Chair, Prof. of Astrophysics.

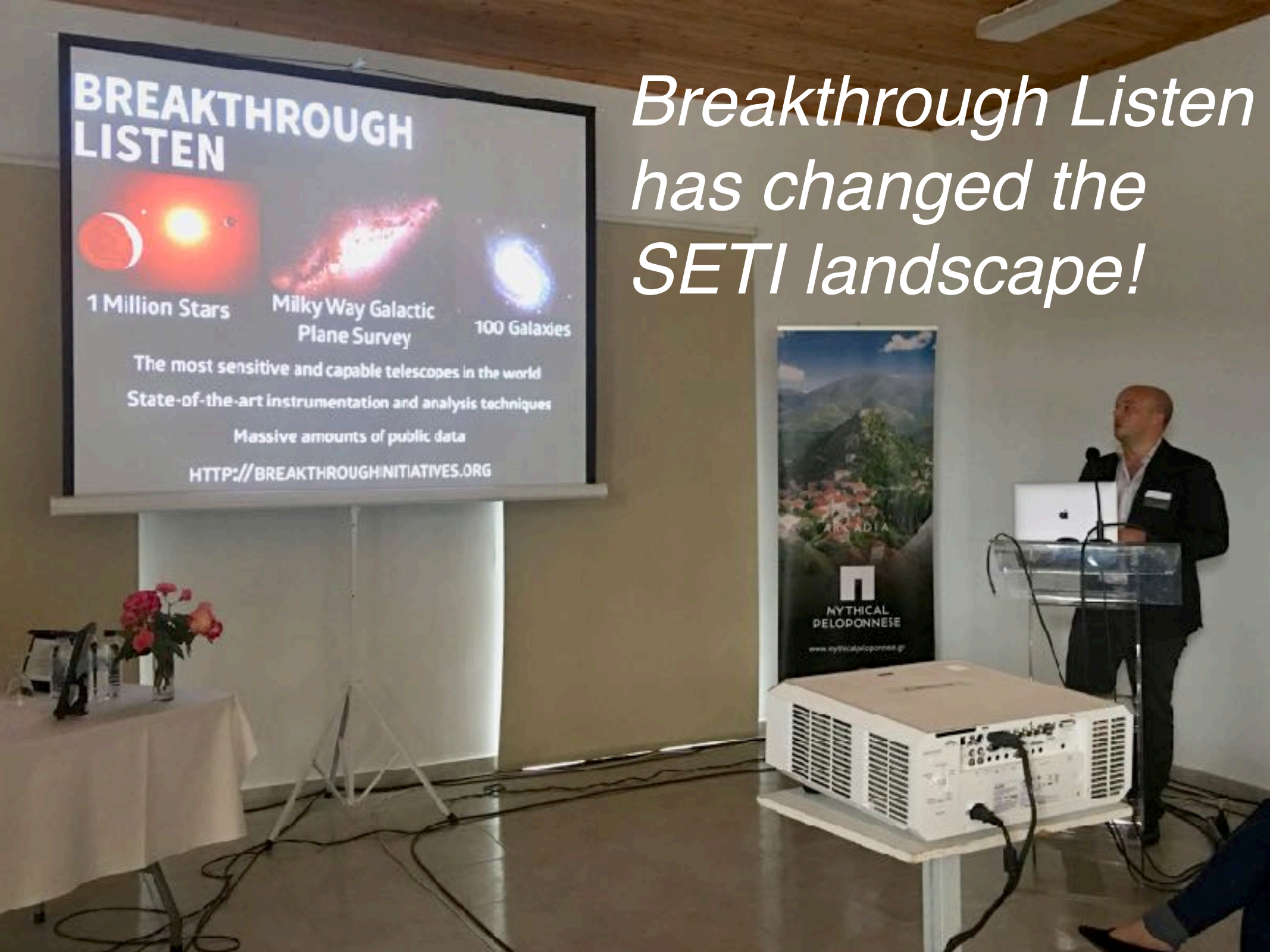
Director Jodrell Bank Centre for Astrophysics

Every conference should have this standard of food & hospitality!

Thank you very much!

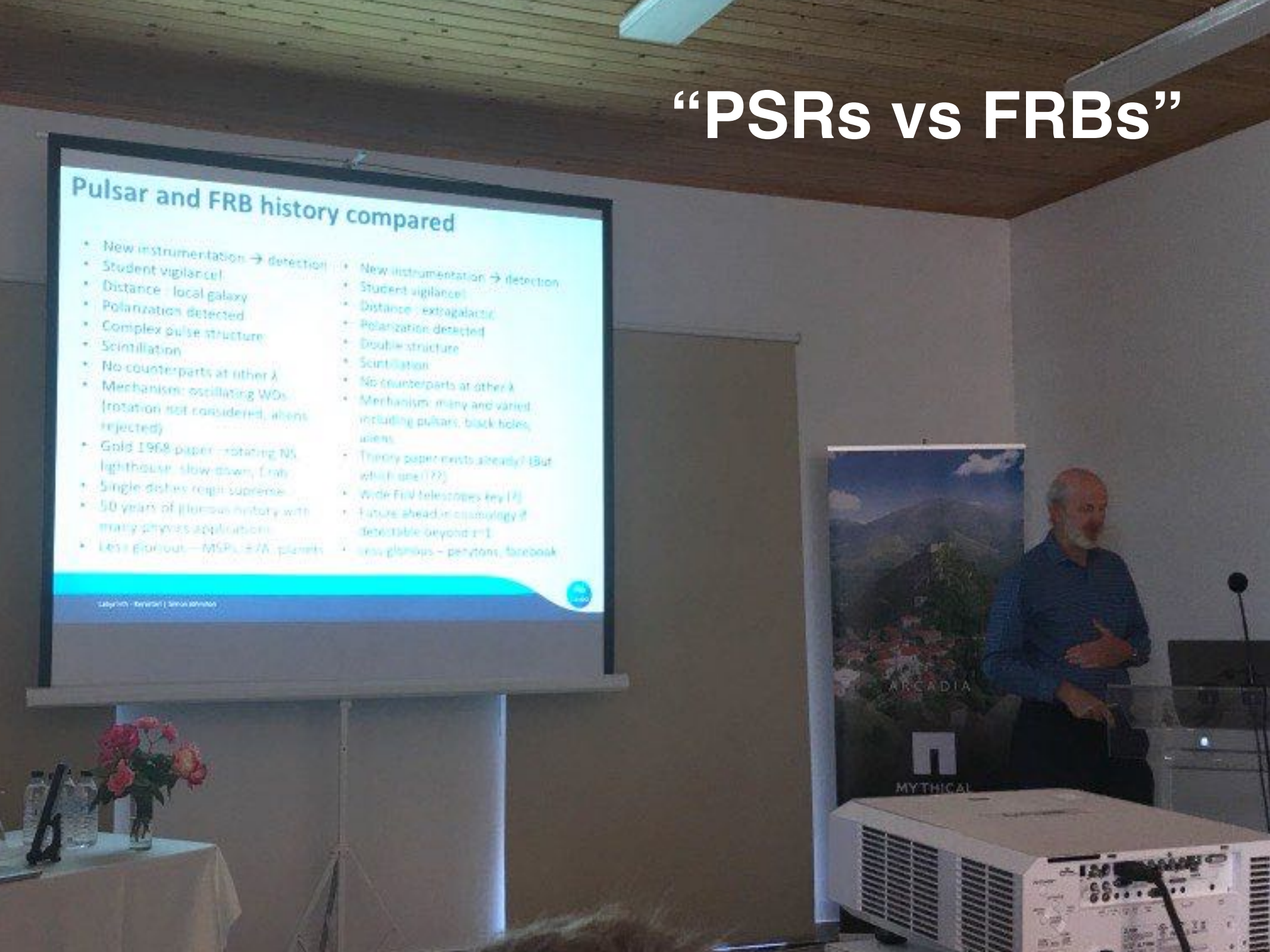
Very exciting times!!

- SETI renaissance via Breakthrough Listen
- FRB host identification will soon be possible
- Subarcsecond positions for FRBs might be very important for their physical interpretation
- First detections of Gravitational waves
- Hot stars and radio source variability (IDV)
- New types of transients ?
- Multi-wavelength/Multi-messenger astronomy
- Some great telescopes coming online NOW + TNRT, DSA-10!



Breakthrough Listen has changed the SETI landscape!

“PSRs vs FRBs”


Pulsar and FRB history compared
New instrumentation → detection
Student vigilance!
Distance – local galaxy
Polarization detected
Complex pulse structure
Scintillation
No counterparts at other λ
Mechanism: oscillating WDs (rotation not considered, aliens rejected)
Gold 1968 paper – rotating NS lighthouse, slow down, E-rot
Single dishes reign supreme
50 years of glorious history with many physics applications
Less glorious – MSPs, e/A, planets
New instrumentation → detection
Student vigilance!
Distance – extragalactic
Polarization detected
Double structure
Scintillation
No counterparts at other λ
Mechanism: many and varied including pulsars, black holes, aliens
Theory papers exists already! (But which one???)
Wide FoV telescopes key (!)
Future ahead in cosmology if detectable beyond z~1
Less glorious – petytons, facebook
ARCADIA
MYTHICAL

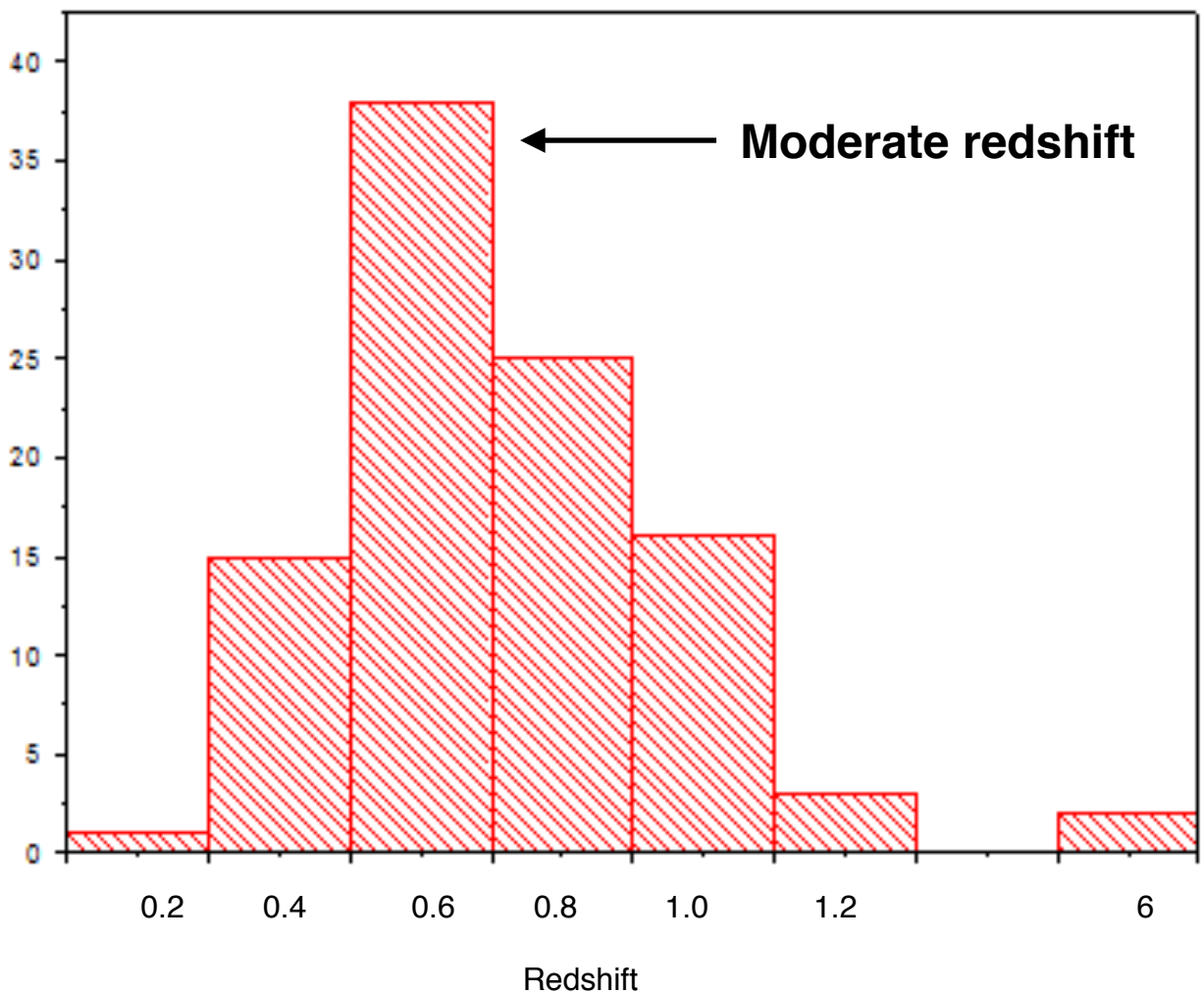
FRB Galaxy host population

dN vs DM (z)

FRB Galaxy host population

dN vs DM (z)

Petroff/Macquart/Johnston et al. 2019



Is this tracing the SF history of a particular class of galaxy e.g. low metalicity dwarfs?

“GRBs vs FRBs”


Pulsar and FRB history compared
VLA 1.4GHz
• New instrumentation → detection
• Student vigilance!
• Distance – local galaxy
• Polarization detected
• Complex pulse structure
• Scintillation
• No counterparts at other λ
• Mechanism: oscillating WDs (rotation not considered, aliens rejected)
• Gold 1968 paper – rotating NS lighthouse, slow down, Crab
• Single dishes reign supreme
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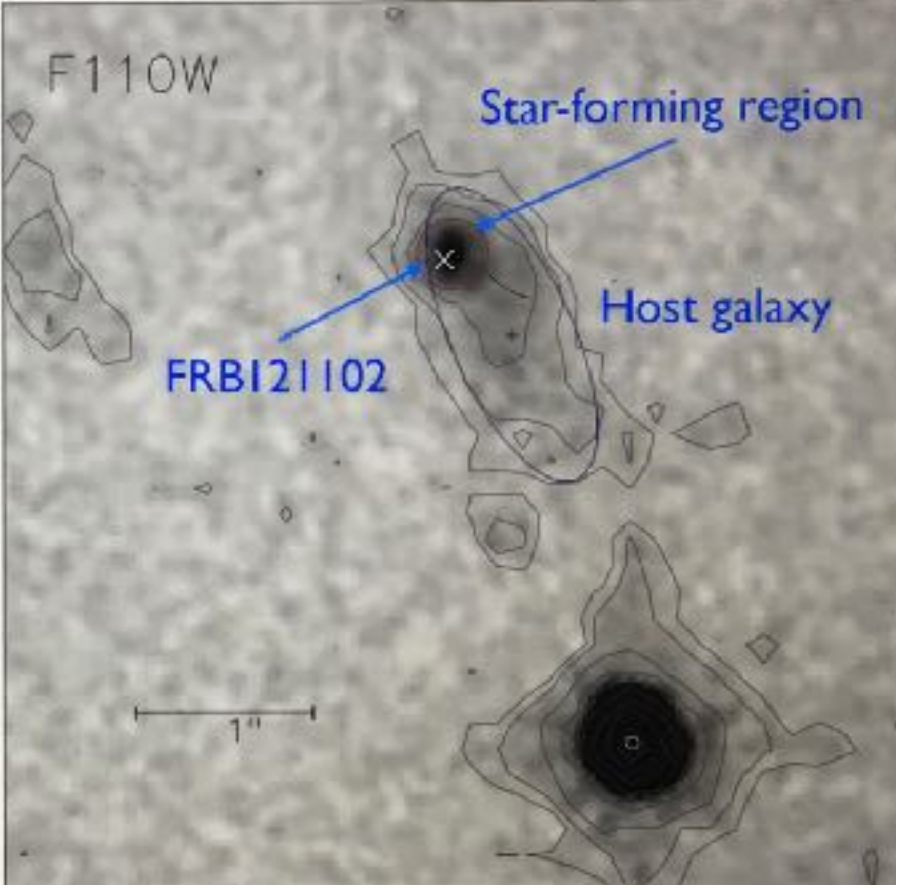
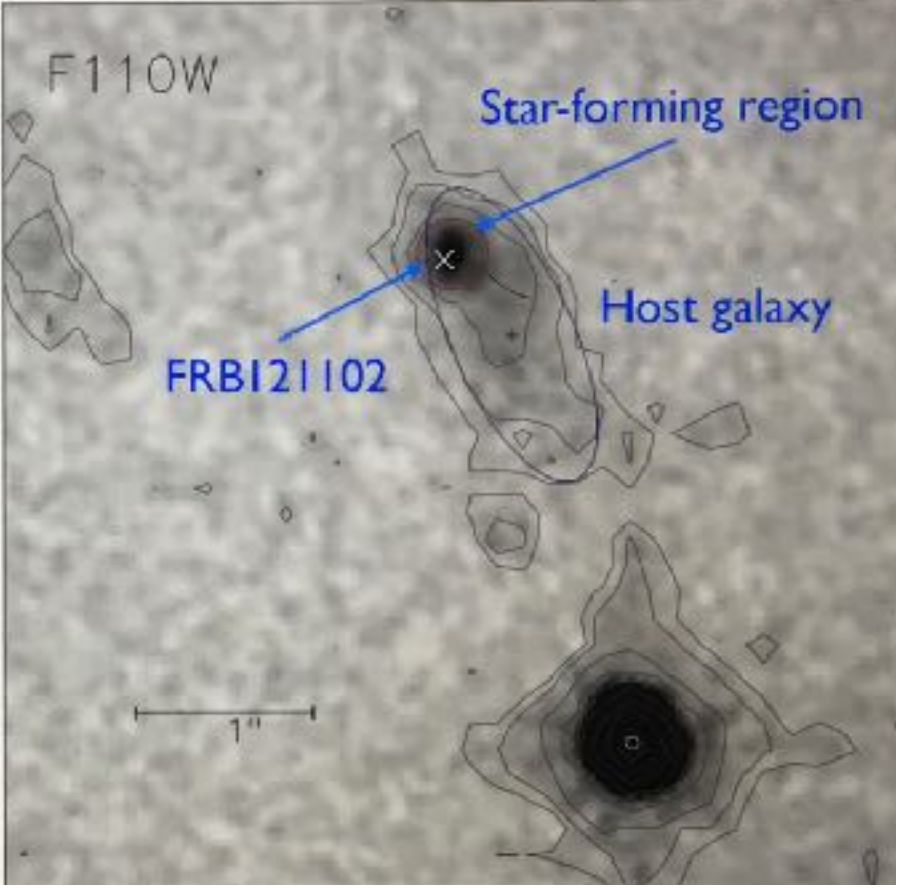
• Less glorious – pervtons, facebook
ARCADIA
MYTHICAL



Bassa et al. 2017

Is this telling us that repeating FRBs are associated with Massive Stars ?

Repeating FRBs Should be typically found in central star formation regions in low metalicity dwarfs (== long-duration GRBs) ???



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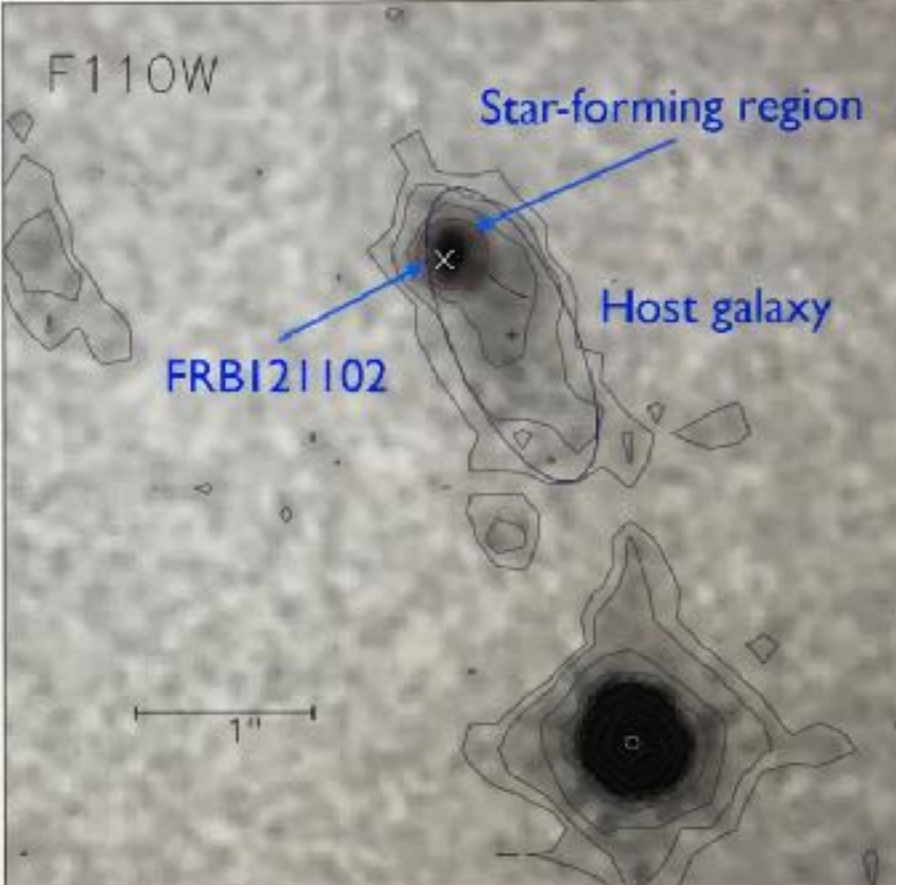
Non-repeating FRBs associated with compact object mergers => located randomly within their host galaxy a la short-duration FRBs?



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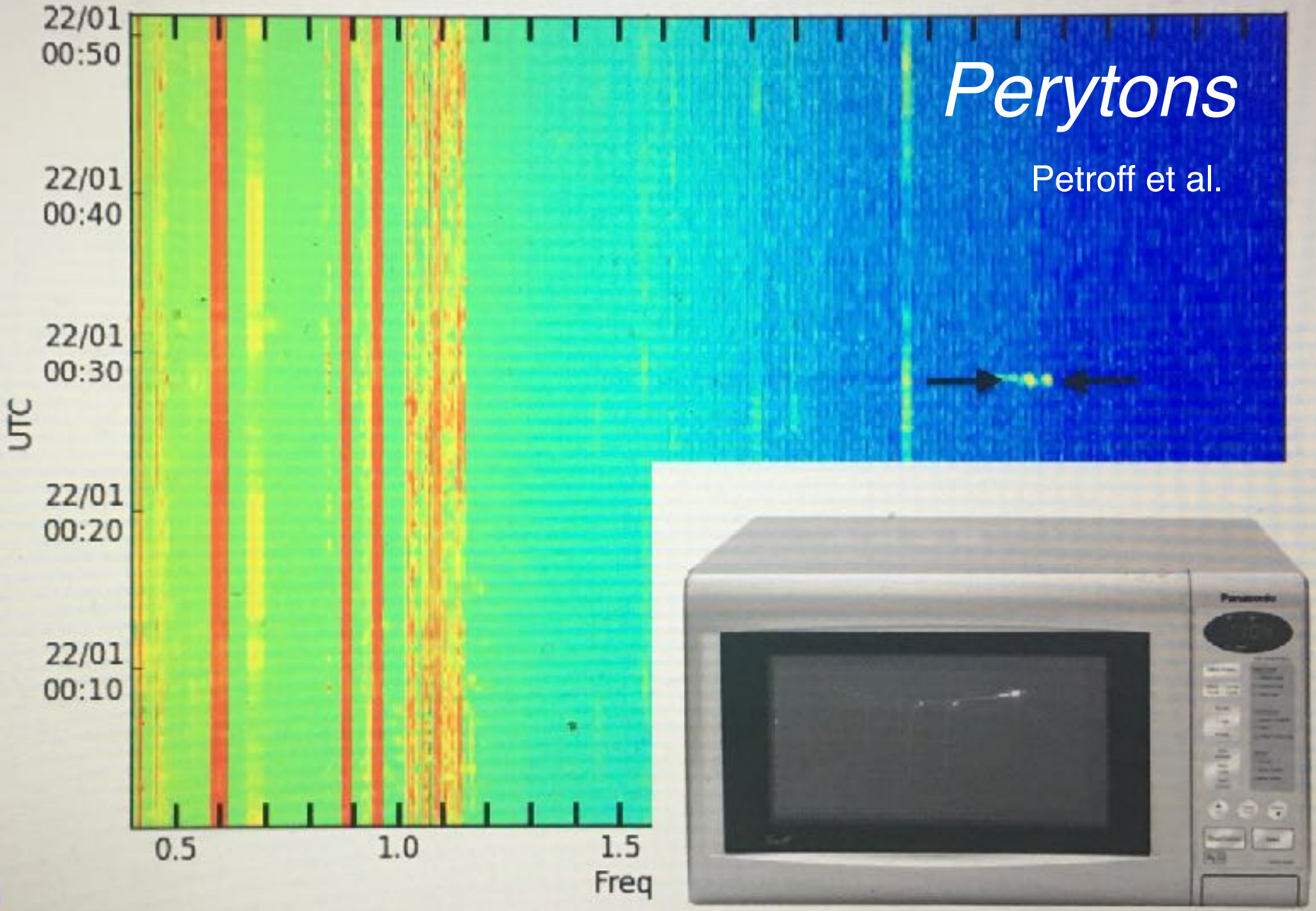
Non-repeating FRBs associated with compact object mergers => located randomly within their host galaxy a la short-duration FRBs?

Precision positions (EVN) could be very important…

Precision astrometry also important after SETI success & Space missions

Location, location, location…


22/01
00:50
22/01
00:40
22/01
00:30
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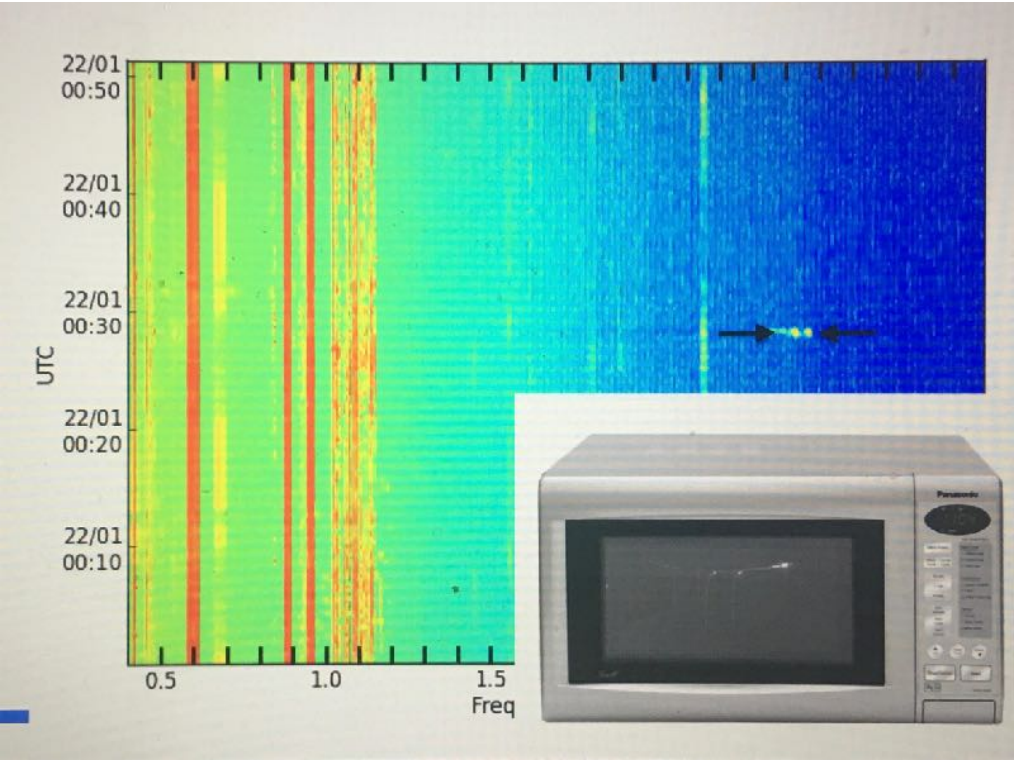
00:20
22/01
00:10
UTC
0.5
1.0
1.5
Freq
Perytons
Petroff et al.


22/01
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22/01
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22/01
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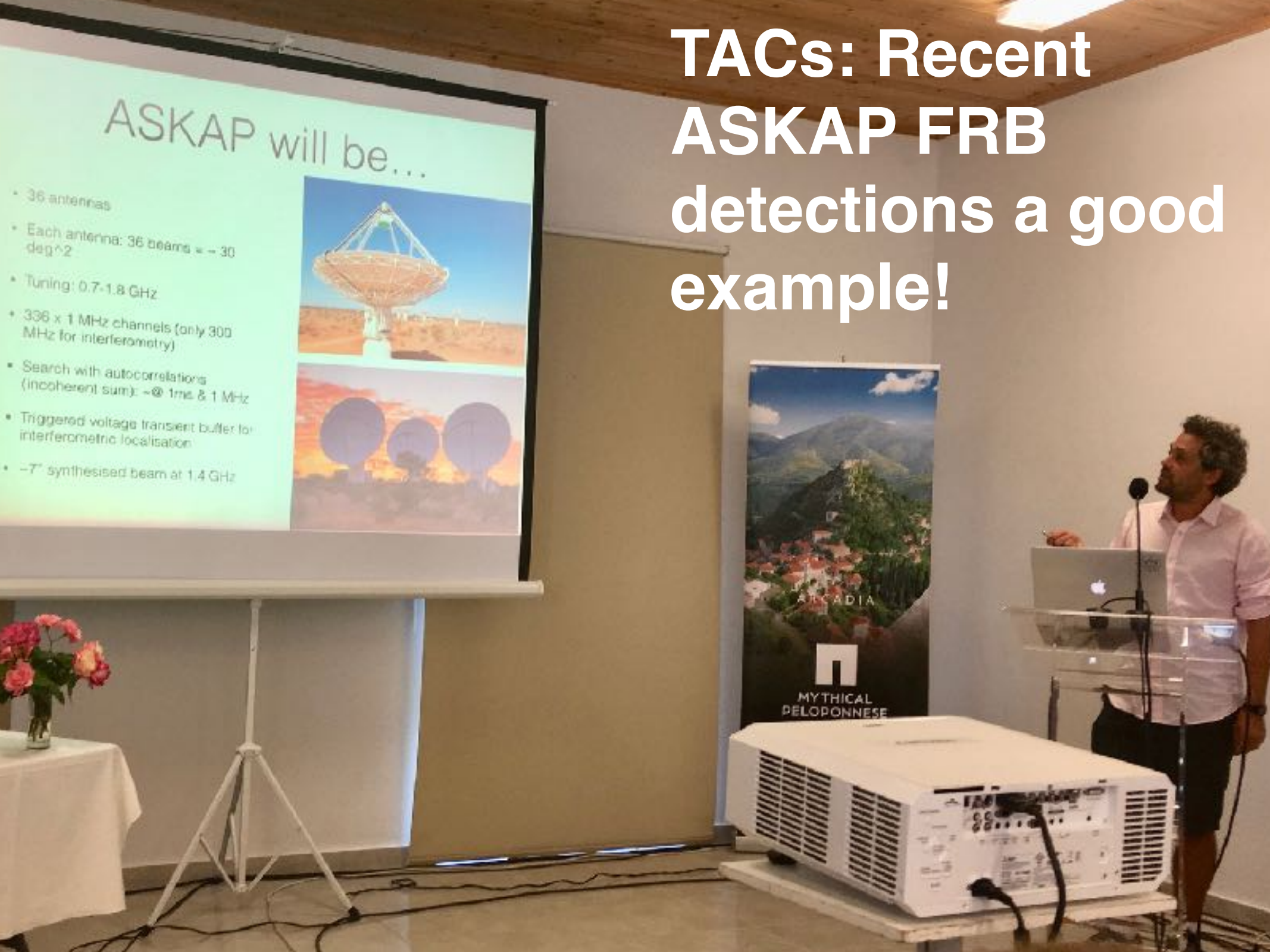
UTC
0.5
1.0
1.5
Freq

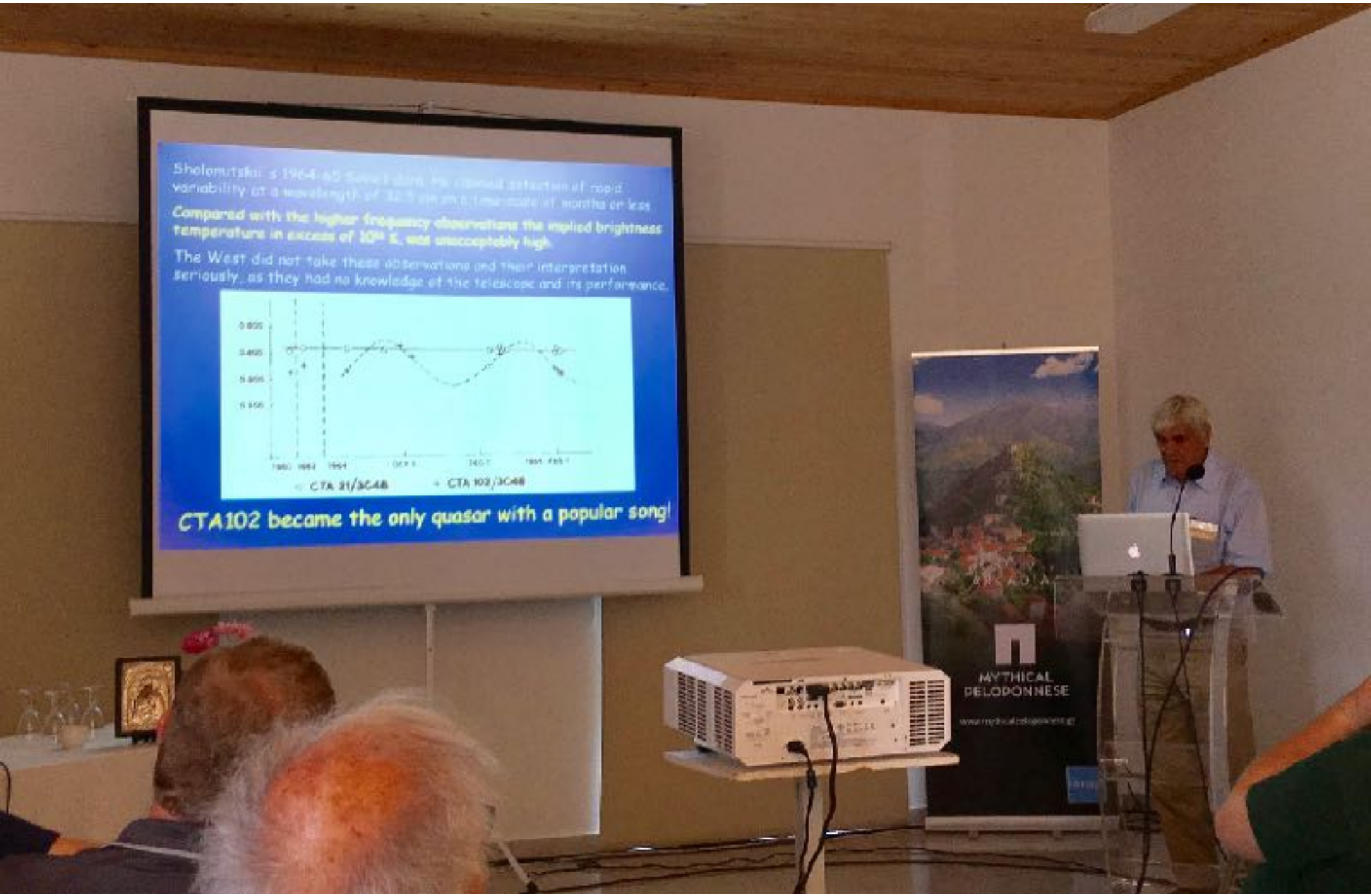

That's not a knife...
THIS is a knife.
-Crocodile Dundee

This is a (Jodrell Bank) microwave…


Thank You
Misconceptions
Preconceptions
Bias
Epicycles…
Peer review
Bias
TACs…

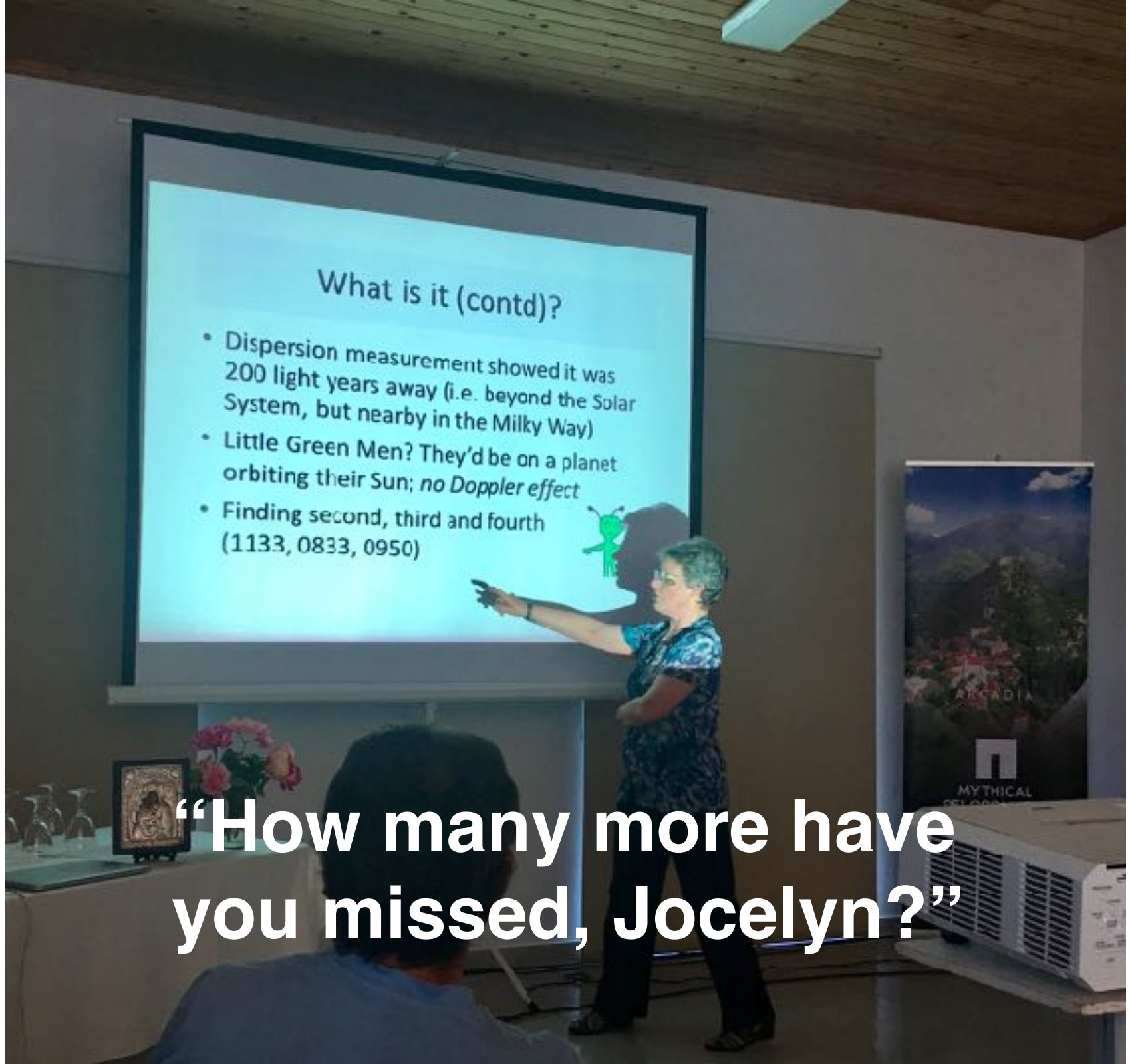


TACs: Recent ASKAP FRB detections a good example!

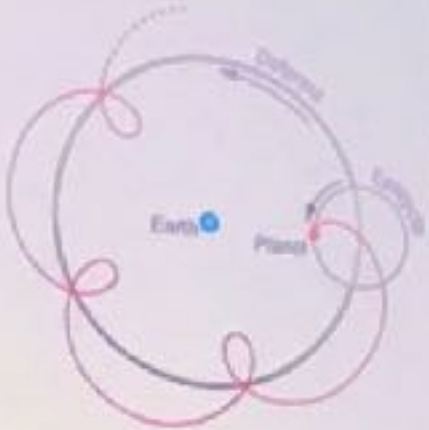

variability at a wavelength of
Compared with the higher frequency observations the implied brightness temperature in excess of
The West did not take these observations and their interpretation seriously, as they had no knowledge of the telescope and its performance.
CTA 21/3C48
CTA 102/3C48
CTA102 became the only quasar with a popular song!
MYTHICAL
PELOPONNESE

GREAT TALK!


What is it (contd)?
• Dispersion measurement showed it was 200 light years away (i.e. beyond the Solar System, but nearby in the Milky Way)
• Little Green Men? They'd be on a planet orbiting their Sun; *no Doppler effect*
• Finding second, third and fourth (1133, 0833, 0950)
MYTHICAL



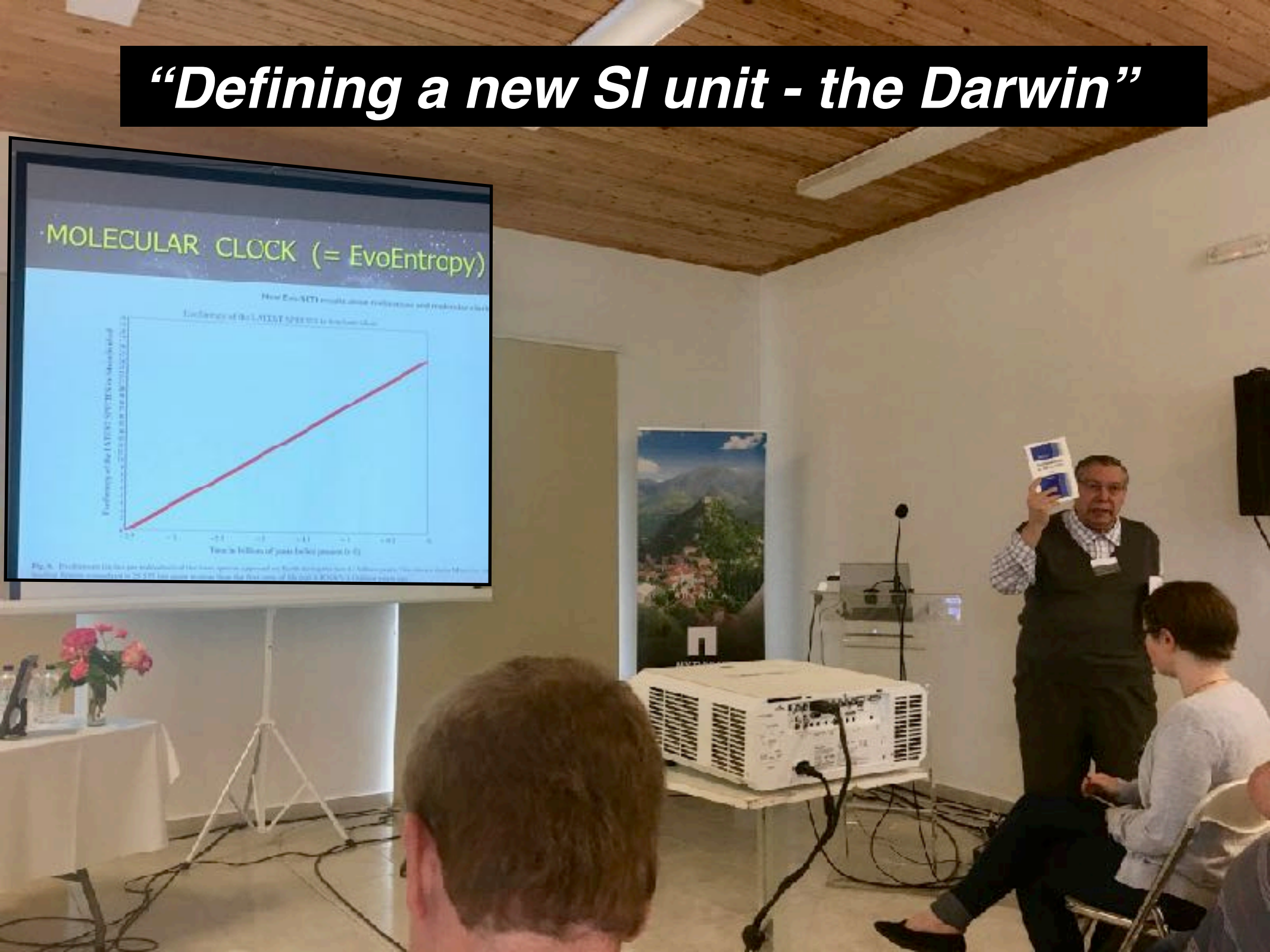
"How many more have you missed, Jocelyn?"



Man has always thought he understood the Universe. Why is the present time any different from past misconceptions?

Fred Hoyle

"Defining a new SI unit - the Darwin"



PRIZES!

Category: Best plot ?

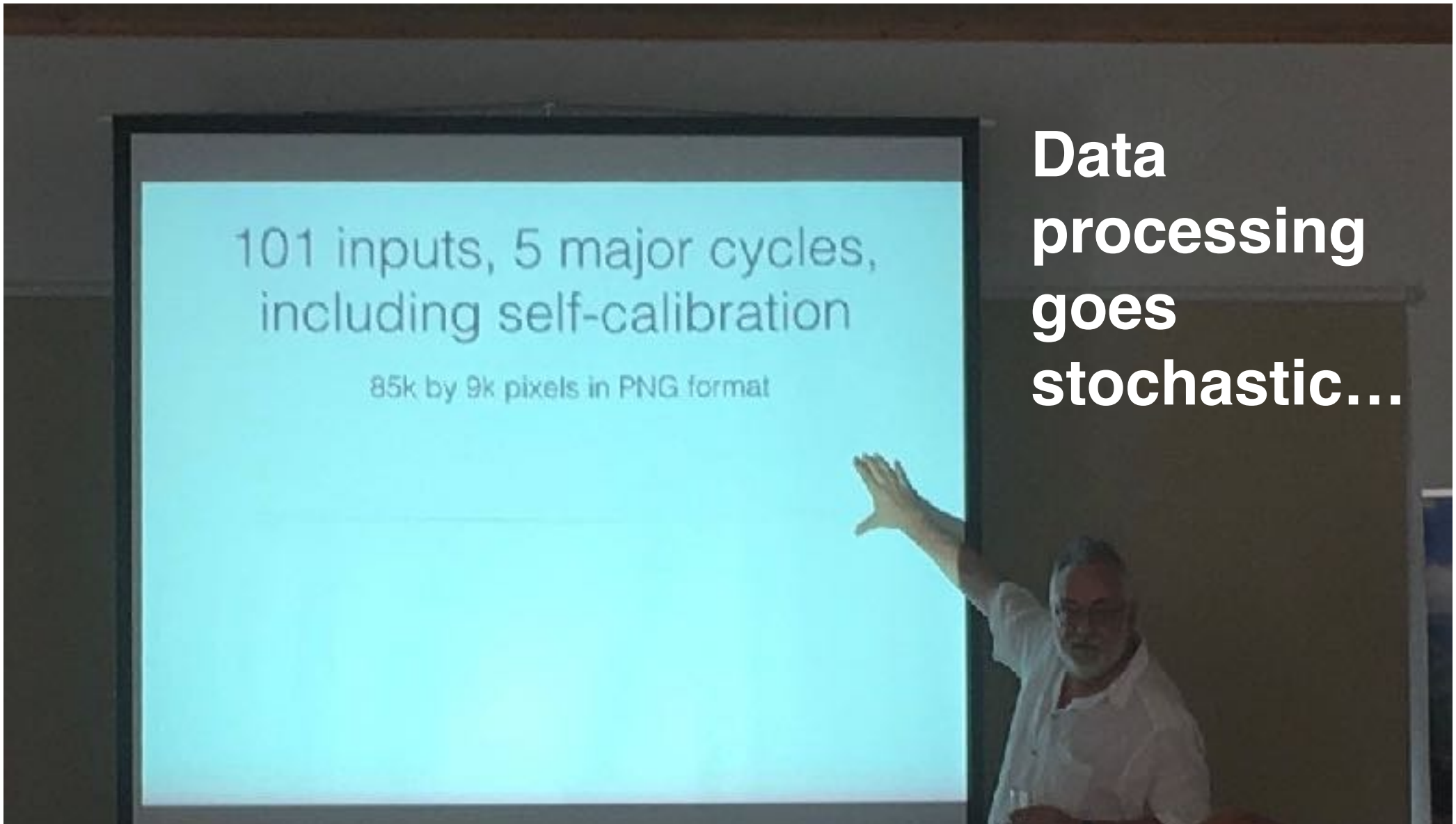
PRIZES!

Category: Best plot ?

"Here's a plot your not supposed to understand…"

PRIZES!

“It’s getting very complex! “



PRIZES!

Diplomacy

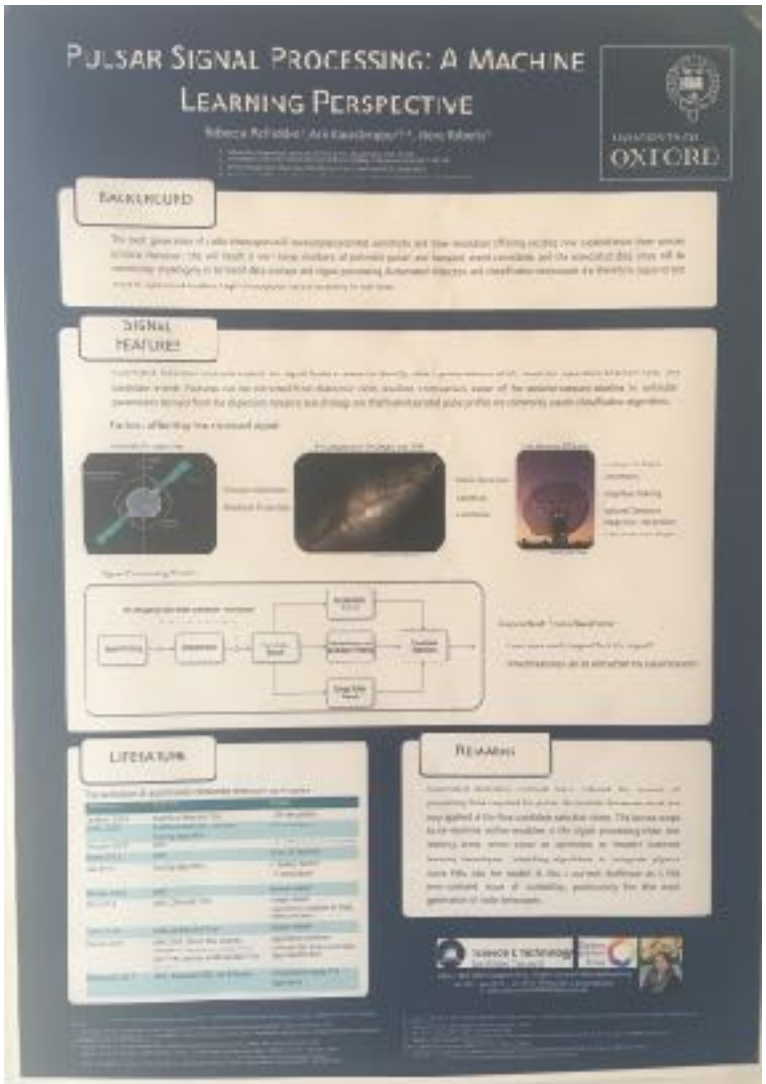
Aris?

PRIZES!

Best poster

PRIZES!

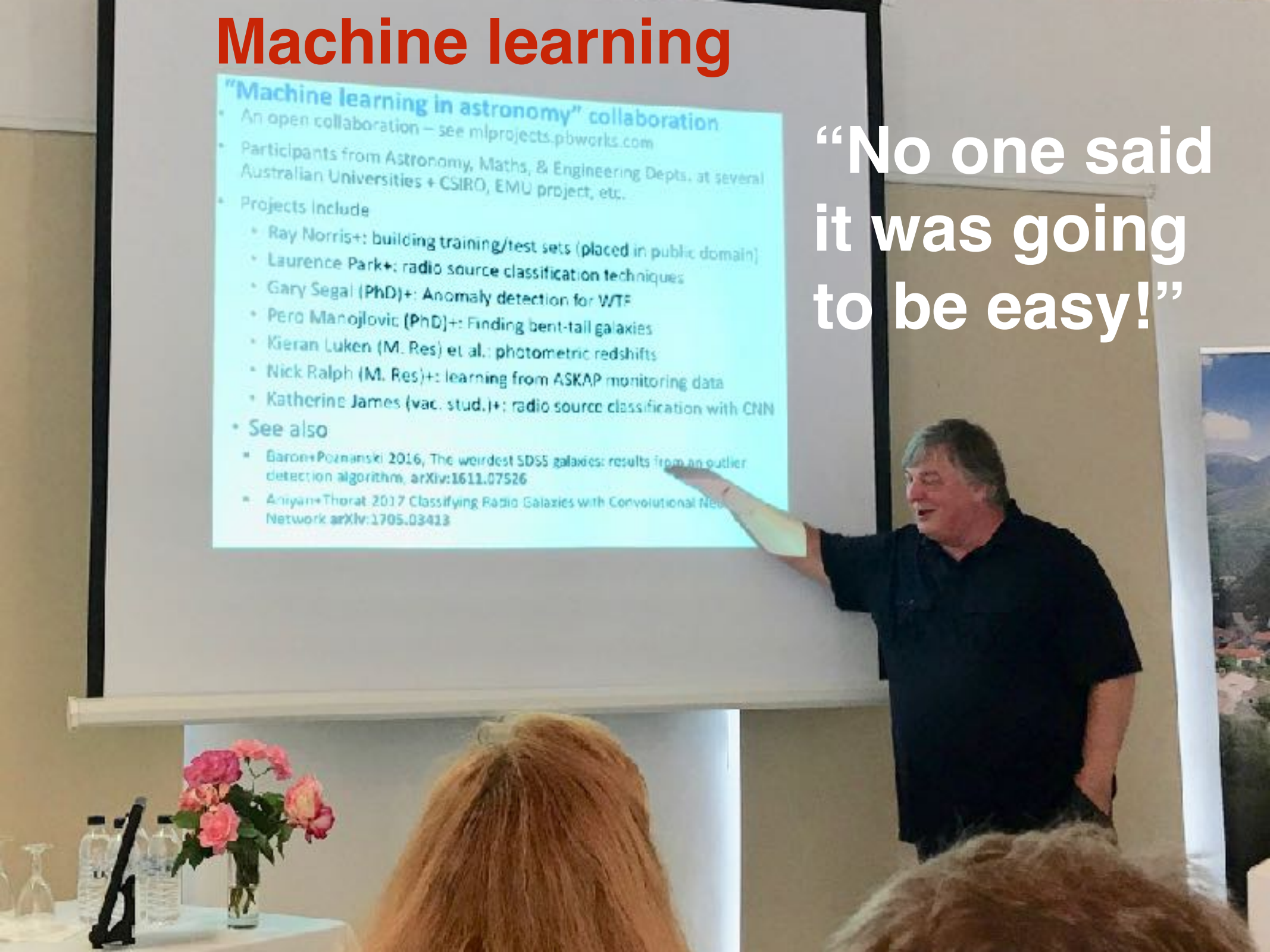
Best poster (Rebecca)



PRIZES!

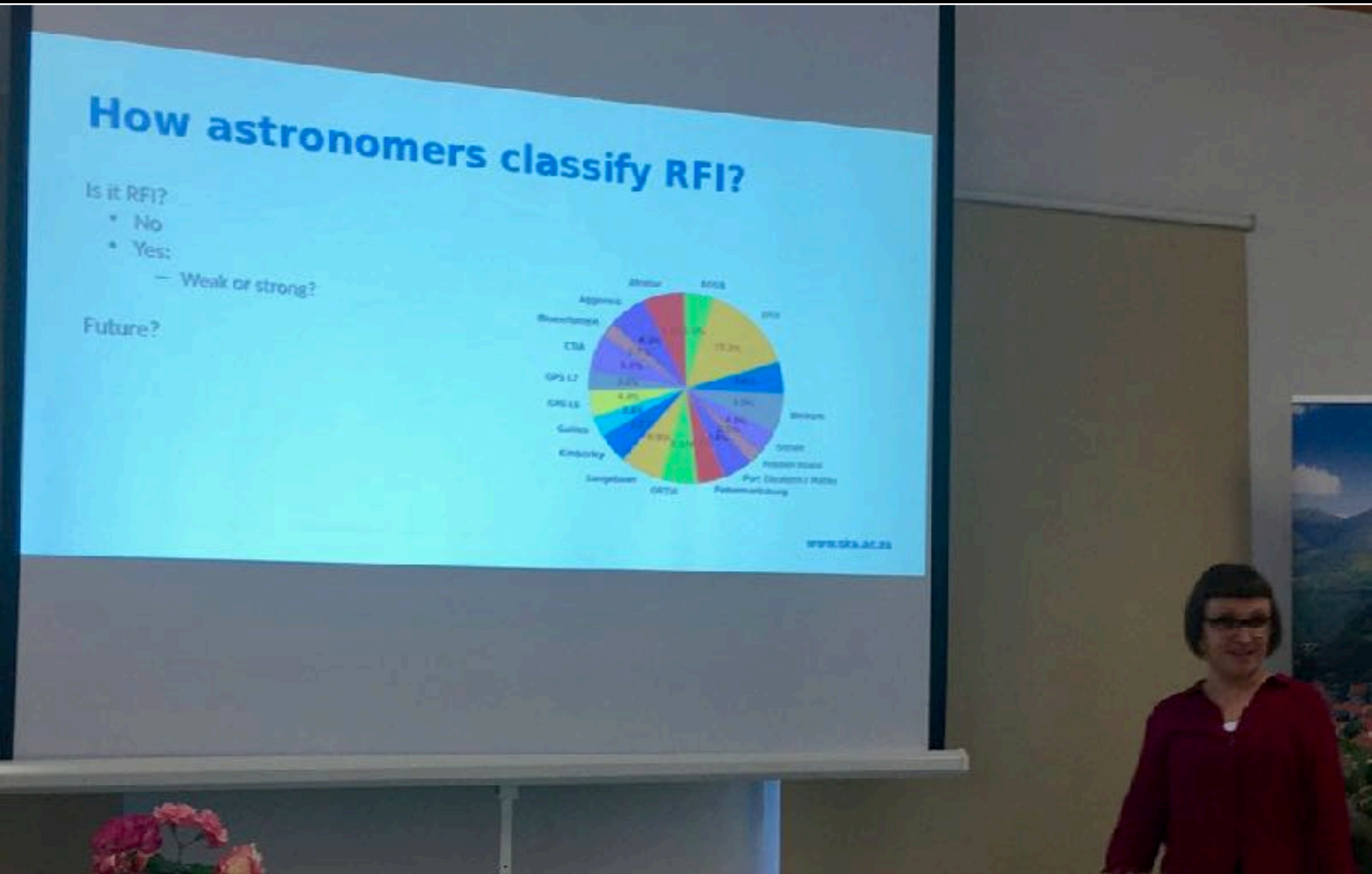
The very highest levels of concentration…

Machine learning

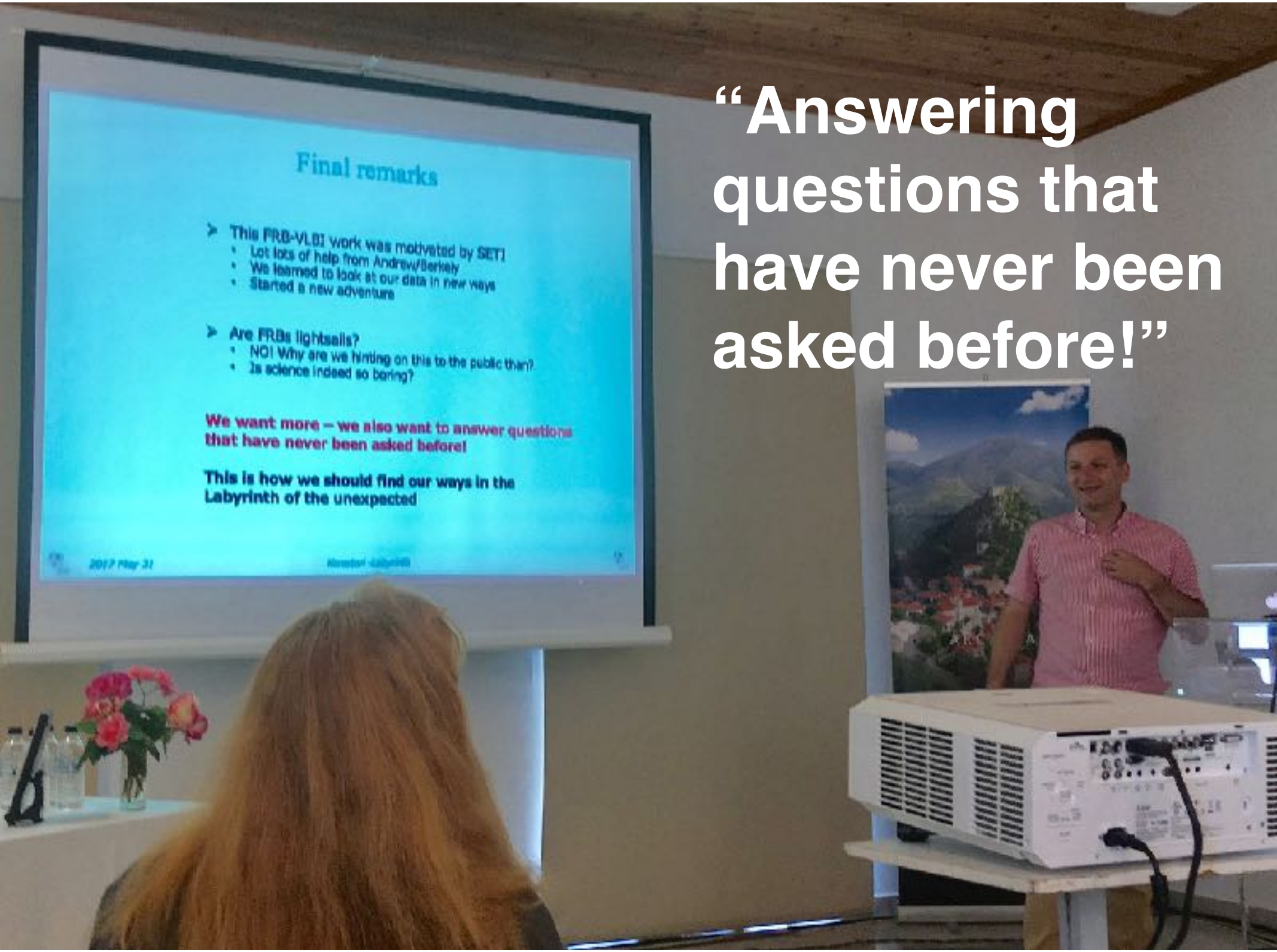


"No one said it was going to be easy!"

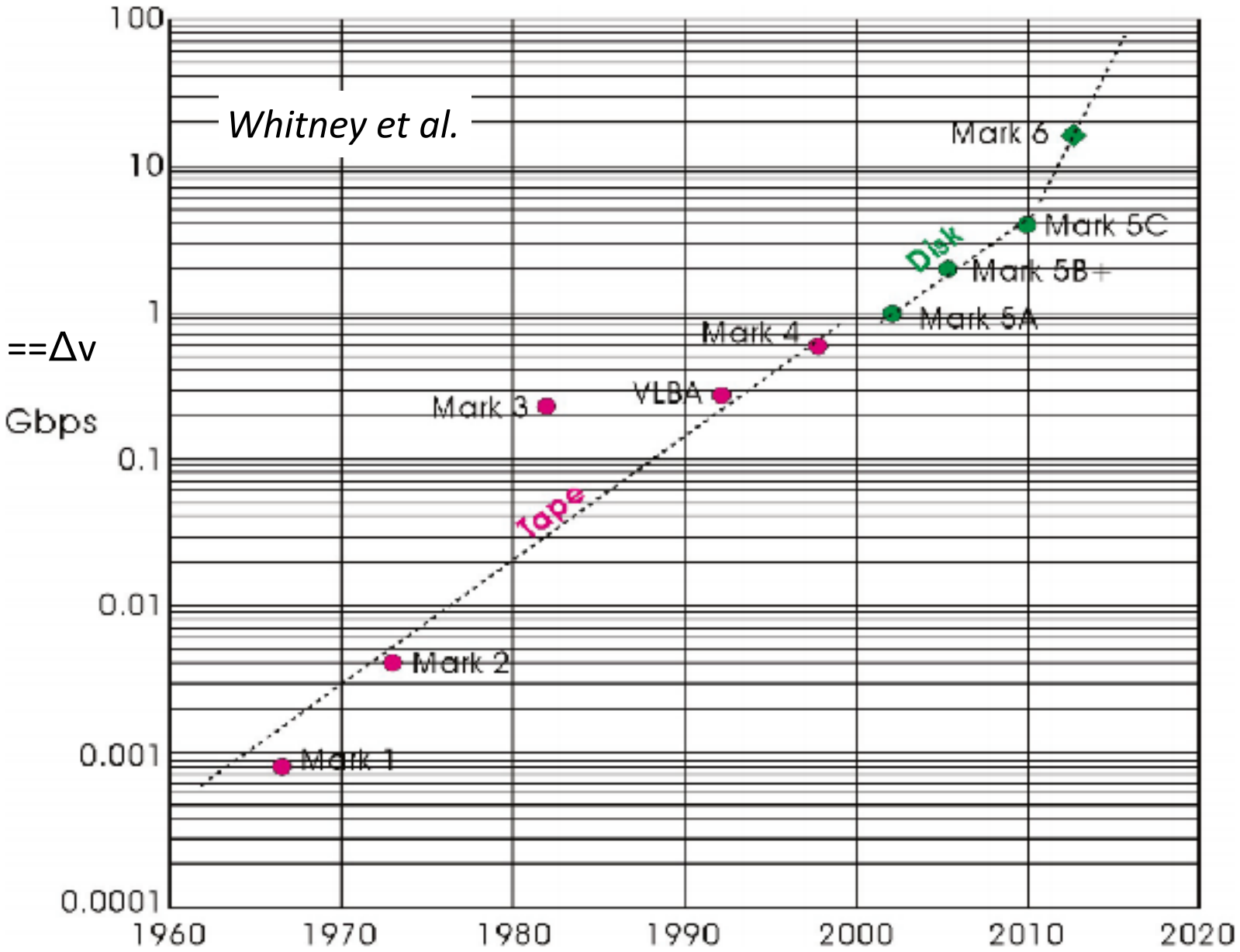
Might be good to start with RFI classification…



“Sean the sheep”


Final remarks
This FRB-VLBI work was motivated by SETI
Lot lots of help from Andrew/Berkely
We learned to look at our data in new ways
Started a new adventure
Are FRBs lightsails?
NO! Why are we hinting on this to the public than?
Is science indeed so boring?
We want more – we also want to answer questions that have never been asked before!
This is how we should find our ways in the Labyrinth of the unexpected
"Answering questions that have never been asked before!"

- Exponential gains in instantaneous bandwidth too…



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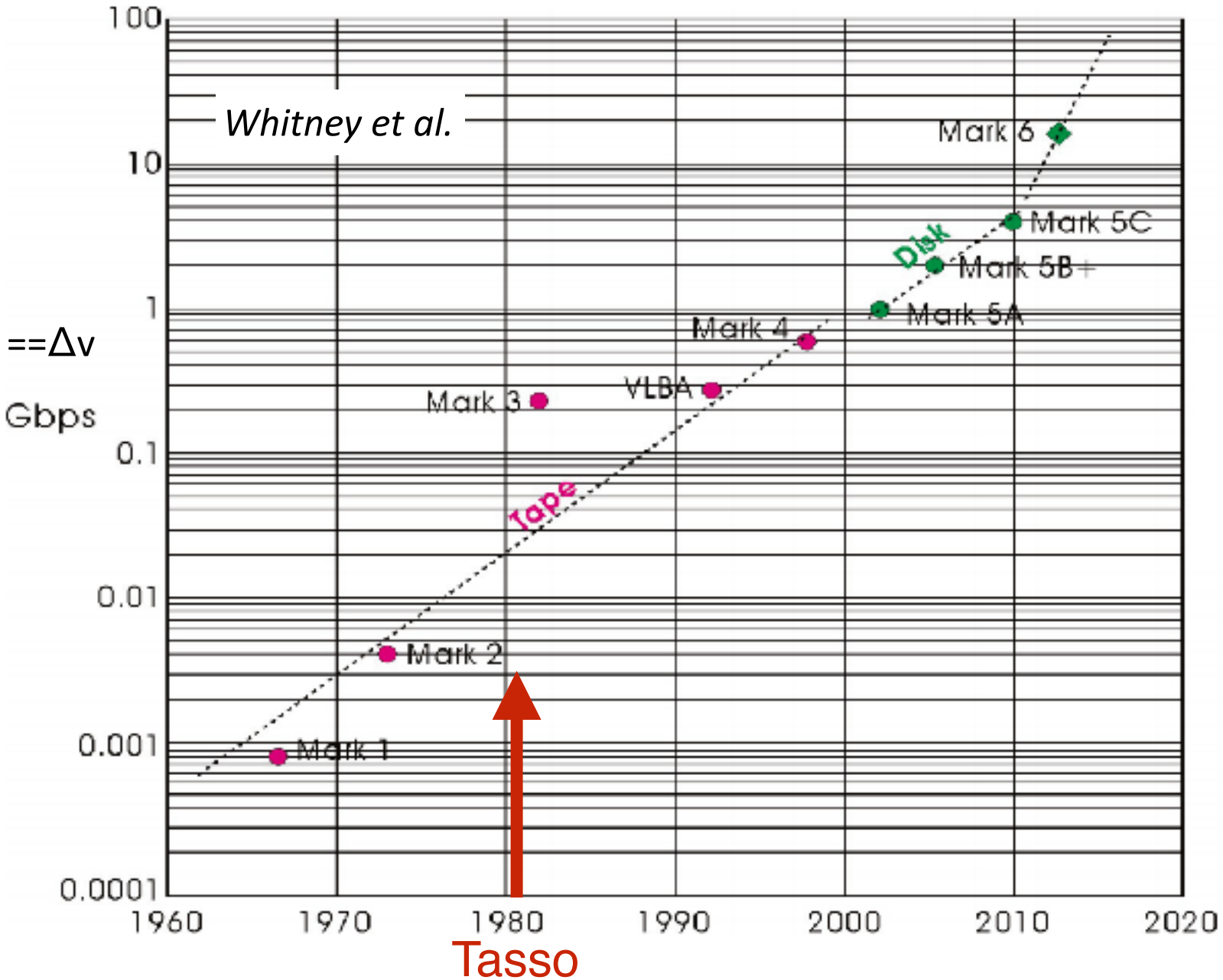

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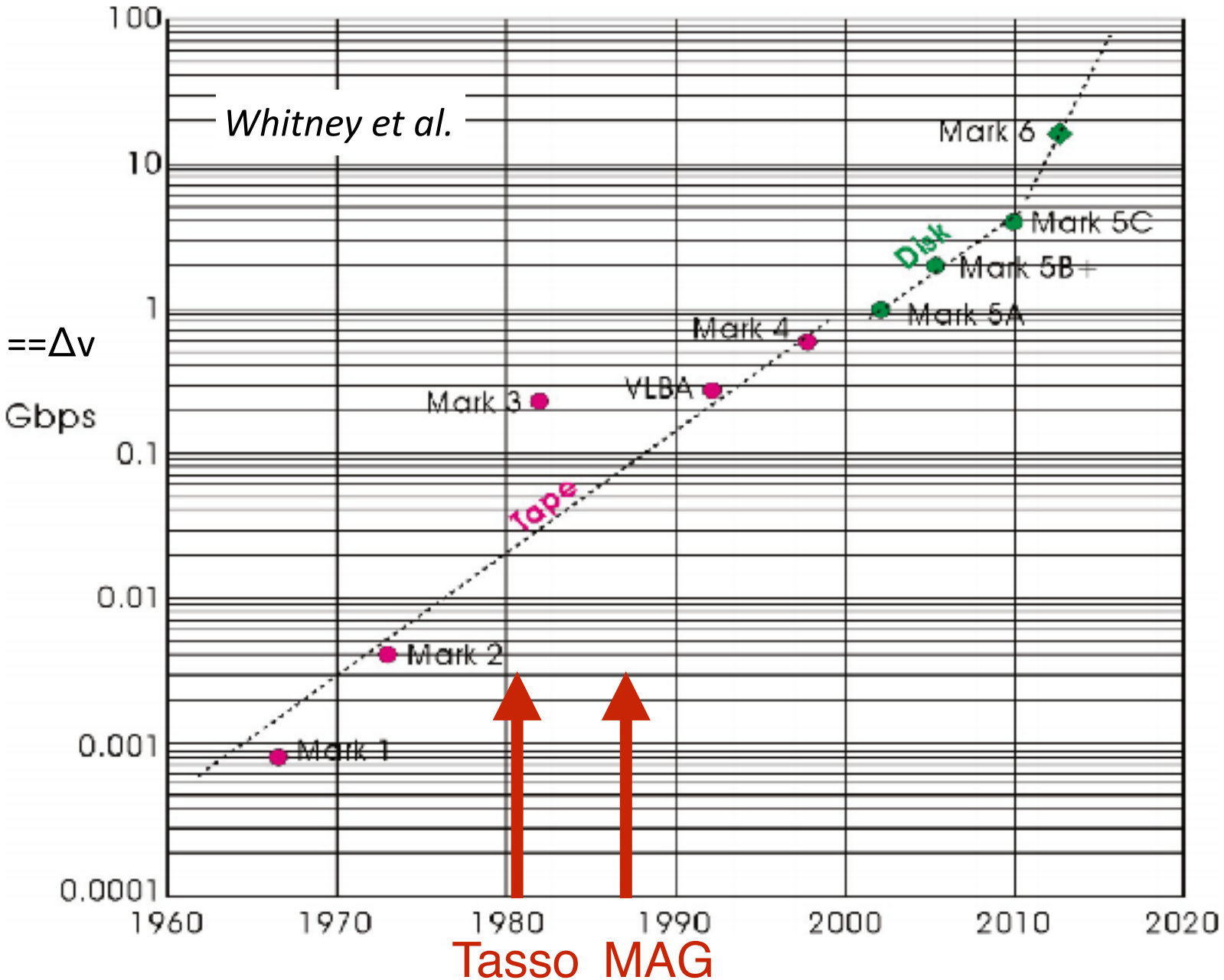

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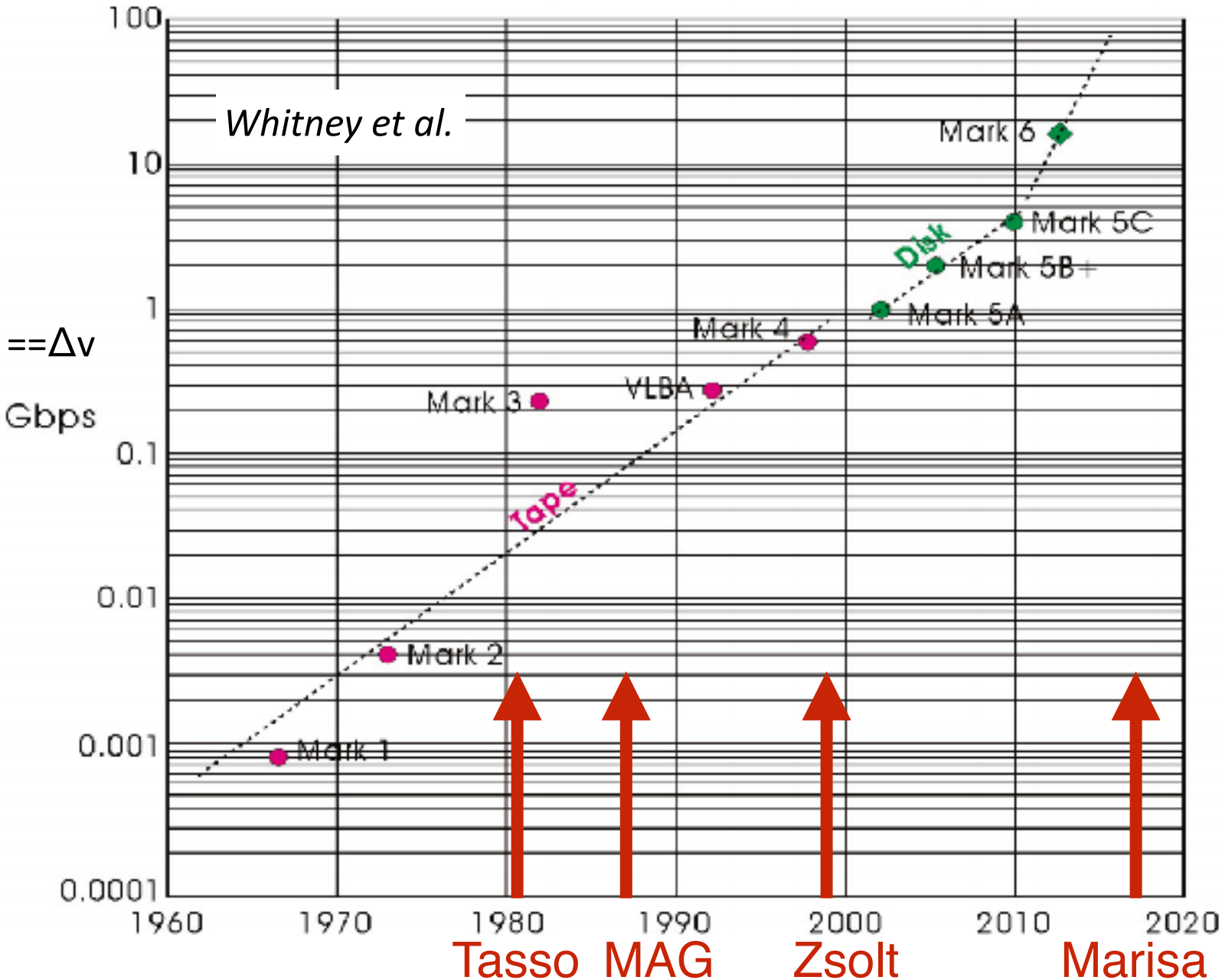

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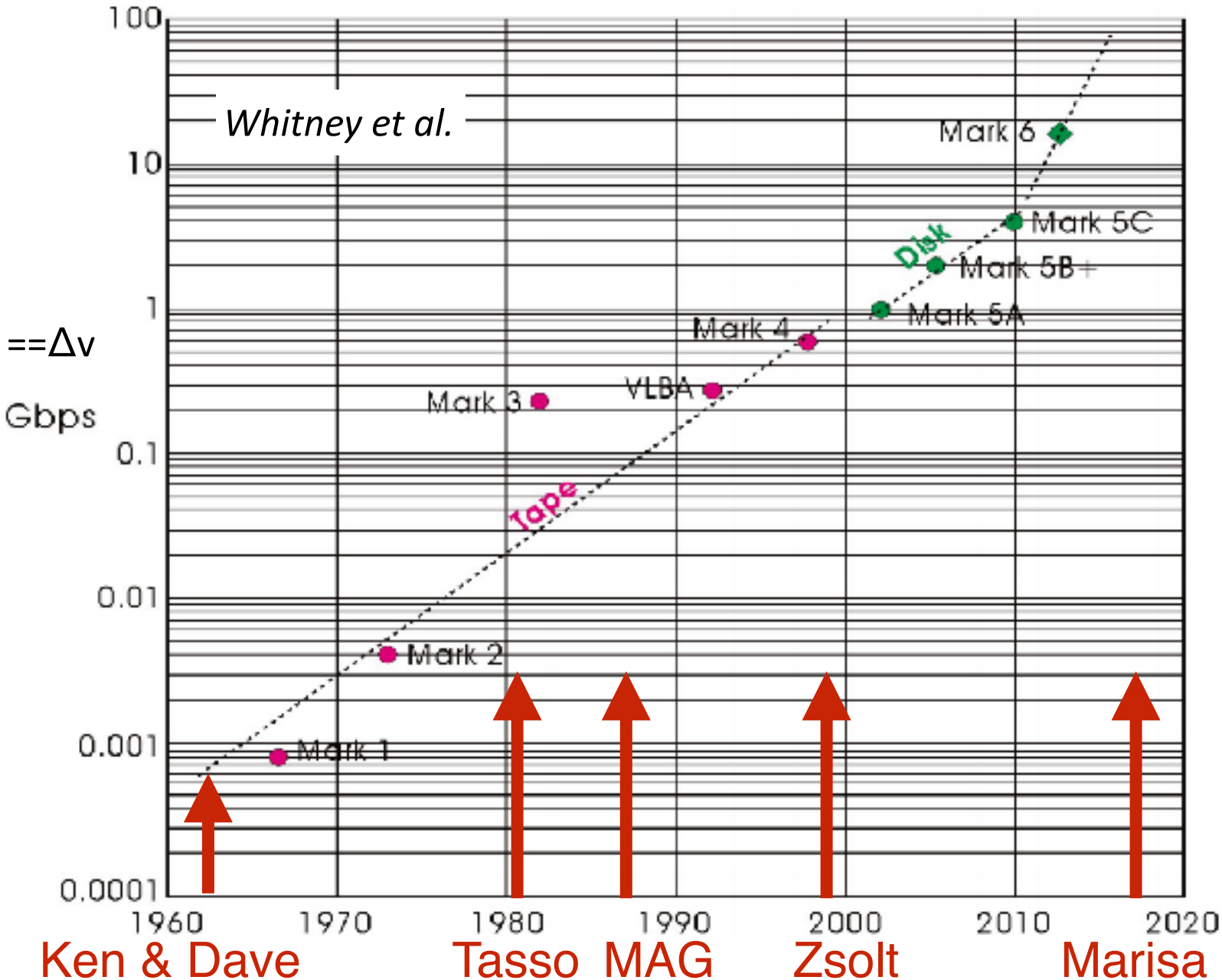

Η ΠΕΡΙΦΕΡΕΙΑ ΠΕΛΟΠΟΝΝΗΣΟΥ

τιμής ένεκεν

ΣΤΟΝ

ΦΥΣΙΚΟ - ΡΑΔΙΟΑΣΤΡΟΝΟΜΟ - ΜΗΧΑΝΟΛΟΓΟ

ΔΡ. ΑΝΑΣΤΑΣΙΟ ΤΖΙΟΥΜΗ

ΓΙΑ ΤΗ ΣΥΜΒΟΛΗ ΤΟΥ ΣΤΗ ΡΑΔΙΟΑΣΤΡΟΝΟΜΙΑ
ΚΑΙ ΤΗΝ ΠΡΟΒΟΛΗ ΤΗΣ ΕΝΕΤΕΡΙΑΣ ΤΟΥ ΑΡΚΑΔΙΑΣ
ΣΤ' ΙΝ ΑΡΚΑΔΙΑ ΕΒΟ

ΤΡΙΠΟΛΗ 30 ΜΑΪΟΥ 2017

Ο ΑΝΤΙΠΕΡΙΦΕΡΕΙΑΡΧΗΣ ΑΡΚΑΔΙΑΣ
ΕΥΑΓΓΕΛΟΣ ΓΙΑΝΝΑΚΟΥΡΟΣ

ΤΙΜΗΣ ΕΝΕΚΕΝ

ΣΤΟΝ ΔΡ. ΤΑΣΟ Κ. ΤΖΙΟΥΜΗ
ΡΑΔΙΟΑΣΤΡΟΝΟΜΟ - ΑΣΤΡΟΦΥΣΙΚΟ

ΓΙΑ ΤΗΝ ΠΟΛΥΧΡΟΝΗ ΚΑΙ ΑΝΕΚΤΙΜΗΤΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΚΛΙ ΚΟΙΝΩΝΙΚΗ ΤΟΥ ΠΡΟΣΦΟΡΑ ΣΤΟΝ ΚΟΣΜΟ ΣΤΗΝ ΕΛΛΑΔΑ ΚΑΙ ΣΤΗΝ ΙΔΙΑΙΤΕΡΗ ΠΑΤΡΙΔΑ ΜΑΣ ΤΟ ΚΕΡΑΣΤΑΡΙ ΑΡΚΑΔΙΑΣ

29 ΜΑΪΟΥ 2017

ΟΙ ΑΠΑΝΤΑΧΟΥ ΚΕΡΑΣΤΑΡΛΙΟΙ

Η Ένωση Ελλήνων Φυσικών

απονέμει

στον διακριτικά επιστήμονα

ΑΝΑΣΤΑΣΙΟ Κ. ΤΖΙΟΥΜΗ

τα βραβεία της Ιδιαιτερότητας

για την μεγάλη συνεισφορά στην έρευνα και για τα σημαντικά αποτελέσματα προς
όφελος των επιστημών της Φύσεως.

ΤΟ Δ.Σ. ΤΗΣ Ε.Ε.Φ.

Thank you!