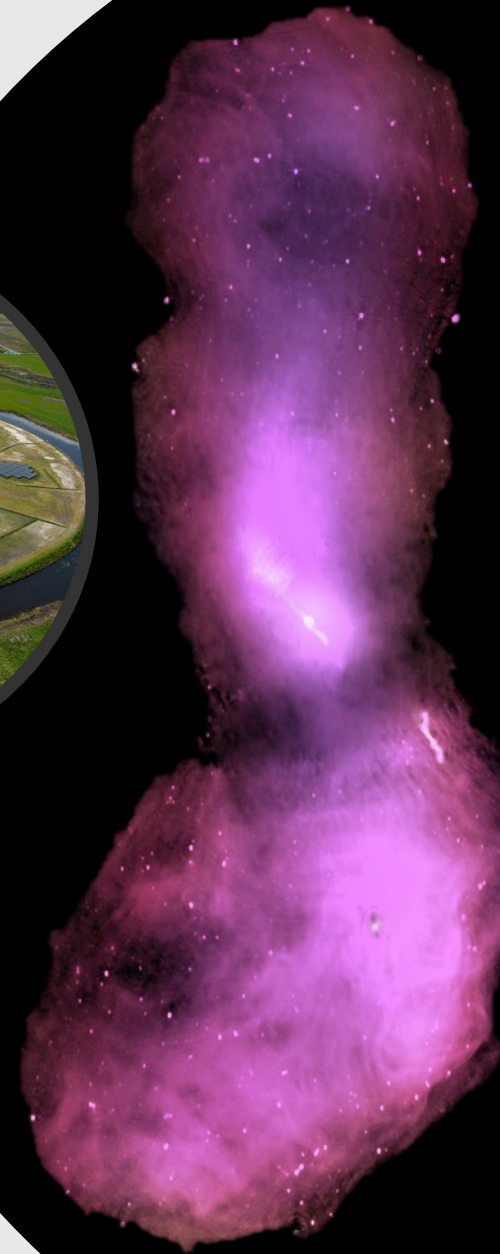




Designing a Telescope Proposal

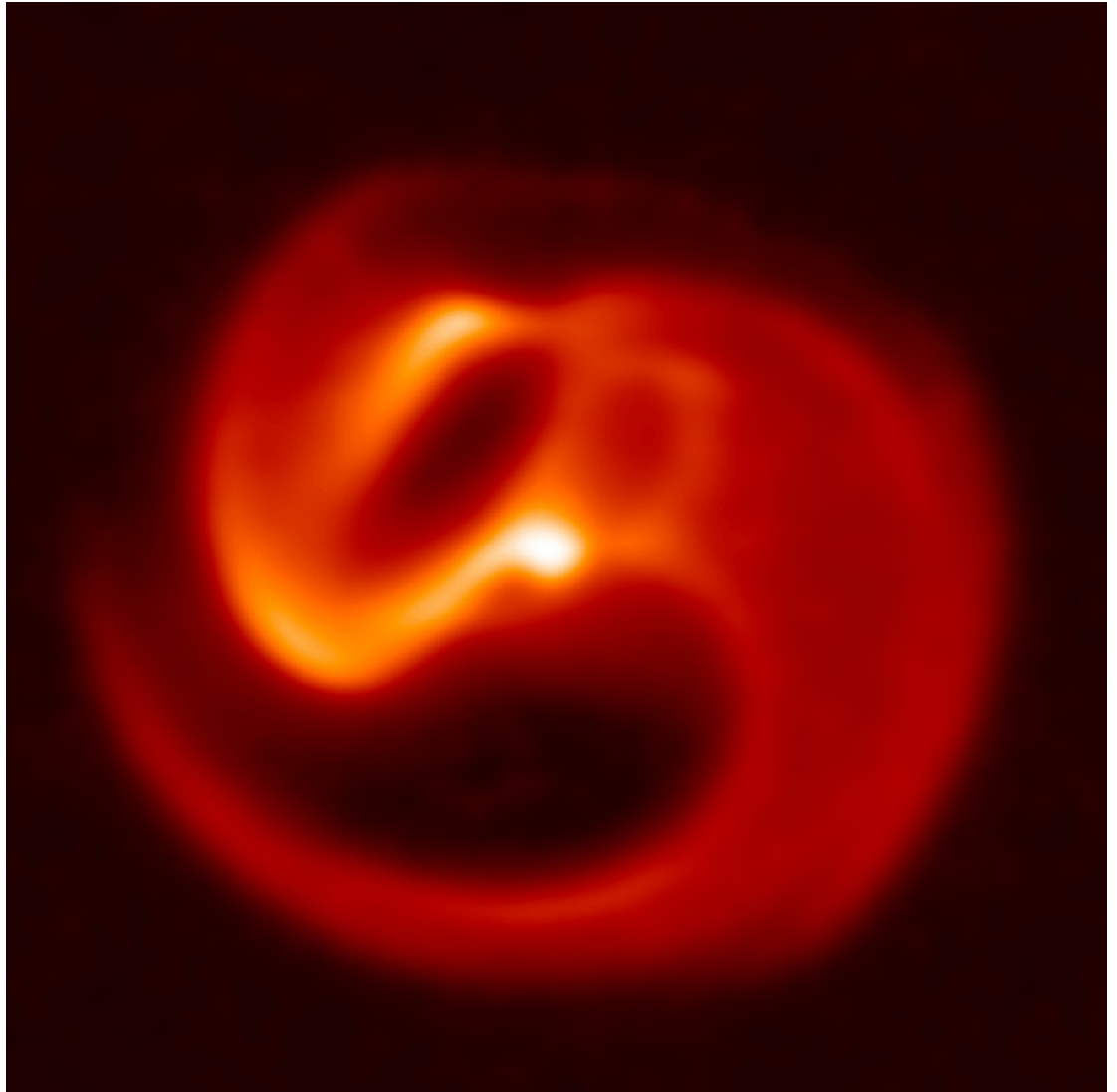
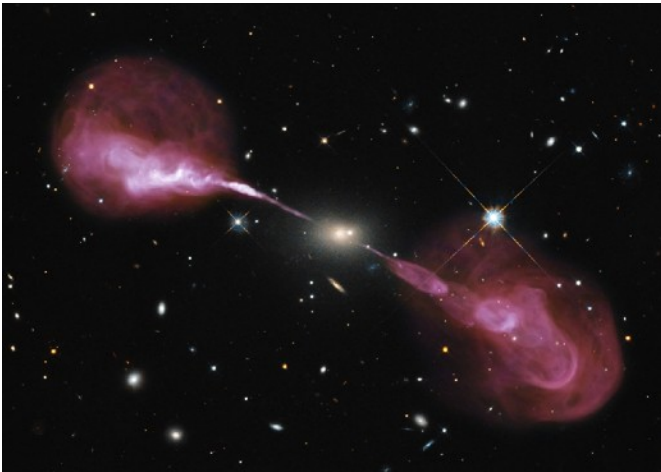
Joe Callingham (ASTRON)

*Botswana Radio Astronomy School,
Palapye, Botswana
11th of July 2019*



Step 1: Identify Sources

- › You have your favorite source(s) or population



Step 2: Identify Question

- › What do you want to know about your favourite source(s) or population?
- › This should attempt to solve a physical problem.
- › E.g. My model predicts that this source is undergoing evolution, so we predict at frequency X there should be this type of structure. If we find that, it provides the model correct.
- › It can also be a community output (e.g. calibration solutions or new imaging techniques for the community).



Step 3: Identify a telescope to answer that question

ASTRON

- › Do you need spectral resolution? Do you want high angular resolution? Do you need to observe over a wide-field of view?



Step 4: Work out how much time you need to do this

- › Each telescope has observing tools to work this out (sensitivity calculators). Some work based on rms required and others on total time
- › Depends if spectral line or continuum or VLBI
- › Has to be realistic or you are applying for large programs (if you start exceeding ~3 days of observing on radio telescopes, you are entering large program world)

VLA Exposure Calculator	
Array Configuration	<input type="text" value="A"/>
Number of Antennas	<input type="text" value="25"/>
Polarization Setup	<input type="radio"/> Single <input checked="" type="radio"/> Dual
Type of Image Weighting	<input type="radio"/> Natural <input checked="" type="radio"/> Robust
Representative Frequency	<input type="text" value="0.0000"/> <input type="text" value="GHz"/>
Receiver Band	Unspecified
Approximate Beam Size	<input type="text" value="Unknown"/>
Digital Samplers	<input type="radio"/> 3 bit <input checked="" type="radio"/> 8 bit
Elevation	<input type="text" value="Zenith (90 degrees)"/>
Average Weather	<input type="text" value="Winter"/>
Calculation Type	<input checked="" type="radio"/> Time <input type="radio"/> BW <input type="radio"/> Noise/Tb
Time on Source (UT)	<input type="text" value="0h 0m 0s"/>
Total Time (UT)	<input type="text" value="0h 0m 0s"/>
Bandwidth (Frequency)	<input type="text" value="0.0000"/> <input type="text" value="GHz"/>
Bandwidth (Velocity)	<input type="text" value="0.0000"/> <input type="text" value="km/s"/>
RMS Noise (units/beam)	<input type="text" value="100.0000"/> <input type="text" value="μJy"/>
RMS Brightness (temp)	<input type="text" value="0.0000"/> <input type="text" value="mK"/>
Confusion Level	0.0Jy
<input type="button" value="Help"/> <input type="button" value="Save"/>	

Step 5: Write a compelling proposal **ASTRON**

- › What makes a compelling proposal is in the eye of the beholder somewhat
- › TACs are used to assessing, so bias should be limited (or entrenched?)
- › Best practice to writing a proposal in my view:
 - Make the question you are trying to solve so obvious it hurts
 - Best if question impacts broadly (particularly around hot science topics)
 - Stress the key role the telescope you are applying at is the only (or close to it) telescope that can solve this
 - (sometimes) conclude with potential prospects if science is successful



"I haven't read your proposal yet, but I already have some great ideas on how to improve it!"

The reverse order...

- › In truth, a lot of astronomers work in the reverse order (step 3 to 1) – keeping in mind their favourite source



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A

Writing an abstract



Conclusions and tips

- › There are many ways to write telescope proposals, and you get better with practice
- › The science goal and technical capabilities of the telescope must go hand in hand
- › Make the question you are trying to answer VERY obvious throughout
- › Compelling abstract is key... but hard.

