

Introduction

This project will simulate the process of proposing for, and reviewing, proposals at a radio telescope. You will learn to compose strong, compelling proposals, will practice quickly brainstorming scientific ideas with order-of-magnitude calculations, and will apply principles we have learned in class.

The project has five stages:

1. **Ponder a topic/target you're interested in.** Think, and/or do some reading of papers from arxiv.org. Consider: what can single-dish radio observations contribute to the topic? It's OK if your observations have done before. YOUR job is to come up with a well-motivated and well-rounded *observing proposal*.
2. **Develop and propose an observation with your group.** All group members must contribute to the proposal's development. I leave it to you on how to divide the labor in calculations, writing, literature checks, etc. You may work in groups of up to 4 people. If you're having difficulty finding a group let me know and I will pair you with someone. 21 April will serve as a group discussion session.
3. **April 30, in class,** you will all serve as the "Time Assignment Committee", assessing the proposals from your peers using standard TAC assessment guidelines (which will be discussed in class that day);
4. **By 6 May 10AM, each INDIVIDUAL will turn in their OWN revised proposal.** You will each revise the group proposal to make it stronger based on the TAC assessment. For this project component, students are required to work alone. **Your grade will be based 10% on your level of participation in part 1, and 90% on your changes from the group proposal to the final individual proposal. I will use the TAC comments and assessment sheet given in class for grading your final proposals.**
5. Based on the in-class assessments and my own review, four hours of GBT time may be scheduled for one or two programs. I will prioritize proposals for which the observations are actually likely to be published by students and/or faculty at WVU. Up to ~8 hours may be allocated for truly novel proposals.

Ground Rules/Constraints

Your job is to propose a measurement of some object or set of objects. You have freedom of choice for your scientific goal. You should brainstorm with your group, but are welcome do so also with anyone willing in the department. You are welcome to email/chat with me to discuss your ideas. Slides from our 14 April class are posted on the class webpage for a few ideas. You will also find a proposal latex template that I use for almost all of my NRAO (VLA/GBT/VLBA/ALMA) proposals.

Things to include in your proposal

Good proposals cover a number of areas: a compelling **title**, **scientific background** (Why is this science interesting? What is the bigger picture view of this topic?), **proposed observations** (What measurement do you want to do, and why is this observation interesting? What test will you perform and what is the main expected outcome? Briefly, how will you interpret your observations?), and a **technical feasibility justification** (Prove that this observation is doable and estimate the time you need. What frequency(s) will you use and how much time will you need to spend with each receiver? This is the right section to do things like state the feasibility of detection, expected S/N or sensitivity limit, check object sizes vs beam sizes, estimate required exposure—short is good. Note why GBT is the right facility for the observation; could other facilities do the science better?).

What you will turn in

1. **30 April before 9am:** For the in-class exercise, by 9 am you must email me a PDF of your proposal for peer assessment (I will circulate these to your peers before class). *These copies should include your project title but not your names.* You must also have one member of your group send me an email that contains your title, group member names, and a statement of the primary roles/contributions of each group member in developing the proposal. Group proposals should have up to one page of text, with one additional page for any references and figures, no less than 12pt font. Develop this proposal with the guidelines given above.
2. **6 May:** Individual final proposals can be up to two pages of text in length, with one additional page for any references and figures; no less than 12pt font. Please include your name on these; they will only be read by me.

Grades will be based as noted above. NOTE: as with real proposals, if your figures are illegible or your text or figures go beyond the formatting guidelines you will be heavily penalized (10% reduction in grade). In reality, some telescopes will reject your proposal outright if it does not follow formatting guidelines.

Useful links and information

GBT observers guide: <https://science.nrao.edu/facilities/gbt/observing/GBTog.pdf>

NED collects images and the radio flux density of many objects: <https://ned.ipac.caltech.edu/>

NRAO Archive has historical radio images and data: <https://archive.nrao.edu/archive/advquery.jsp>

SIMBAD is a broad multi-wavelength database: <http://simbad.u-strasbg.fr/simbad/>

NASA ADS is an excellent query tool for papers: <https://ui.adsabs.harvard.edu/>