

2020-07-30

SMART meeting, 30 Jul 202

Present:

- Ramesh Bhat
- Keegan Smith
- Nick Swainston
- Sam McSweeney
- Zhongli Zhang
- Susmita Sett
- Marcin Sokolowski
- Isaac Colleran
- Mengyao Xue
- Ryan Shannon
- Willem van Straten

Update overview (Ramesh):

- Survey ramping up
- 3 student projects connected to SMART survey
- Have been awarded time on OzStar (1.5 million hours), looking ahead to Garrawarla
 - 2-3 times speed increase on OzStar (compared to Galaxy)
- Adopted strategy of "quick look, first pass" pipeline constrained by PhD timelines
 - Limited DM steps, 5-10 mins of data
 - New pulsar (J0036-1033) gives us hope!
 - Also important for "quick" turnaround of data processing so that fields can be re-observed if necessary
 - 96 known pulsars detected with Keegan's pipeline
 - 5 fields have been processed (although not sifted for candidates)
- Alternative search strategies are being explored (cf Susmita & Marcin's imaging pipeline)
- ADACS proposal initially turned down, but CIC resources have been allocated
- We have to take advantage of all remaining Phase 2 compact configuration time for data collection
 - There will be a proposal call later this year
- At least 60% data is in the can
 - By the end, ~3PB, 0.5 million beams, 7 million core hours for 1 round of processing
- Follow-up of J0036-1033 possible with ~10 existing archived VCS observations (both phase 1 and phase 2, extended and compact)
 - For localisation, regridding/re-beamforming straightforward task w/out need for re-observing
 - Sub-arcminute localisation unlocked
 - Efforts to understand polarimetry -- for new pulsar (and more generally)
 - Attempts to detect new pulsar in imaging
 - So far unsuccessful
 - Suggests that pulsar is "low luminosity pulsar"
 - Proposal has been put in for Parkes, and will be put in for GMRT (deadline tomorrow)
 - Will be basis for short paper

Nick's update:

- Just about finished processing (quick look) 9 observations.
- Been through 1000's of candidates
- New Nextflow pipeline:
 - Has improved efficiency, uses containers
 - Can now process 1 obs per week
 - Installed on Garrawarla, Ozstar, and (almost) at SHAO
- ML part of pipeline helps a lot, but still produces many obvious noise candidates
- Working to decentralise candidate ranking (so that it's not just Nick doing it)
- Also working on Single pulse candidates
 - Likes LOFAR single pulse software/pipeline
 - Have tried SHAO's pipeline (STEP?) -- almost working, but indications that it may not be the best choice
 - >15 candidates per beam lots of candidates!!

Marcin's update:

- Pipeline:
 - Offline correlation (1 sec integration), RFI flagging, calibration, and other standard MWA processing, output = Stokes images from XX, YY
- Looking for J0036-1033 in imaging
 - RMS 12 mJy (I) and 2.5 mJy (V) images show nothing convincing at pulsar's location
 - Pointing towards pulsar is <5mJy
 - Also, GMRT image of same area of sky shows nothing (which gets down to 2.5 mJy/beam)
 - Can see other pulsars in the field with same imaging techniqu

Sam's update:

- LOFAR's tree classifier
 - DM curve, profile, freq-vs-phase, time-vs-phase features
- Generative adversarial networks
 - Isaac's ongoing project
- All available ML tools will feed into database app (with web interface) for human inspection.
- Working with CIC to develop database/web app.

Discussion:

- Fancy tricks for localisation? Follow up with Ryan's FRB localisation techniques with ASKAP (Ryan to email Nick some Python code). May get down to $\sim 1/10$ of a (tied-array) beamwidth in precision.
- Imaging can help weed out nights when ionosphere is very active and moves sources around
- Test gridding method on known pulsar position to get errors
- Not likely for Nick's pulsar to be in a sidelobe -- sidelobe detections have characteristic frequency dependence.