Summer 2019 Student Start-up for Pulsars and Transients

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1. **Contact Info:**

- Jim Cordes — `cordes@astro` — 520 Space Sciences.

- Shami Chatterjee — `shami@astro` — 524 Space Sciences.

- Adam Brazier — `brazier@astro` — 522 Space Sciences on Tues, Thurs.

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2. **Introductory and Reference Material:**

Start here[1]: `http://astro.cornell.edu/~shami/psrintro/`

As a starting plan, read the Nobel Prize lectures in (1), (2) for historical flavor and work through (5), (4) for a background understanding of radio pulsars.

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3. **Python:**

Make sure you have access to a working Python installation. If you're using a laptop of your own, it is <u>much better</u> not to fiddle with your operating system Python version, since you risk breaking things. Instead, we recommend that you install and update the <u>Anaconda Python distribution</u>.

Start here: `https://www.anaconda.com/distribution/` (or search for Anaconda Python).

Please install the <u>Python 3.7</u> version (current) rather than the Python 2.x version.

Then install the following packages, at least, if they aren't already there by default:
$\rightarrow$ IPython;
$\rightarrow$ NumPy, Matplotlib, AstroPy, SciPy.

If you haven't worked with Python before, please open a terminal window, launch IPython, and use one of the various online tutorials to come up to speed on the basics.

- Try: `https://www.learnpython.org/` (Basics, and NumPy arrays)
- Or try: `https://docs.python.org/3.7/tutorial/`

- If you haven't used Matplotlib before, try this tutorial too:
Pyplot: `https://matplotlib.org/users/pyplot_tutorial.html`

- For a flavor of advanced Astronomy-specific capabilities, take a look at:
`https://python4astronomers.github.io/intro/quick-tour.html`

- Finally, here is a gist by Danny Price that brings it all together:
`https://gist.github.com/telegraphic/790df2b9dc94dcb690053fe563687282`

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[1]All links are clickable in the PDF version.

4. **Advanced exercises:** please ask for help if needed.

- **Detection of the carrier signal from the <u>Voyager</u> spacecraft:**

This uses data from the Green Bank Telescope that were acquired as part of the Breakthrough Listen (SETI) project:

IPython Notebook: `https://github.com/UCBerkeleySETI/breakthrough/blob/master/GBT/voyager/voyager.ipynb`

You can get the required filterbank module at the same place: `https://github.com/UCBerkeleySETI/breakthrough/tree/master/GBT/voyager`

There is also a PDF description file included.

You can run the notebook as a Jupyter notebook. It will produce some plots.

Getting this to work is a bit of a challenge so if you accomplish it, congratulations.