Welcome to the 2018 ISR Summer School!

- The mission of this school is to introduce students to basic incoherent scatter radar (ISR) concepts and encourage the use of data products in their ongoing research efforts.
- Every student comes with a slightly different background. Each lecture is structured to come at the ISR concepts from a different angle so you may find some lectures building from your particular education base more than others.
- Ask questions! There will be lots of unstructured time in the afternoons where you can discuss concepts you didn't understand with the lecturers. If you hear unfamiliar jargon or acronyms during the lectures feel free to ask for a definition – you are likely not alone. Use the chat or Slack #general channel.
- Even if you don't become an ISR expert, this school will give you the tools you need to use ISR data in your research and become more familiar with topics you will encounter in future conferences.
- All lectures will be placed on the school wiki for future reference.

The week ahead

- The week is divided up into morning lectures and afternoon group work.
- The lectures take you through the basics of radar, ISR theory, pulse coding, data analysis and fitting, and data interpretation. Some topics are iterated to give different perspectives and review material.
- Experiments will be designed on Tuesday and run that night at PFISR.
- On Tuesday night/Wednesday morning, your group will have the opportunity to observe your experiment being run.
- Data will be delivered on Wednesday afternoon and the rest of the week's group work will be used to analyze the results.
- Each group will present results from their experiments on Saturday morning in a randomly selected time slot. All group members present.
- Introductions!

Group Discussion of Select Ionospheric Properties

- We are going to divide into your groups in breakout rooms
- Each group will be given one significant ionospheric property/concept to discuss
- Some helpful questions are listed to facilitate discussion
- After twenty minutes, each group will report back a summary of their property/ concept and why it's important in ionospheric research (5-6 min)
- The challenge is to use simple (plain) language with as little jargon as possible. Charts and figures can be drawn and shared on slides.
- Bonus points if your group can compose an explanation that passes the Up-goer Five Text Editor (http://splasho.com/upgoer5/)
- Mentors will be available and can help as much as you would like. If you don't understand a concept, press the help button!
- The ionospheric lecture is available on the wiki and there are helpful charts and bullets points that you can refer to if needed.
- Have fun!

Group #1: SCALE HEIGHT

- What is scale height?
- Why is it important in the ionosphere?
- How does scale height affect composition?
- How does scale height affect the size of ionospheric features at different altitudes?

Group #2: CHAPMAN LAYERS

- Why is the ionosphere layered?
- Why are there multiple layers?
- What is the effect of solar zenith angle?
- What are the assumption and limitations of Chapman layers?
- What similarities are found in ionization from auroral precipitation?

Group #3: CONDUCTIVITY

- How is conductivity related to magnetic field?
- Why does geographic location matter for conductivity?
- How does conductivity vary with altitude and where are peaks?

Group #4: DEBYE LENGTH

- What is the Debye length?
- How does the Debye length factor into whether a plasma's bulk motion is observed or that of individual particle motion?
- How does the Debye length vary with altitude in the ionosphere?
- If we want to measure bulk plasma parameters with an incoherent scatter radar, how will the Debye length affect our choice of radar frequency?

Group #5: COLLISION FREQUENCY

- How does collision frequency vary with altitude?
- What is the interaction between collision frequency and gyrofrequency?
- How are ions and electrons affected differently by collision frequency with altitude?