

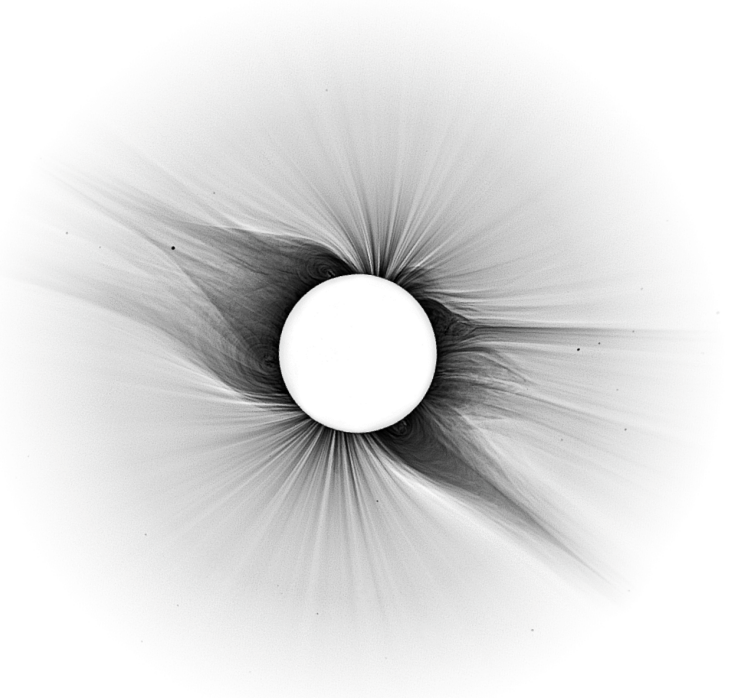


Ripples in the Solar Wind

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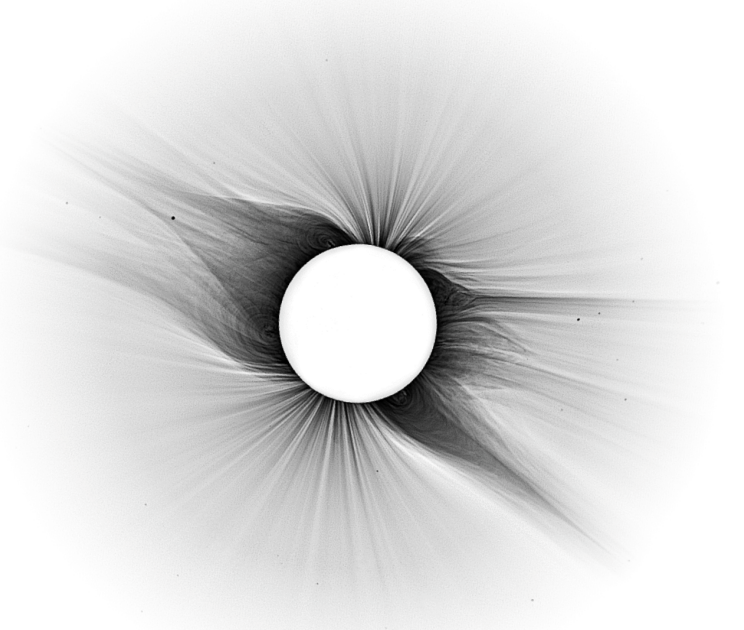
Studying the solar wind

- The solar wind is the continuous “evaporation” of the Sun’s outer atmosphere, which flows out to fill the solar system with hot plasma.
- Variability drives **space weather** that can affect satellites, power grids, pipelines, and safety of astronauts & high-altitude airline crews.



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- Variability drives **space weather** that can affect satellites, power grids, pipelines, and safety of astronauts & high-altitude airline crews.
- Many unanswered questions...
 - Can we **forecast** space weather that’s coming next week? month? year?
 - Did the solar wind blow away **Mars’** atmosphere & oceans?
 - It’s driven by whatever **heats the solar corona** to a temperature of >1 million K, which we still don’t understand.



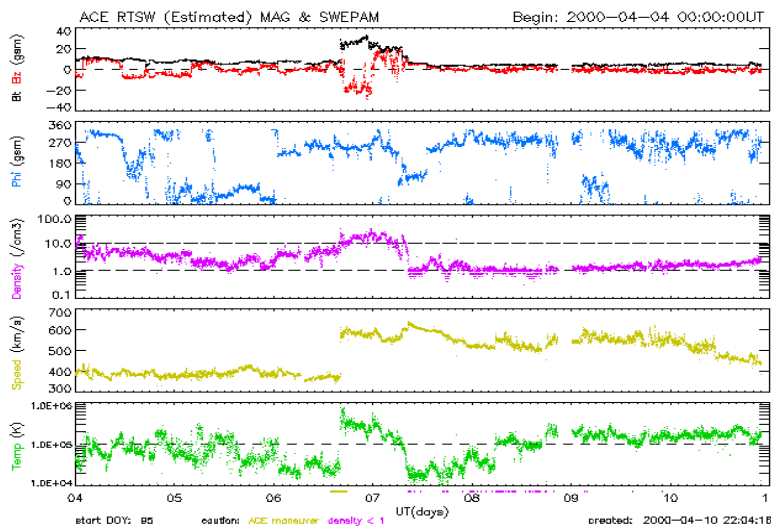
Studying the solar wind

- Many of us suspect the physics of the solar wind depends a lot on the properties of its small fluctuations (waves, shocks, turbulent “eddy”).
- There are still so many aspects of **waves in the solar wind** that haven’t yet been examined.
- We have > 50 years of **high-resolution data** from space probes that measure the “*in situ*” properties of the solar wind.



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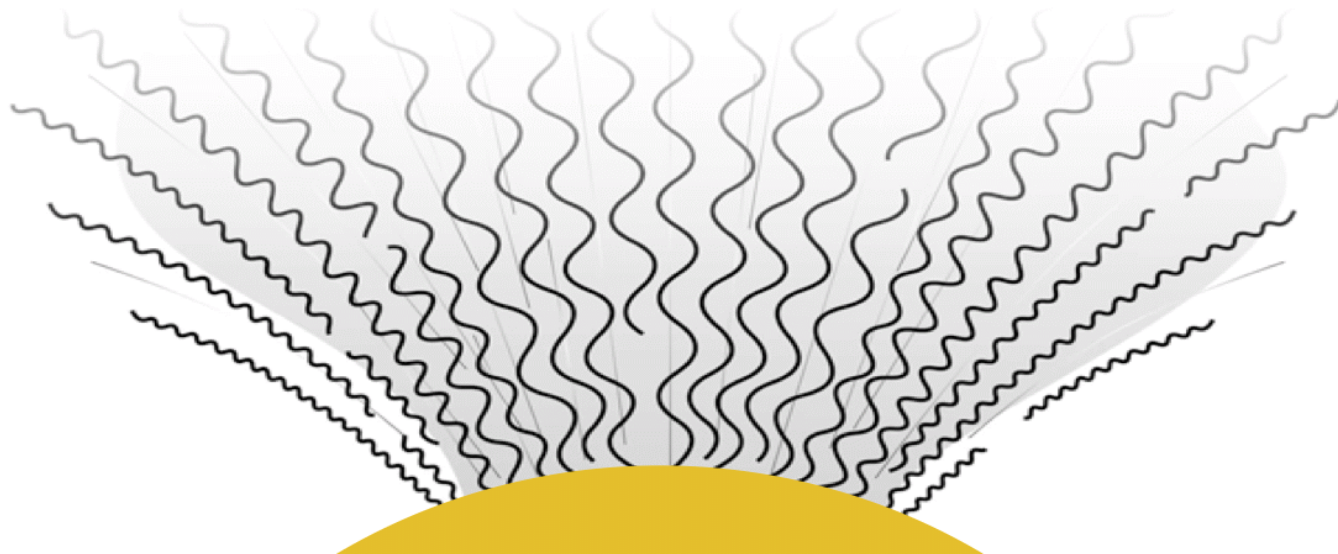
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This project: a fishing expedition?

1. Obtain data (fits on a laptop)
2. Process it (remove stuff that isn't "waves in the wind")
3. Extract the wave properties (amplitudes, phases, cross-correlations)
4. Verify some well-known trends (stronger waves in faster wind, etc.)
5. Dig deeper!

Very open-ended... No guarantee of publishable results, but I've got a **long list** of trends to hunt for – i.e., theoretical predictions that haven't yet been tested with real data.



You:

- Some coding skills needed. You'll be writing your own codes (with guidance from me) for reading, plotting, & analyzing the data.

Python? R? IDL? Matlab? Mathematica?

- Recommended courses to have taken: ASTR-2600 and ASTR-3800.

Me:

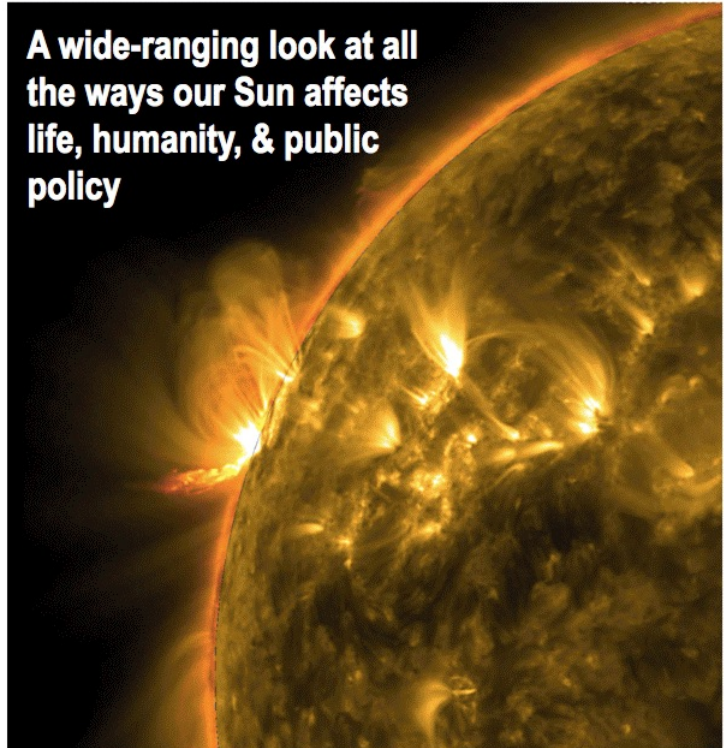
- Prof. Steve Cranmer... Email: steven.cranmer@colorado.edu
Web page: <http://lasp.colorado.edu/~cranmer/>
- Email me
 1. Your CV
 2. Brief description of your coding experience
 3. Do you want \$, or independent study credit, or honors thesis?

The SUN and Society:

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- Climate change
- Solar panels
- Photosynthesis
- Vitamin D
- Fusion power
- Alien life under other Suns?



A wide-ranging look at all the ways our Sun affects life, humanity, & public policy

Open to all majors (no pre-requisites)

Counts toward APS Gen. Astron. Major, APS Minor, Space Minor

ASTR-2050 ♪ Spring 2018 ♪ Tues/Thur 9:30–10:45 ♪ Duane G131

For more information: Prof. Steven Cranmer . . . http://lasp.colorado.edu/~cranmer/ASTR_2050_2018/