- Heliophysics Summer Schools -
Learning about “living with a star” in an evolving world

... and some observations on the School’s history, lecturers, students, books, and educational impact.

Karel Schrijver
2016/08/01 Boulder, CO
1) Science of coupled systems

- Energetic Electrons
- Solar Flare Protons
- Damage to Spacecraft Electronics
- Ionospheric Currents
- GPS Signal Scintillation
- Radiation Effects on Avionics
- Geomagnetically Induced Current in Power Systems
- Induced Effects in Submarine Cables
- Telluric Currents in Pipelines

Source: NASA
2) Expansion of experience

- Corona
- Wind in the outer heliosphere
- Earth ionosphere
- Mammal range

From Heliophysics I

Heliophysics summer school 10th anniversary
ABOUT COOL STARS

The Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, or Cool Stars, for short, is one of the longest running independent astronomy workshops in the world. It began in Cambridge, Massachusetts in 1980. Since then, Cool Stars has been regularly held in America and Europe since 1993. Previous host cities include: Athens, GA; Florence, Italy; Tenerife, Spain; Lisbon, Portugal; Barcelona, Spain; and Flagstaff, AZ. We are delighted to announce that CS19 is being held in Durham, UK.

Cool Stars gathers approximately 400 international participants annually to present the latest research in the pre-main-sequence through the asymptotic giant branch, with an emphasis on exoplanets, binaries, and the wider universe. It is renowned for its high scientific standards, providing a cross-disciplinary exchange of ideas and results in the areas of astrophysics, exoplanets, galactic and stellar evolution, and astrobiology. Ultimately, Cool Stars aims to advance understanding of the fundamental processes that govern the evolution of cool stars, and the wide range of related topics, with an emphasis on cutting-edge science, demonstrated by the preponderance of seminars on recent findings.

In previous workshops, Cool Stars has been celebrated for its role in the discovery of the first extrasolar planet around a Sun-like star and the first confirmed brown dwarf, which were both first announced at Cool Stars 9 in Florence, Italy in 1995.
Magnetic storms and aurorae occur around all magnetized planets.
locations of Kepler Planet Candidates

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NEWSRELEASERIGHT

News Release Archive:

News Release Number: STS01-2016-27

NASA's Hubble Telescope Makes First Atmospheric Study of Earth-Sized Exoplanets


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July 20, 2016: The possibility of life imagination for centuries. Over the planets orbiting other stars has spark sustain life. Most of these candidates are unique contributions to the paper example, to make the first measurements of extrasolar planets.

Now, astronomers have used Hubble around temperate, Earth-sized planet that increases the chances of habitable exoplanets TRAPPIST-1b and TI away, are unlikely to have puffy, hydrogen-dominated atmospheres twice the mass of the Moon. The most massive planet listed on the NA Archive is DENIS-P J082303.1-491201 b, about 29 times the mass although according to some definitions of a planet, it is too massive to be a "planet".
Looking at stars like the Sun to learn about rare large space storms

NASA’s Kepler mission monitored ~150,000 stars.

All rotating stars with convective envelopes exhibit atmospheric magnetic activity.

Spectral type: appr. K6

1.1 $10^{37}$ ergs ~ X110000

(courtesy Dave Soderblom at STScI)
Flying through the local universe on a super-galactic scale

The visible universe contains a few hundred billion galaxies, with a few hundred billion stars each. Every star (give or take a factor of a few) has a planetary system.
4) Recognizing analogs

NASA’s Rover Curiosity
Heliophysics summer school and books

- Project started in 2006 with a proposal to LWS/TR&T by Karel Schrijver and George Siscoe.
- School leads: Fran Bagenal, Amitava Bhattacharjee, Dana Longcope, Karel Schrijver, and Jan Sojka.
- Schools last 8 or 9 days:
  - ~50% of the time is dedicated to lectures,
  - ~40% to labs/homework/discussions, and
  - ~10% to career skills (introductions, short presentations, posters, career discussion, Q&A sessions, student-teacher mentoring sessions, …),
  - with some excursions within Boulder (SWPC, LASP, …)
- Each year approximately 35 students are selected from 70-90 applications by mid-PhD to early-postdoctoral students from around the US and elsewhere in the world.
- The 10 schools trained well over 300 promising researchers by ~70 subject-matter experts from all sub-disciplines within or connected to heliophysics from around the world.
- Four ‘reader’/textbook volumes published by Cambridge University Press.
- Online resources ([http://vsp.ucar.edu/heliophysics/summerschool](http://vsp.ucar.edu/heliophysics/summerschool))
  - Lectures from all years in pdf format, many also available as movies, accompanied by problem sets, and with student labs and their documentation, and Heliophysics “Volume V”. The website offers multi-perspective access and search capabilities, and expanded problem-set and lab-documentation resources.
1) Science of coupled systems
2) Expansion of experience
3) Approximating experimental physics
4) Recognizing analogs
Heliophysics: the pursuit of socially-relevant science of the local cosmos, using the universe as its laboratory