MEETINGS

Heliophysics: A Field With Its Own Universal Laws?

AGU Chapman Conference on Universal Heliophysical Processes; Savannah, Georgia, 10–14 November 2008

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If one might be so bold as to draw an analogy with the "spirit of Copenhagen"—the atmosphere created by Niels Bohr in which a small group of physicists developed the field of quantum mechanics—then the "spirit of Savannah" might describe the atmosphere at the Chapman Conference on Universal Heliophysical Processes, held there in November under the umbrella of the International Heliophysical Year. Whether or not the analogy will hold depends upon whether some subset of the Space Physics and Aeronomy community continues a movement to establish "heliophysics" as a field with universal laws of its own—a project that has become surprisingly controversial. Extensive, lively debate at the conference among researchers in very different fields who otherwise would rarely meet, along with uniformly excellent conference presentations tailored to communicate across disciplines, suggests a positive future for the project.

The movement to establish heliophysics as a field with universal laws of its own began with publication in 2004 of the National Research Council report "Plasma physics of the local cosmos" (http://books.nap.edu/openbook/0309092159/html/index.html). The report divides the universe into gravitationally and magnetically organized matter and focuses on the latter as the domain of heliophysics. Aeronomers were quick to point out that their domain includes gravitationally organized matter in an essential way, in particular, in interactions between ionized and neutral media. At the conference, participants expanded an existing table of universal heliophysical processes to include gravitationally organized matter.

Some conference participants dismissed the idea that heliophysics can be a standalone field with its own universal laws, arguing instead that it is a purely derivative science based upon universal laws of physics and chemistry. From the perspective of universal laws as paradigms, i.e., synthesizing principles with explanatory power that link distinctive phenomena, others pointed out examples that heliophysics can call its own—for example, an emerging paradigm that received new support at the conference is a common mechanism for coronal mass ejections and substorms. Some argued that searching for more universal laws of this kind through a program of comparative studies may be a fruitful path for breakthroughs in understanding a wide variety of heliophysical phenomena. On the other hand, aeronomers have been conducting comparative studies of planetary environments for years and find that each has unique heliophysical characteristics that elude explanations in terms of a common paradigm. Their comparative approach instead deepens our understanding of the fundamental laws of physics and chemistry that govern all of these environments. In the "spirit of Savannah," participants plan to continue this discussion through a Web site currently under development (http://www.bu.edu/csp/NESSC/savannah).

The "spirit of Savannah" seems especially appropriate for these efforts in view of the city's history of tolerance. In keeping with that history on the conference tour arranged by NASA's John Cooper, who grew up in Savannah, one British participant noted, "Only in America [read Savannah] would a group of scientists sing 'Moon River' over the grave of Johnny Mercer and drink a toast to transvestite Lady Chablis" (made famous in John Berendt's *Midnight in the Garden of Good and Evil*). May that tolerance extend to new scientific endeavors.

The conveners are indebted to AGU staff for their gracious, seamless, behind-the-scenes work to ensure that all needs were met for a successful conference.

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