



# News from The Society for Astronomical Sciences

Vol. 7, Number 1

## The 2009 Joint SAS/AAVSO Symposium is in final stages of organization and scheduling

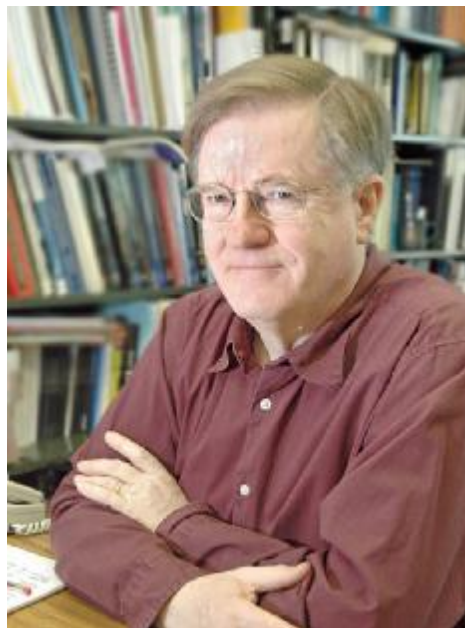
The final planning for this years Symposium is underway. On pages 2-3 you can see the tentative schedule of speakers. Since this is a joint meeting between the SAS and AAVSO, an extra half day was required to accommodate all the speakers. As in the past workshops will be offered. For this meeting they will be evening sessions: Tuesday evening: Data Mining by Paul Szkody and Arne Henden.

We are entering an era when much data on variable stars exist in the public domain. The data mining workshop is designed to make observers comfortable with using available data to enhance their observations as well as to provide a resource for work on cloudy nights and/or lack of telescope access. The first hour of the workshop will focus on the AAVSO data. Their web site is changing along with the usual tools available and this hour will provide instruction on how to best use the new site. The last 2 hrs will center on the Sloan Digital Sky Survey data. We will explore how to access the photometric and spectroscopic data, make finding charts, find magnitudes of comparison stars, find and classify new variables, and make simple queries with the SQL language used in many databases. New material beyond the Nantucket Data Mining Workshop will be included, so this workshop will be of interest to all attendees.

On Wednesday evening: photometry Essentials by Brian Warner and Jerry Foote.

*Continued on page 3*

## John Percy to deliver the Keynote address this year



John R. Percy (BSc Math and Physics 1962, MA Astronomy 1963, PhD Astronomy 1968, all University of Toronto) will deliver this years keynote address at the SAS Symposium. He is professor emeritus, astronomy and astrophysics, at the University of Toronto. His research interests include variable stars and stellar

evolution, and he has published over 200 research papers in these fields, and the recent book "Understanding Variable Stars".

He is also active in science education (especially astronomy) at all levels, throughout the world. He has edited or co-edited the proceedings of five major international conferences on this topic. His education interests and experiences include: teaching development at the university level; development of astronomy/space curriculum for Ontario schools; development of resources for educators; pre-service and in-service teacher education; lifelong learning; public science literacy; the roles of science centers and planetariums and the role of skilled amateurs in research and education ("citizen science").

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### Committee:

- Lee Snyder – Co-Chairman
- Robert Stephens – Co-Chairman
- Robert Gill – Audio Visual Webmaster
- Dave Kenyon – Program Co-Chairman
- Dale Mais – Program Co-Chairman, Newsletter editor
- Brian Warner – Program Co-Chairman
- Jerry Foote – Program Co-Chairman

### Advisors:

- Arne Henden
- Dirk Terrell
- Alan Harris



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**Tuesday, May 19**

<i>Coffee/Registration</i>		<i>08:00</i>	<i>08:45</i>
Welcome		08:45	09:00
Ame Henden	The AAVSO Wide-Field Photometric Survey	09:00	09:30
Kate Hutton, Mike Simonsen	Long-Period Variable Star Section Update	09:30	10:00
Lee Snyder	BL ERI: A Contact Binary System	10:00	10:30
<i>Coffee Break</i>		<i>10:30</i>	<i>10:45 15 MINUTES</i>
John L. Menke	Occultation Roulette: It is Addictive!	10:45	11:15
Scott Degenhardt	High-Resolution Asteroid Profiles by Multi-Chord Occultation Observations	11:15	11:45
<i>Lunch</i>		<i>11:45</i>	<i>13:30</i>
Russell M. Genet	Lightweight Mirror Developments	13:30	14:00
Tom Krajci	Optimizing Opto-mechanical Performance Using Simple Tools and Techniques	14:00	14:30
Wayne Watson	Recent Enhancements to the Sentinel Fireball Network Video Software	14:30	15:00
<i>Coffee Break</i>		<i>15:00</i>	<i>15:15 15 MINUTES</i>
Jay M. Pasachoff	Photometry and Light Curves in the Solar System	15:15	15:45
Richard Miles	Solar-r Photometry of Comet 17P/Holmes beyond 3.8 AU	15:45	16:15
Thomas G. Kaye, David Healy	The Spectrashift Exoplanet Transit Research Project	16:15	16:45
<i>Workshop</i>	<i>Data Mining</i>	<i>18:30</i>	<i>21:30</i>

**Wednesday, May 20**

<i>Coffee</i>		<i>08:00</i>	<i>08:25</i>
Welcome, Announcements		08:25	08:30
<b>Daniel O'Conner</b>	<b>Odyssey Moon Update</b>	08:30	09:00
James L. Edwards	Thinking Out Loud: An Optical SETI Campaign Well-suited for Amateur Astronomers	09:00	09:30
J. Young, A.W. Harris	The Early History of Photometric Observations of Asteroids made at TMO	09:30	10:00
Gary A. Vander Haagen	What's Next in Asteroid Photometry?	10:00	10:30
<i>Coffee Break</i>		<i>10:30</i>	<i>10:45 15 MINUTES</i>
Brian D. Warner	Slow Rotating Asteroids	10:45	11:15
Robert Stephens, Ralph Megna	Extending a Spectroscopic Survey of Main Belt Asteroids with Micro Telescopes	11:15	11:45
<i>Group Photo</i>		<i>11:45</i>	<i>12:00</i>
<i>Lunch</i>		<i>12:00</i>	<i>13:30</i>
<b>Pamela L. Gay</b>	<b>TBD</b>	13:30	14:00
Olivier Thizy	Echell and Optical Fibre Spectroscopy with eShel	14:00	14:30
Nicholas J. Wilsey, Matthew M. Beaky	Revisiting the O'Connell Effect in Eclipsing Binary Systems	14:30	15:00
<i>Coffee Break</i>		<i>15:00</i>	<i>15:15 15 MINUTES</i>
<b>Paul Temple</b>	<b>Using a Webcam CCD to do V Photometry</b>	15:15	15:45
Donald F. Collins	Intrinsic Variability of beta Lyrae Observed with a Digital SLR Camera	15:45	16:15
<i>Sponsor Infomercials</i>		<i>16:15</i>	<i>16:45</i>
<i>Workshop</i>	<i>Photometry Essentials</i>	<i>18:30</i>	<i>21:30</i>



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Thursday May 21, 2009

<b>Registration/Coffee</b>		<b>08:00</b>	<b>08:25</b>
Announcements		08:25	08:30
David Boyd, Boris Gaensicke	An Intensive CCD Photometry Campaign to Observe DW Ursae Majoris	08:30	09:00
Jerry Home	Deciphering Multiple Observations of V480 LYR	09:00	09:30
Robert E. Stencel, Jeffrey L. Hopkins	epsilon Aurigae 2009: The Eclipse Begins - Observing Campaign Status	09:30	10:00
Jeffrey L. Hopkins, Robert E. Stencel	epsilon Aurigae: Hydrogen alpha Emission Line Variation - The Horn Dance	10:00	10:30
<b>Coffee Break</b>		<b>10:30</b>	<b>10:45 15 Minutes</b>
John Pye, Lauren Elder, Jeff Hopkins	2009 Eclipse of EE Cephei	10:45	11:15
Robert K. Buchheim	Lightcurve of UZ Sge	11:15	11:45
<b>Closing Remarks</b>		<b>11:45</b>	<b>12:00</b>
<b>LUNCH</b>		<b>12:00</b>	<b>14:00</b>
<b>AAVSO Membership Meeting</b>		<b>14:00</b>	<b>1630</b>
<b>Banquet</b>		<b>17:30</b>	<b>19:30</b>
<b>Dinner Speaker (John Percy)</b>		<b>19:30</b>	

## Membership Information

*Membership in your new Society for Astronomical Sciences (SAS).*

As was pointed out with the last issue, it was felt that a modest membership fee would greatly help SAS to produce a better product for its members. This fee will be \$25.00 per year. What will this membership fee provide? Well for one thing it WILL NOT go to any committee members as part of their efforts within SAS. We volunteer our time for The Society.

Members will receive a discount for the registration fee each year for the Symposium at Big Bear. It will assure you that you will get a copy of the published proceedings each year, even if you do not attend the Symposium. It will help defray costs in bringing in outside speakers (professionals) to the symposium.

Membership is annual and runs from

July to June of the following year. To become a member, send \$25 to: Society for Astronomical Sciences, 8300 Utica Avenue, Suite 105, Rancho Cucamonga, CA 91730. You may also join online at the registration page of the web site. Membership dues are tax deductible.

The SAS is a 501(c)(3) charitable organization.

### *Your Participation Wanted!*

As I have mentioned in previous Newsletters, we need your participation in the Newsletter. We don't want this to become a one person or just a couple person show. If you have an article which can cover a variety of topics, please put it together for a future Newsletter. Work in progress is always welcome. In addition, we have started a "letters to the Editor" section where we would like to add 2-3 letters from the members/participants. We had no letters to incorporate into this Newsletter edition. Con-

structive comments are always welcome as we are always looking for ways to improve not only the quality of the Newsletter but also the quality of the Symposium. We want the SAS to become a year around organization not just a once a year group.

*Continued from page 1*

We will cover topics needed for precision photometry and how to reduce your measurements to a standard system. Jerry's portion will cover FWHM, HWHM, photometry aperture, SNR, focus requirements and **choosing comparison stars. Examples will be given from actual images.**

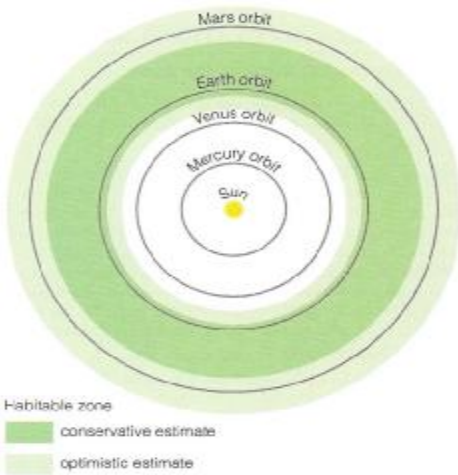
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### Challenge to the readers

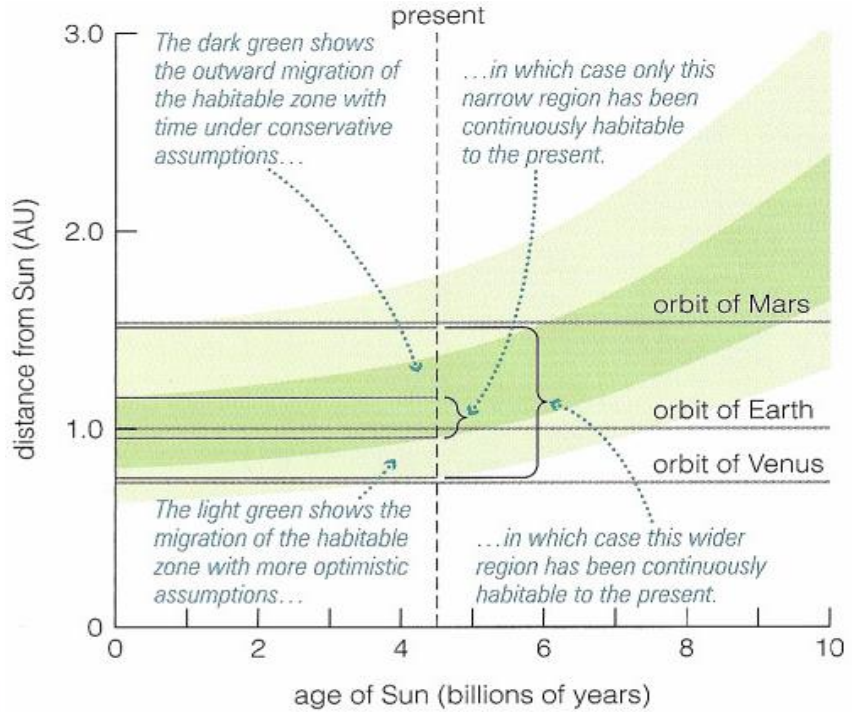
Consider and study the diagram on the next page and see what is happening to the SHZ (stellar habitable zone) around the sun. Why is this happening? What is the chemistry/physics taking place? Hint: you will need to think on the ideal gas law. Email me your answers, explanation to follow in next Newsletter.

Thus concluded the article on exoplanets Part 1 from the last Newsletter. By the way, no one took a stab at the question posed above. Perhaps nobody is reading



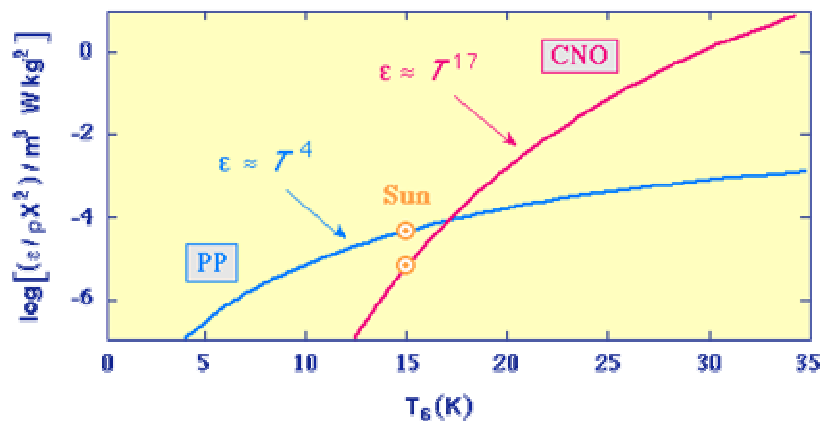
these things? In the way of a brief review, recall the figure above and how we talked about the size of a habitable zone around a star and how that zone varies in size depending on the spectral type of the star. Remember this zone is defined as the region where liquid water can exist on a planetary body. It's a bit fuzzy because things such as atmospheric pressure, composition, etc can have a strong influence on the boundaries of this zone.

The next figure (above right) is the figure the question above was referring to. In this figure the age of the sun is plotted versus distance of the habitable zone from the sun. As is shown, with time the habitable zone of the sun is expanding



outward in the solar system. Why is this the case. There are a number of factors at work here which is driving this process. We all know that the sun, as a main sequence star, is burning hydrogen into helium within its core. There are two energy producing cycles that drive this fusion, the proton-proton cycle (p-p cycle) and the carbon-nitrogen-oxygen cycle (CNO cycle). Both of these cycles have

very different temperature sensitivities as the figure below shows. The energy production rate for the p-p cycle is driven by the temperature raised to the fourth power whereas the CNO cycle is dependent on temperature raised to the seventeenth power. For our sun, on the main sequence, the core temperature is such that 98% of the sun's energy comes from the p-p cycle with the CNO cycle contrib-



uting the remaining 2% of the suns total energy output.

So what is the answer to the Challenge for the readers? As you see in the top right figure on the previous page, the habitable zone of the sun is migrating outward in the solar system. The sun's luminosity is ever so slowly increasing and it has been doing so since the birth of the sun. To understand why, we must have a look at the ideal gas law:

$$PV=nRT$$

In spite of the high temperatures and pressures in the core of the sun, the plasma there behaves to a very good first approximation as an ideal gas. The sun also on small time scales is in hydrostatic equilibrium. This means that the inward force of gravity is balanced by the outward push of the energy being made in the core. The pressure of the overlying layers of the sun upon the core remains constant, the amount of material in the upper layers does not change and the volume of the core remains constant. However, as the fusion reactions are taking place, recall that 4 hydrogen atoms are being converted into 1 helium atom, thus the particle density in the core is gradually falling, the n in the equation above, is decreasing! Since P and V remain constant, the temperature in the core must increase for the equation to hold. As the temperature of the core increases, the fusion reactions become more intense (more energy is being produced) and the role of the more sensitive CNO cycle increases with its even greater temperature sensitivity. All of this results in an increases pressure outward which causes the sun to expand. The luminosity of the sun (or any star) depends on this equation:

$$L = 4\pi R^2 \sigma T^4$$

As the star expands, its radius, R, increases and its surface area increases. Even though the surface temperature of the star is also dropping with the expansion, the increased surface area more than compensates for that and overall the luminosity increases. This results in the push outward, with time, of the habitable zone around the sun or any other star.

Over time (long periods of time), the contribution of the CNO cycle to the total energy generation of the star increases and at some point becomes the dominate source. This occurs not long after the sun moves off the main sequence. The increased temperature sensitivity of the CNO cycle results in an accelerating increase in the stars luminosity and the star very rapidly moves to the red giant stage. This acceleration of the luminosity is reflected in the acceleration of the increase in the size of the habitable zone around the sun (star) and can be seen in the graph in the upper right side of the previous page.

Challenge to the readers: At what point in the cores evolution does the ideal gas law break down? Email me your comments at [dale.mais@mpiresearch.com](mailto:dale.mais@mpiresearch.com)