

## CCAS Minutes from the October 6, 2016 Meeting

7:30 pm Meeting was called to order. New members and guests were introduced.

Our speaker was Dr. Charles Lada with the Harvard Smithsonian Center for Astrophysics in Cambridge, MA.

Dr. Lada spoke on **The Search for Stellar Origins from Antiquity to the 21<sup>st</sup> Century**

When he was a student of astronomy in the early 1970s, the field of stellar origins basically was non-existent. Back through time, stars and their formations were referred to in various cultural myths. However, throughout history many minds grappled with what are stars and how did they come into being.

Some of the major findings:

During the golden age of Athens, Pericles was a leading figure of the Sophists, a group of natural philosophers that had inquiring minds and wished to figure out phenomena in their daily lives. He and others including Anaxagoras studied eclipses and rainbows, explaining them in logical terms. They conceived a scientific cosmos, a round earth, and “aether” stars.

Later, the work of Nicolae Copernicus (1473-1543) provided a basis for the heliocentrism.

Tycho Brahe working in Denmark studied the parallax of heavenly bodies. For planets yes, but it didn't work for stars because he didn't have the resolution.

By 1750, Thomas Wright theorized that stars are suns and that our sun is a star.

Immanuel Kant and Pierre-Simon LaPlace worked on the nebular hypothesis. This suggested that clouds of dense gaseous material spins and eventually coalesces into various accretion disks. A possible explanation of stellar and planetary formation.

Among the many distinguished accomplishments of William Herschel, his discovery of a new planet Uranus doubled the size of the known universe at the time. He also was fascinated by nebulae.

In 1897 William Huggins worked with spectroscopy, finding hydrogen and nitrogen in luminous fluids.

Edwin Hubble's work included finding that many of the observed nebulae actually were distant galaxies.

Interpreting the laws of thermodynamics and Kelvin's conservation of energy showed the conversion of gravitational potential energy into radiant energy, which results in a slow, steady contraction of the sun.

Cecilia Payne-Gaposchkin, the first woman to receive a PhD from Harvard, offered ground-breaking work. Employing the newly accepted quantum mechanics, she found that stellar atmospheres are uniform in composition and primarily hydrogen. From her work Hans Bethe determined that a thermonuclear reaction made of hydrogen, converts to helium releasing enormous amounts of energy.

Harold Ewen and Edward Purcell working at Harvard in the 1950s were able to detect radio emissions of hydrogen. Among other findings, they determined that the raw material for stars is found in substantial concentrations between stars. This is proof that stellar formation is an ongoing process, one that is closely being observed to this day.

In fact, the talk closed with a striking visual presentation of a nebulae that William Herschel once observed. This seemingly dark mass recently was observed using infrared technology, which revealed that stellar formation was indeed taking place within.

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Following the talk, CCAS member Bernie Young sought help on a number of potential projects that he'd like to work on with the growing number of students from Jim Mitchell's Earth and Space course at D-Y Regional High School.. Some of the topics he suggested were: global positioning of the sun; sunspot/Wolf number; astronomical spectroscopy; and astrophotography.

George Silvis, another CCAS member, mentioned another intriguing topic: Sudden Ionosphere Disturbances (SID). For example when solar flares occur, they disrupt communication signals. Trying to measure the size of the disturbances, Stanford University has an interest in developing hardware that would be a SID data grabber. They seek contributors and participants in this effort and offer software that amateur astronomers can obtain and use. The American Association of Variable Stars Observers (AAVSO), a group George regularly works with, works with the data, too.

Jim Lynch, CCAS President, then conducted a brief business meeting. He mentioned that the CCAS officers had a meeting on September 27 to discuss forming several ad hoc committees. These committees would work on specific aspects of the group, for instance membership, education & outreach, fundraising, website maintenance, and editing the newsletter "First Light."

He's hoping more people will get involved with running the CCAS. Also, suggested we plan a social retreat and/or potluck gathering.

The Meeting was adjourned at 9:50 pm.

Respectfully submitted by Chris Lynch for Secretary Gus Romano.