Talk Abstracts

"Star Formation in the Cartweel's Disk and Spokes"
James L. Higdon & Sarah J. U. Higdon Georgia Southern University

Numerical simulations of Cartwheel-like ring galaxies that model star formation invariably find that the interiors of these systems are rich in gas and star formation activity, often exceeding the expanding outer-rings. New data allow us to ferret out star formation throughout the Cartwheel's interior to very faint levels and reveal its relation to atomic and molecular gas. Do the faint star forming regions we detect arise from low levels of on-going star formation? Or are these no more than infalling post-starburst clusters from the outer-ring? I will also discuss how the models can be improved to better represent star formation in these systems.

"Brightness Measurement of Mars in 2011-2012"
Richard W. Schmude, Jr.; Gordon State College, 419 College Dr., Barnesville, GA 30204

Brightness measurements were carried out between July 29, 2011 and June 21, 2012. Measurements were carried out with an SSP-3 Solid state stellar photometer with a filter transformed to the Johnson V system (wavelength of about 550 nanometers). Mars was a bit brighter than expected during late northern winter but was close to its expected brightness during northern spring and early northern summer. The Hellas Region of Mars developed clouds/frost at about the same time that it did in 1995.

"Finding the True Metal Abundances in High Velocity Clouds"
Jeff Gritton, University of Georgia

As high velocity clouds (HVCs) pass through the gas in the Milky Way, the HVC and Galactic material mix. Mixing of hot, metal-enriched Galactic halo material into cooler, metal-poor clouds begins long before the clouds completely dissipate and long before they slow to the velocity of the Galactic material. As a result, the clouds that we see are not in the same condition as they were in the past. In order to learn how to extract the true initial characteristics of the clouds from observations of real, somewhat mixed clouds, we made detailed 2 and 3 dimensional simulations of the hydrodynamics and time-dependent ionization levels of cloud-ISM interactions. Our simulations assume a hot, tenuous, solar metalicity halo and and warm, low metalicity clouds. They reveal that the metalicity of the intermediate ions in high velocity material is noticeably augmented by mixing with halo gas, while the metalicity of poorly ionized HVC gas is less augmented and the metalicity of highly ionized HVC gas is more affected. These results may be important for interpretations of the clouds' origins based on their metalicities.

"Asymmetries as a Driver of Galaxy Evolution"
Clayton Heller Georgia Southern University

Non-symmetrical distributions of disk and halo matter produce gravitational torques that can be a central driver of secular galaxy evolution. Stellar bars which are capable of channeling significant amounts of gas to the central regions of galaxies are themselves susceptible to dynamical instabilities and secular changes. The most dramatic of which is a recurrent vertical buckling that leads to the appearance of boxy bulges. Also, dark matter halo substructure can trigger or destroy bars and these interactions may largely determine the stellar bar evolution. In addition, the triaxiality of high-z halos can induce a precession of the disk plane.

"Probing Interstellar Silicate Dust in Quasar Absorption Systems at z < 1.4", Monique C. Aller (University of South Carolina), Varsha P. Kulkarni (University of South Carolina), Donald G. York (University of Chicago), Giovanni Vladilo (Osservatorio Astronomico di Trieste), Daniel E. Welty (University of Chicago), & Debopam Som (University of South Carolina)

Interstellar dust plays a significant role in the physical processes driving galaxy evolution, such as star-formation, and the heating, cooling, and ionization of interstellar material. It also impacts observations of distant objects through its obscuring and reddening effects. However, while interstellar dust has been studied extensively in local galaxies, much less is known about the properties of dust in distant galaxies. One technique to study extragalactic interstellar dust is to look for absorption features produced by the dust in the spectra of luminous background objects, such as quasars. We will present results from an ongoing study of the interstellar silicate dust in several quasar absorption systems using data obtained with the Infrared Spectrograph on the Spitzer Space Telescope. Based on the shape of the 10 micron silicate absorption feature, we find suggestions that the interstellar silicate dust grains in the distant universe may be significantly more crystalline in structure than those in the Milky Way. If confirmed, this may have implications for both dust and galaxy evolution, and for assumptions about the similarity of dust properties at all epochs. Support for this work is provided by NASA through an award issued by JPL/Caltech. Additional support comes from National Science Foundation grants AST-0908890 and AST-1108830 to the University of South Carolina.

"Hot Gas in the Galactic Halo"
David Henley, University of Georgia

The Galactic halo, above and below the Galactic disk, is filled with gas at ~1-3 million K. This gas is a major contributor to the diffuse soft X-ray background (SXRB) at high Galactic latitudes. X-ray spectroscopy of the SXRB emission enables us to determine the physical conditions in the hot gas, providing clues to its origin and evolution. Unfortunately, such measurements are hampered by contamination due to solar wind charge exchange (SWCX) emission from within the solar system. We have recently completed a survey of the SXRB using archival XMM-Newton observations. Here I will discuss a subset of these observations, chosen to minimize the contamination due to SWCX. I will present the observed X-ray spectral properties of the Galactic halo, and compare them with the predictions of physical models for the origin of the hot gas.

“Future of Planetariums as a tool for Astronomy education”
Philip Groce Helping Planetariums Succeed, LLC.

Planetariums are often viewed as an important contributor to Astronomy education throughout the world. Yet, the public's knowledge of basic astronomical concepts seems not to be any greater than it was several decades ago before the great push in science education and the resulting flourish in planetarium populations and public observatories. To put it bluntly, if planetariums are so effective, why as a society are we failing astronomy? With free desktop planetarium software and educational astronomy documentaries available on TV and in classrooms, do we still need planetariums? Do planetariums have a future as an instrument of formal and informal astronomy education? These are just some of the questions that will be posed and somewhat addressed in this presentation.

“As the Star Turns: Interferometric Imaging of Lambda Andromedae”
J. R. Parks (GSU), R. J. White (GSU), J. D. Monnier (UMich), F. Baron (UMich), X. Che (UMich), G. W. Henry (TSU), B. Kloppenborg (MPI), E. Pedretti, G. Schaefer (CHARA/GSU), N. Thereau (St. Andrews), M. Zhao (PSU), T. ten Brummelaar (CHARA), P. J. Goldfinger (CHARA), C. Farrington (CHARA), H. A. McAlister (CHARA/GSU/MWI), N. Turner (CHARA), J. Sturmann (CHARA), L. Sturmann (CHARA) & S. T. Ridgway (NOAO)

We present interferometric images of starspots on the active giant Lambda Andromeda (Lam And). In this era of high-precision astronomy, "secord-order" effects such as starspots can no longer be ignored. Understanding the characteristics of starspots is vital not only to our understanding of stellar interiors, but also to increase the precision of extrasolar planet surveys. The images presented represent the first direct measurements of cool starspots. These measurements are in good agreement with previous studies preformed via light curve inversion. We will also present results suggesting rotation of Lam And can be traced through apparent starspot motion.

“Precision Differential Photometry from a Non-Precision Site (Expanding Undergrad Research Potential)” **Joe Jones, North Georgia College & State University.**

More than a decade ago the first exo-planet transit light curve was observed with modest instruments. This inspired the idea that it might be possible to develop observational and data reduction techniques using our venerable, but ancient 16” Boller & Chivens telescope to achieve the milli-magnitude precision differential photometry necessary for such a project. Such capability with a small instrument in the very “non-photometric” environment of our region greatly expands the potential observational projects available to undergraduate (and faculty) researchers. A brief description of the techniques developed to achieve this capability at North Georgia will be presented. The state of our telescope is such that if these techniques work for us, they should be more than applicable to other researchers at institutions in the region with similar sized but more modern instruments.

“Dynamic UC HII regions in Sgr B2: Flickering and Ionized Flows”
C. G. De Pree, Agnes Scott College

The Sgr B2 star forming region in our Galaxy contains a large sample of HII regions, and the diversity of morphologies and number of unusual broad line sources make it an ideal laboratory for testing theories of ultracompact (UC) HII region evolution. Recent high-resolution, radiation-hydrodynamic simulations show that the dense, rotating, accretion flows required to form massive stars quickly become gravitationally unstable (Peters et al. 2010a). The orbits of these dense clumps and filaments near newly born massive stars irregularly trap and expose their ionizing radiation (Peters et al. 2010b). The resulting HII region flickers between hypercompact (HC) and UC sizes throughout the main accretion phase, rather than monotonically expanding. Peters et al. (2010c) show that this model can solve the UC HII lifetime problem (Wood & Churchwell 1989), since accretion continues for a period ten times longer than the free expansion timescale for an HII region. Imaged at 1.3 cm, the Sgr B2 region contains 49 regions, 25 of which are hypercompact (HC), with physical diameters < 5000 AU (Gaume et al. 1995). We have observed this large sample of UC HII regions in the Sgr B2 region in the three hybrid arrays in the 1.3 continuum and H66a and H68a lines with a resolution of 0.25². These new 1.3 cm EVLA observations of the Sgr B2 will allow us to: (1) Determine the frequency and magnitude of UC HII flux and size fluctuations over a 22 year time baseline (1989 to 2011) in one of the most source-rich massive star forming regions in the Milky Way, (2) Constrain and test the theoretical models described in Peters et al. (2010a, 2011b), (3) Observe recombination lines with the improved spectral resolution and bandwidth of the new EVLA correlator, and characterize line profiles and velocity gradients, and (4) Examine the dynamics of sources with especially broad or multiply peaked line profiles discussed in De Pree et al. (2011).

"Element Abundances in the Distant Universe: Magellan Observations of sub-Damped Lyman alpha Absorbers at z ~ 2" **Debopam Som (Univ. of South Carolina), Varsha P. Kulkarni (Univ. of South Carolina), Joseph Meiring (Univ. of Massachusetts, Amherst), Donald G. York (Univ. of Chicago), Celine Peroux (Laboratoire d'Astrophysique de Marseille), Pushpa Khare (IUCAA), James T. Lauroesch (Univ. of Louisville)**

Quasar absorption line systems offer a unique window into the high redshift universe providing useful information about galaxy formation and evolution. The damped Lyman-alpha absorbers (DLAs) and sub-DLAs contain the majority of neutral gas in galaxies at high redshift. They also allow a direct determination of interstellar element abundances in galaxies as a function of redshift. Our recent studies indicate, surprisingly, that the sub-DLAs appear to be more metal-rich than the DLAs, especially at low redshifts. The differences between DLAs and sub-DLAs pose open questions regarding the chemical evolution of galaxies. To explore the answers, we aim to expand the sets of element abundance data for DLAs and sub-DLAs. We have therefore recently observed 15 more absorbers at redshifts z ~ 2 using the MIKE spectrograph at the 6.5 meter Magellan Clay telescope. We will present observational data from this study for a few high redshift DLAs and sub-DLAs

Poster Abstracts

“Modeling the Role of Charge Exchange in X-ray Emission Spectra”
R. S. Cumbee (UGA), D. Lyons (UGA), P. C. Stancil (UGA), M. Rakovic (Grand Valley State), D. R. Schultz (Univ of North Texas)

Most of the gas in the Universe is not in thermal equilibrium requiring some type of collisional non-equilibrium model for accurate interpretation of observations. When ions and neutrals are present, charge exchange (CX) is one process that can occur which plays a role in the ionization balance and may dominate the ion emission spectra, such as in the solar wind charge exchange (SWCX) mechanism. In the SWCX mechanism, a SW ion captures an electron from a heliospheric or atmospheric neutral atom creating a highly excited ion which subsequently emits one or more x-rays in a cascade to the ground state. To improve SWCX x-ray models, CX computations of the dominant SW ions colliding with neutral targets have been performed. Using the CX cross sections, x-ray spectra and hardness ratios have been calculated for collisions of a range of ions with H and He. The relevance of the spectra models to heliospheric and astrophysical environments will be discussed. This work was partially supported by

NASA grants NNX09AC46G and NNG09WF24I. Synopsis: Charge exchange cross sections are used to produce x-ray spectra and hardness ratios for collisions including H and He as target ions.

“Absorption Trough Identifications in the Far Ultraviolet in a Seyfert Galaxy Sample”
Christin Holtzclaw, Elizabeth Graham, & Jay P. Dunn, Georgia Perimeter College

We present outflow trough identifications for four Seyfert 1 galaxies: MRK 279, NGC 3783, NGC 5548, and NGC 3516. We extract the data from MAST archive website and utilize the final version of CalFUSE (i.e., v3.2) to process the raw data. We coadd the spectra (exposures, segments, and observations) to maximize the signal-to-noise and normalize the data. Using the OVI doublet line, we identify the outflow velocity in each of the four objects and mark locations of common ions seen in Seyfert outflows (e.g., CIII, NIII, H Lyman series), which will provide column densities and therefore radial distances in subsequent efforts.

“Extinction Characteristics of FeLoBAL Quasars in the SDSS”
Branden Wasik, Daniel Hayes, & Jay P. Dunn, Georgia Perimeter College

Here we present a search for Mg II and Fe II broad absorption line (BAL) troughs in quasar spectra with strong narrow emission lines. We obtain these spectra from the Sloan Digital Sky Survey in the redshift ranges from z=0.45 to 1.15 with a magnitude of less than 19. Of the 15002 quasars surveyed, we find 175 with Mg II BALs and 17 with both Mg II and Fe II BALs. Of the objects with both ions, we find 6 objects with narrow emission stemming from O II (lambda 3727). In conjunction with the detection frequencies of the ionic troughs, we also determine the host galaxy reddening for each source, which will be used in future work to determine the radial location of the extinction source.

“Columbus State University Global Observation and Outreach for the 2012 Transit of Venus”,
Rosa Williams & Shawn Cruzen, Columbus State University

Faculty, staff and students from Columbus State University’s (CSU’s) Coca-Cola Space Science Center presented a webcast of the 2012 Transit of Venus from three continents to a global audience of 1.4 million unique viewers. Team members imaged the transit with telescopes using white-light, hydrogen-alpha, and calcium filters, from Alice Springs, Australia; the Gobi Desert, Mongolia; Bryce Canyon, UT; and Columbus, GA. Images were webcast live during the transit in partnership with NASA’s Sun-Earth Day program, and Science Center staff members were featured on NASA TV. Local members of the public were brought in for a series of outreach initiatives, in both Georgia and Australia, before and during the transit. The data recorded from the various locations have been archived for use in demonstrating principles such as the historical measurement of the astronomical unit.

"Three New Intermediate Velocity Clouds in the Northern Galactic Hemisphere"
L. Magnani and Allison J. Smith (U. of Georgia)

We surveyed the CO(1-0) transition in 16 regions at Galactic latitudes > 45o with compact dust cores less than 0.5o in size and E(B-V) values ~ 0.1 mag. We discovered 3 new intermediate-velocity molecular clouds (IVMCs) and 2 high-latitude molecular clouds with more typical LSR velocity (~ 0 km/s). The 3 IVMCs (detected in CO emission in 11 lines of sight) nearly double the number of previously known, CO-emitting clouds with vLSR < -20 km/s. In order to detect the CO(1-0) line, N(H2) values of at least 1019 cm-2 are necessary, implying that the molecular/atomic fraction of these object is significant and is in contrast to the primarily atomic lines of sight with log N(H2) < 17.3 detected in absorption by FUSE. The 3 molecular clouds are projected on and likely associated with a previously known intermediate-velocity HI feature known as the Intermediate Velocity Spur that may extend to the Galactic halo.

“Reconstruction of Interplanetary Coronal Mass Ejections Using Multi-spacecraft Observations”
David Fink (Emory University) & Dr. Qiang Hu (University of Alabama in Huntsville)

Coronal mass ejections (CMEs) originating at the solar corona sometimes propagate outward through space in the form of magnetic clouds (MCs). A common model for an MC is a helical magnetic flux rope with uniformity along its axis. These interplanetary CMEs (ICMEs) are characterized as having an elevated magnetic field magnitude, a smooth rotation of magnetic field direction and a decreased plasma beta. Using one-dimensional in-situ data, the geometric and physical properties of a flux rope can be deduced using the Grad-Shafranov (GS) reconstruction technique. Using a GS solver written in MATLAB, we reconstructed three separate ICME events using a cylindrical model. The event used were seen by the ACE spacecraft, positioned at Earth’s L1 point, as well as either STEREO A or B, positioned ahead and behind of Earth in its orbit respectively. These events occurred between 2007 and 2009, while the longitudinal separations of the STEREO crafts with respect to each other, as well as with respect to ACE, were increasing. As a means of viewing one event at different points along its axis, reconstructed STEREO data was compared to observed ACE data. This comparison acts as check for the model's accurarcy. As expected, later events had larger disagreements of results because of the larger spatial separation of measurements.

Poster - Jim Wyrosdick, University of North Georgia

“Astronomy Club of Augusta” - Kenneth Beard

“Atlanta Astronomy Club”, Leonard Alton

“American University”, Kevin Staarc