



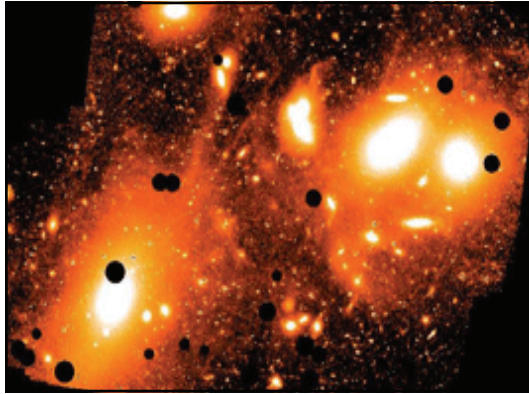
## New Camera Sees "First Light" on Burrell Schmidt Telescope

Using new instrumentation, Case Western Reserve University astronomers can now view the night sky wider and deeper than before. While the vast reaches of intergalactic space may appear dark and empty, a new camera installed on the university's Burrell Schmidt telescope at Kitt Peak National Observatory in Tucson, AZ will bring into clear view the faint sea of orphan stars strewn throughout the nearby Virgo cluster of galaxies.

The design and installation of the new camera system was led by Case Western Reserve astronomer Paul Harding, who also serves as the observatory manager. A new charge coupled device (CCD) --- a larger and more sensitive version of the imaging technology found in everyday digital cameras --- will enable the astronomers to determine the ages of these stars and unravel the secrets of their origins.

This faint orphan starlight, dubbed "intracluster light", is formed when galaxies collide with one another inside titanic clusters of galaxies. During these collisions, stars are ripped away from their parent galaxies and strewn throughout the cluster by the gravitational forces at work. Originally discovered in the Virgo cluster three years ago by Case astronomer Chris Mihos and his collaborators, this intracluster light holds the key to understanding how galaxy clusters form and evolve.

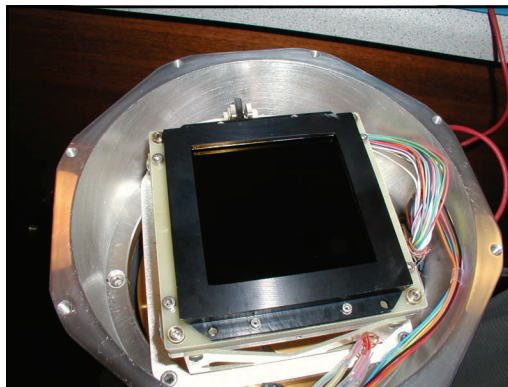
The primary reason for upgrading the



*Intracluster light (ICL) in the Virgo*

telescope's camera is to determine the color of these stars, according to Mihos and Harding. "Typically, younger stars are bluer," Harding says, "so if we can measure the color of the intracluster light, we can learn about its age."

Younger ages for the stars would suggest that the Virgo cluster formed relatively recently, over the past few billion years. But because the stars are very faint in the blue, to measure the stellar colors the existing camera needed to be upgraded to be able to image a wider portion of the sky with even greater sensitivity.



*Image of the new CCD sitting in the cryogenic dewar*



### Inside this Issue:

<b>What they are up to; where they have gone</b>	<b>2</b>
<b>Frontiers of Astronomy Lectures</b>	<b>2</b>
<b>Sale of Nassau Astronomical Station</b>	<b>3</b>
<b>Sloan Digital Sky Survey III</b>	<b>3</b>
<b>International Visitor</b>	<b>4</b>
<b>April Fool's Pranks</b>	<b>4</b>
<b>Carl K. Seyfert Prize Fellowship</b>	<b>5</b>
<b>Postdoctoral Scholar</b>	<b>5</b>
<b>Chair's Space</b>	<b>6</b>

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## What they are up to; where have they gone . . .

**Amanda Kepley ('02)** recently completed her PhD, "Magnetic Fields in Irregular Galaxies", at the University of Wisconsin. Irregular galaxies have a chaotic interstellar medium, which is easily disrupted by star formation, interactions, and mergers. Her thesis investigated the role of an important, but often overlooked component of the interstellar medium: magnetic fields. She is now working as a postdoc in Charlottesville, VA, a joint position at the Department of Astronomy at the University of Virginia and at the National Radio Astronomy Observatory with Kelsey Johnson.

**Cameron McBride ('03)** also recently completed a Ph.D. in Astrophysics at the University of Pittsburgh. His thesis ('Our Non-Gaussian Universe: Higher Order Correlation Functions In Galaxy Surveys') focused

on the use (and misuse) of correlation functions to describe the distribution of galaxies in the Sloan Digital Sky Survey, in order to better understand cosmology and probe the physics of galaxy formation. In Fall 2008, Cameron heads to Vanderbilt University to take up a three year postdoctoral research position working with Dr. Andreas Berlind.

**Bonnie Stayer ('04)** has shown that an astronomy degree can qualify you for a broad range of careers. After leaving Case, she graduated from the University of Pittsburgh in 2008 with a M.Sc. in Geographical Information Systems and Remote Sensing. She now works for ESRI, Inc., the world's leading GIS software maker. As a Solutions Engineer on the Technical Marketing team, she creates custom software demonstrations for a variety of customers.

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## Frontiers of Astronomy Lectures

Since the 1920's the Department of Astronomy has sponsored a public lecture series entitled Frontiers of Astronomy. These public talks are presented at the Cleveland Museum of Natural History with the Cleveland Astronomical Society and the Cleveland Museum of Natural History as cosponsors and with the support of the Arthur S. Holden, Sr. Endowment. These lectures are well attended with the 2007-08 series of five lectures drawing more than 1200 total attendees.

Professor Robert Kirschner of Harvard University in October delivered a lecture entitled *Exploding*

*Stars and the Accelerating Cosmos: A Blunder Undone.*

In November Professor Romeel Davé of the University of Arizona spoke upon *Numerical Cosmology: Building the Universe on a Computer.*

Professor Gus Evrard of the University of Michigan visited in December to tell us about *Adventitious Machinery: Our Heritage as Amplified Noise.*

Professor Pablo Laguna of the Pennsylvania State University in March 2008 explained *Black Holes: Their birth and violent interactions.*

Professor Dieter Hartmann of Clemson University finished the yearly series in April with a lecture on *Probing the Early Universe with Extremely Energetic Gamma-Ray Bursts.*

The 2008-09 lecture series continues with Professor Eric Herbst (Oct 16); Professor Alan Marscher (Nov 13); Professor Sally Oey (Dec 18); Professor Carlos Frenk (Mar 12); Professor Mario Livio (Apr 16). If you are in the Cleveland area, please consider attending these free public lectures. Check out our website: <http://astroweb.case.edu> for more information.

Additionally, we record these lectures and the recordings are available on DVD by request.



*Cleveland Museum of Natural History*

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## Sale of Nassau Astronomical Station

The Nassau Astronomical Station, located in Montville, 45 miles east of downtown Cleveland, was established in 1957. We moved our primary research telescope, the Burrell Schmidt, from Montville to Kitt Peak Observatory in Arizona in 1978, and we are still doing cutting-edge research with the Burrell, despite its 24-inch aperture (see New Camera on p 1). Ohio's light pollution, unpredictable weather and poor seeing have made Montville less suitable for professional research, and so we were very pleased to be approached by Geauga Park District, who own land on both sides of our property, with a proposal to make the Nassau Station part of their exciting new outreach project, Observatory Park, which will have two telescopes, a seismograph and a night garden. We expect the sale to be finalized in late 2008.

We are memorializing Dr. J.J. Nassau's many contributions to our department and observatory with a plaque on the telescope building, which will read:

*"This was the site of the Nassau Astronomical Station from 1957 to 2008. It was named in honor of Dr. Jason John Nassau, director of the Warner and Swasey Observatory, Case Western Reserve University, from 1924 to 1959. Under Dr. Nassau's leadership, the Observatory became a great center for research, and a place to share the excitement of astronomy with the general public."*

We thank James Nassau, J.J. Nassau's son, for his contributions to the wording on the plaque.



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## Sloan Digital Sky Survey III

Case has joined the Sloan Digital Sky Survey, the most ambitious sky survey ever undertaken, in its newest incarnation. The survey was originally designed to measure the large-scale structure of the universe using galaxies and quasars, which it has done with enormous success (SDSS papers are now among the most cited in Astronomy worldwide). The unique design of the 2.5-meter telescope with its large imaging camera and 7 square degree spectroscopic field has spawned many additional projects, including SEGUE, a study of the Milky Way's structure and origins, and BOSS, which aims to catch the echoes of oscillations in the early, hot universe, before stars and galaxies had formed. SDSS-III will run for six years, starting July 2008, and we are pleased and proud to be part of it.

As well as doing science with the enormous amount of data this survey will produce, Case astronomy is contributing to the "nuts and bolts" of survey operations: Observatory Manager Paul Harding will design the aluminum plates that hold the 650 fibers that funnel light into the spectrograph and Case astronomy alumnus Dan Oravetz ('06), who is pictured here with Paul, now works as telescope operator for the SDSS telescope on its beautiful, remote mountain top location in southern New Mexico.

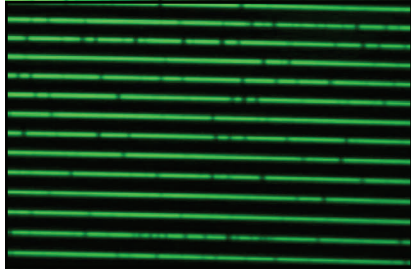


***Dr. Paul Harding and  
Dan Oravetz ('06)***



## International Visitor

In November 2007 the Department was host to a month-long visit by Professor Sergei Andrievsky of Odessa National University, Odessa, The Ukraine. Sergei is a long-time collaborator of Warner Professor Earle Luck. Their collaboration focuses on the physical properties of Cepheid Variables and the use of Cepheid abundances to map out the elemental abundance distribution in the disk of the Milky Way. During Professor Andrievsky's visit substantial progress was made on a paper which explores the physical nature of the sub-group of small light amplitude Cepheids known as the s-Cepheids.



## NEW CLASS: "Life in the Universe"

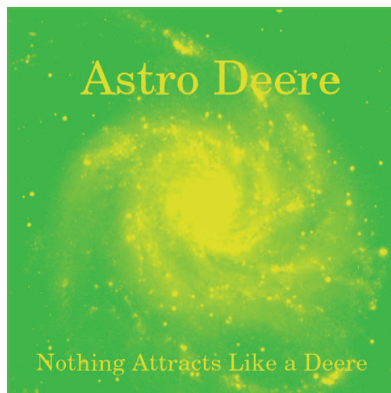
The astronomy department at Case is proposing a new introductory course in astrobiology titled "Life in the Universe". This course, intended for non-astronomy majors, will be a multi-disciplinary exploration of current topics in the search for extraterrestrial life. Beginning with our present ideas of how life originated on Earth, we will discuss the conditions necessary for life's continued survival on Earth, our current understanding of the conditions present on other planets and satellites within our solar system, and conclude with the current status of the search for habitable extra solar planets within our Galaxy. This new course, with its concentration on topics such as stellar evolution and planetary science, is intended to complement the department's current introductory offering of "Einstein's Universe" with its concentration on issues of gravity and cosmology. As such, we expect that this new course will expand the appeal of astronomy to a broader range of the Case community.

## April Fool's Pranks

On April 1st, the secrets of dark matter were revealed when the Department of Astronomy was transformed into a giant dark matter laboratory, complete with a cryogenic detection chamber (the lounge refrigerator) and particle accelerator (the microwave oven). Many dark matter candidates came to light; while all the usual suspects were present (neutrinos, brown dwarfs, MACHOs, and black holes), a few new dark matter detections were made, including "Charley Quarks" and "Free Floating Space Donkeys". Even the ghost of Fritz Zwicky was spotted in the hallway, suspiciously watching over the dark matter.

This strange "Astro Deere" tractor had been magically transported from beyond the Centaurus Cluster and was found assembled in the Astronomy Classroom, where it attracted many awed visitors.

Sadly, when a new day dawned on April 2nd, the dark matter had again mysteriously vanished, although to this day we still catch fleeting glimpses of the strange material throughout the department.



Most impressively, the mysterious "Great Attractor" was found to be.. the GREATER TRACTOR.



**Craig Rudick, PhD student**

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## ***Edward Montiel awarded the First Carl K. Seyfert Prize Fellowship for Undergraduate Research***

Edward Montiel is the first recipient of the Carl K. Seyfert Prize Fellowship for Undergraduate Research. Edward is a junior majoring in astronomy and math at the University of Arizona.

Edward is interested in both observational and theoretical aspects of astronomy. His primary research interest are currently in cosmology. Professor Morrison worked with Edward on the nature of the "Ring around the Galaxy" using SEGUE data. SEGUE is a part of the Sloan Digital Sky Survey.

The Fellowship will support one undergraduate student each summer to come to Cleveland and work on cutting-edge astronomical research with CWRU faculty members. The Seyfert Fellow will be awarded based on a national competition each spring.

The Fellowship's namesake, Dr. Carl Seyfert (1911-1960), was a Cleveland-born astronomer who worked on a variety of subjects, including stellar and galactic astronomy, and astronomical instrumentation. He was a pioneer in the study of spiral galaxies with bright emission-line nuclei. Such galaxies are now referred to as "Seyfert galaxies," and are believed to host supermassive black holes at their centers which drive their nuclear activity.

Dr. Seyfert was also a member of the Warner and Swasey Observatory at Case Western Reserve University from 1942-1946, where he used the Burrell Schmidt wide-field telescope to study the luminosity function of stars in the Milky Way.

The Seyfert Fellowship has been made possible by a generous contribution from CWRU Astronomy alumnus Dr. Anthony J. Wasilewski, whose doctoral thesis ("The space density and clustering properties of a new sample of emission-line galaxies") was based in part on Seyfert's pioneering work on active galaxies.



***"Seyfert's Sextet",  
a compact group of galaxies  
discovered by Carl Seyfert  
in 1951***

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## ***Postdoctoral Scholar***



Santiago Patiri has joined the Case Astronomy Department in Fall 2007 as a Postdoctoral Scholar. He is working with Dr. Idit Zehavi on different aspects of large-scale structure and galaxy formation and evolution, particularly as pertaining to the SDSS and other surveys.

A native of Argentina, Santiago completed his PhD in Astrophysics at the Instituto de Astrofísica de Canarias in Spain. He has been working on various large-scale structure related projects at the interface of theory and observations. Some of his research topics include studying the statistics of voids, the dependence of galaxy properties on environment, and the structure of dark matter halos. He has been analyzing the SDSS and the 2dF surveys, as well as working with different simulations and semi-analytic models.



## Chair's Space:

*Welcome to the first edition of the Astronomy Department newsletter at Case. We have lots of news to share with you; for example, we have a new large detector on the Burrell Schmidt telescope at Kitt Peak, we have joined the third incarnation of the Sloan Digital Sky Survey, have new members of the department, and have exciting news about our former students.*

*We have new faces all over the department: our new, full-time Department Assistant, Agnes Torontali; faculty member Idit Zehavi; postdoc Santiago Patiri and graduate student, Zhibo (Real) Ma. We were sorry to say goodbye to Professor Bidelman, who turned 90 this past summer, and has decided to finish his distinguished career in Astronomy by retiring for a second time.*

*Many of these changes have been made possible by the generosity of current and past donors. We really appreciate your support.*

*Professor Heather Morrison*



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*Burrell Schmidt, Kitt Peak Observatory*

*Exploring the frontiers of our universe for  
over 125 years ...*