

# Imaging



# Connection

The Newsletter of the Chester F. Carlson Center for Imaging Science

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## CIS Introduces New Website

A new CIS web page went online presenting a consistent look and feel across all department research and educational area web pages. We tried very hard to make the pages easy to navigate by either subject matter or audience. The main menus are the same as before, Imaging Research, Academic Programs, Outreach & Information, and People. We also target specific audiences to give a place to start if the topical menus did not meet their needs. Audiences such as Prospective Students, Researchers, Alumni, and others, each get their own entry point customized with information for them. The goal is to make the pages simultaneously useful and accessible whether you're a current student looking for a homework assignment, a parent investigating CIS, or an outside researcher seeking potential collaboration.

The new site introduced much more than a new layout and color scheme. There are several features that ensure a new experience every time you check the site starting with the banner image on the front page; it



is different each time you arrive. Specific images highlight a related CIS research project and are clickable to take you directly to more information in that project. Next note that the other images on the front page also change with each arrival. Links to the audience-specific entry points are on the front page, as are links to the latest in imaging science news, and a list of upcoming imaging events. News and events listings are linked to more information such as speaker abstracts, meeting schedules, and other timely details.

Perhaps the most exciting aspect of the new pages is not even visible in the browser. Every web page is created from a database that is constantly being updated. The database includes the news and events, a large document library, and all the rest of the web information, including documentation about how to make updates to the database! The system ensures, for example, that once an event has passed, it no longer appears in the calendar, so your information is always current and relevant. We also provide our ever-

growing list of publications written by faculty, staff, and student researchers. These publications are listed under the relevant researcher's personal page as well as a home page for that research area. This provides a consistent set of research publications from several angles and should make it easier for outside researchers to quickly find the CIS people most appropriate to engage.

Pages are constantly being added and updated. We try to keep the news current and interesting, and provide a set of events that capture the interest of everyone in the imaging science field, both inside and outside of RIT. If you have yet to visit the new pages, please take a look, [www.cis.rit.edu](http://www.cis.rit.edu), and let us know what you think. Your feedback is important!

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### How Do You Want to Stay Connected?

Please let us know how you want to continue receiving this newsletter at our new website: [www.cis.rit.edu](http://www.cis.rit.edu), click on "contact us" and let us know how you prefer to stay connected.

# Infrared Technology Enhances Milky Way Imagery Research

A massive cluster of red supergiants—super-sized stars on the verge of exploding—was recently discovered in the Milky Way by a group of astronomers using infrared technology to penetrate the thick dust that cloaks much of the galaxy.

Only a few hundred such stars are known to exist, with the previous largest collection of them containing only five. These are the biggest stars: a single red supergiant at the center of our solar system would reach the orbit of Jupiter. The 14 together imply a sea of smaller stars in the cluster having a total mass of at least 20,000 solar masses, according to RIT astronomer Don Figer.

Figer recently joined RIT as part of a New York State Office of Science, Technology and Academic Research (NYSTAR) Faculty Development grant worth \$750,000 to help develop the Rochester Imaging Detector Laboratory. He presented his latest research findings at the American Astronomical Society meeting in January in Washington, D.C., and participated in the press conference, Milky Way Roundup.

“It seems odd that here is a spectacularly bright cluster and that we are only seeing it now,” says Figer, formerly at the Space Telescope Science Institute. “This gives us the richest sample of stars getting ready to explode. We still don’t understand what they do in their last stage.”

Figer’s finding may poke holes in some massive star formation models, which suggest that conditions are no longer favorable for this type of massive cluster formation. Ancient globular clusters containing even more stars were thought to have been born only very early, at the time of the formation of the galaxy.

“But that’s probably not true because we’re starting to see more massive clusters,” Figer notes, adding



*Artist's View of Massive Star Cluster in the Milky Way  
NASA, ESA, and A. Schaller • STScI-PRC06-03b*

that further infrared observation will probably reveal more examples.

Of further interest to Figer and his colleagues are the X-rays and rare gamma rays that hang over the cluster, located 18,900 light-years from earth. This high-energy fallout follows a star’s destruction, the remnants of which are only energetic for a short time, giving scientists a snapshot in time of these stars at different stages of life.

The NASA-funded, five-year study will focus on 130 potential star clusters altogether, with the cluster of 14 supergiants being the team’s first focus.

The study was made possible with the use of a unique spectrograph built by a team led by John MacKenty, also of the STScI. The instrument—containing a tiny matrix of mirrors

similar to those in projection televisions, according to Figer—captures spectral data on 100 stars at one time, a novel approach that made the project possible.

Figer and his colleagues will conduct detailed studies of the 14 individual stars using multiple resources, including the Hubble Space Telescope and the Spitzer telescope.

In addition to Figer, the international team of scientists working on this project include Massimo Robberto and Kester Smith of STScI; Francisco Najarro of the Instituto de Estructura de la Materia in Madrid, Spain; Rolf Kudritzki of the University of Hawaii in Honolulu; and Artemio Herrero of the Universidad de La Laguna in Tenerife, Spain.

## Welcome New Faculty, Don Figer

Donald Figer became interested in astronomy the way most kids do: by looking up at the sky on a clear night and wondering about the stars. Only in Figer's case, looking upward changed his life.

"I set a goal to become an astronomer when I was eight or nine years old and that was what I pursued," says Figer, who joined RIT in December as part of a New York State Office of Science, Technology and Academic Research (NYSTAR) Faculty Development grant to build the Rochester Imaging Detector Laboratory.

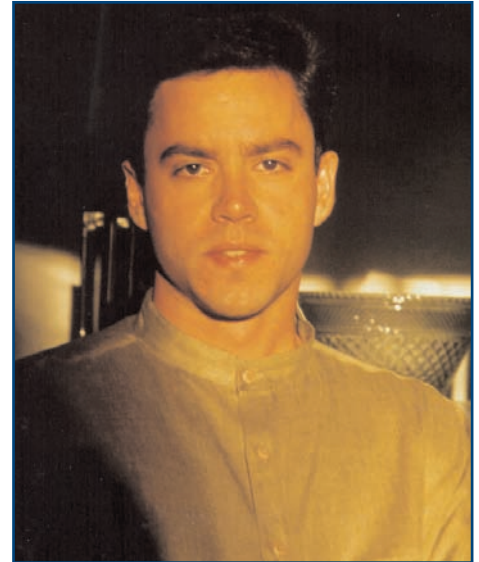
Bit early in life by the astronomy bug, Figer funded his passion with hard work and creativity. He set out

to buy telescopes by cutting grass. ("I had a little business of 10 accounts," he says.) Later he worked at a car wash, started a photography business and then a typing service for his high school classmates' as well as cleaning office buildings after school.

By the time he was 18, he had spent between \$20,000 and \$30,000 on his avocation.

"Astronomy is an expensive habit," Figer notes.

His family encouraged and supported his interests from the start. A generous aunt and uncle bought him a large telescope when he was 13 or 14 years old, giving the young astronomer a powerful instrument for an amateur.



During high school, Figer started taking classes at a nearby college "in order to branch out and learn more

*- article continued on back page*

## David Fetzer '04 Presents "More Efficient Image Analysis Helping Diagnose Extreme Injury"

Sudden traumatic injury to the heart's main artery – called acute traumatic aortic injury – is a life-threatening emergency, but current methods to diagnose the damage can be slow, invasive and expensive.

David Fetzer, a 2004 imaging science graduate, is helping to improve this situation. Fetzer, who is completing his second year of medical school at the University of Texas Health Science Center at Houston Medical School, has been involved in research on the use of computed tomography (CT) in the diagnosis of such injuries.

In April, Fetzer presented a research paper, "Mathematical Modeling Improves Computed Tomography Diagnosis of Traumatic Aortic Injury," at the annual conference of the Association of University Radiologists. The article

will be published this summer in Academic Radiology, the association's journal. Fetzer also received the 2006 AUR Memorial Award as a result of the paper.

Fetzer worked on the research with Dr. O. Clark West, chief of emergency radiology at the University of Texas Health Science Center, who encouraged Fetzer and allowed him to take top-billing on the paper. Physicians at the conference responded favorably, Fetzer says.

"The idea of being able to develop techniques that can be put into use immediately to help people – that's very rewarding," he says.

As an undergraduate, Fetzer did ultrasound imaging research with CIS assistant professor Maria Helguera and gained practical experience assisting at radiology clinic in his

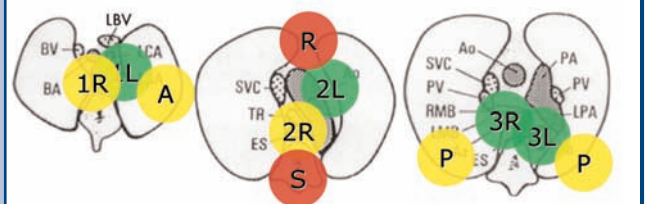


Diagram showing three representative levels (axial slices) of the chest displaying type and location of possible injury signs. After statistical analysis, injury characteristics were rated as having a positive (green), negative (red) or equivocal (yellow) predictive value for aorta trauma.

hometown of San Antonio, Texas. He received numerous honors and awards including the Imaging Science and Technology Outstanding Undergraduate Scholarship award and Doolittle-Merrill Premedical Studies and Nathaniel Rochester Society scholarships. He was chosen to be student speaker for the College of Science commencement.

Fetzer plans to continue in the field of radiology. "I'd very much like to stay in research and teaching while working clinically," he says. "I enjoy all aspects of this field very much."

## Lianza '79 Funds Research for Imaging Science Students through Summer Fellowship

At age 11, Tom Lianza already knew what he wanted to do when he grew up.

He bought a film development kit, and spent his free time taking pictures around his rural Long Island home and developing the images.

"Once you see an image developing in a tray – if that doesn't hook you, you're dead," says Lianza.

He discovered RIT through a summer high school photography program, but he opted to attend State University College at Albany because, as a Regents Scholarship winner, tuition was free. After one year, and at his mother's urging, Lianza transferred to RIT. He received his B.S. and M.S. in photo science in 1979.

In 1989, Lianza and two partners founded Sequel Imaging. The Londonderry, N.H.-based company focused on developing hardware and software to manage color on CRTs, LCDs and other display devices. Customers included big names in the industry, such as, Sony, NEC-Mitsubishi and LaCie.

"I tell people that we were the biggest unknown company," says Lianza. But Sequel came to the attention of GretagMacbeth, an international manufacturer of color measurement equipment, which bought Sequel in 2003. Lianza stayed on as director of display and capture technologies. "I focus on building a future view of color measurement needs," he says, "helping to show how our technology can be used."

Recently, GretagMacbeth introduced a product that Lianza conceived of nearly two decades ago. Called "huey," the device is an entry-level, easy-to-use monitor color-correction tool that can be used to obtain more accurate color reproduction on CRT, LCD and laptop monitors.

Interestingly, Lianza doesn't consider the technological successes



*Tom Lianza takes a picture of himself with a color chart on a wintery day.*

to be the biggest accomplishments.

"What I'm proudest of," he says, "is that for 15 years, 13 families had uninterrupted income and health benefits because of what we were able to do at Sequel."

Lianza is providing support for CIS students through a summer research fund he created last year.

"While the summer months can be a fantastically productive time to get ahead, sometimes students find it difficult to work on their research due to a lack of funding," says Mitchell Rosen, research assistant professor, color management. "Summer support like Tom's allows students to maintain continuity in their investigations during the important months of June, July and August."

Mitchell noted that the idea for the fellowships developed over several years. "At the 2004 meeting of the International Color Consortium in Scottsdale, Ariz., Tom mentioned to me his ideas for becoming more involved with the graduate students of the Center for Imaging Science. In London the following year at another ICC meeting, we went over various concepts and the one that clearly fit his vision most closely was the summer stipend fund."

The fund had a successful start

last summer with the support of two students: Justin Laird, a color science graduate student who has since graduated and gone on to work in display research for Philips in The Netherlands, and Susan Kolakowski, now a third year imaging science Ph.D. candidate who is working on eye-tracking research with Professor Jeff Pelz.

Lianza visited RIT in February and delivered a talk to the Center's Seminar Series. His presentation, a conversation on life beyond RIT, was called "This Technical Life: Some Lessons Learned at RIT and in the Workplace that Made a Real Difference." A video of the talk is available at: [www.cis.rit.edu/seminar](http://www.cis.rit.edu/seminar).

### *Save the Date and Celebrate with CIS*

This year marks the 20th anniversary of the Center for Imaging Science. Celebrate this milestone during the RIT BrickCity Weekend, October 5-8, 2005.

Attend the inaugural induction ceremony for the new Imaging Hall of Fame. Visit the Center's laboratories to learn about cutting-edge research programs such as remote sensing, astronomical imaging, biomedical imaging, color science, nanoimaging, and visual perception. Tour our corporate partner's facility, listen to a student presentation, and reconnect with classmates.

Learn more about BrickCity activities and scheduled events at: [www2.rit.edu/brickcity/](http://www2.rit.edu/brickcity/)

## Collaboration on Next-Generation Information Technology Systems

The IT Collaboratory, an RIT-led research collaboration with the University at Buffalo and Alfred University, has officially moved into a new facility. The IT Collaboratory Research Building—a three-story, 32,000-square-foot structure—was formally dedicated March 3 on the RIT campus.

Started in 2001 with a \$14 million grant from the New York State Office of Science, Technology and Academic Research (NYSTAR), the IT Collaboratory targets the creation of key technologies, knowledge and capabilities to design and integrate next-generation information technology systems. Collaborative research within the center focuses on microsystems, photonics, remote sensing systems and nanomaterials—helping to develop a skilled, educated workforce that will play a major role in the economic revitalization of upstate New York.

“The opening of the IT Collaboratory is further proof that our efforts to transform the Finger Lakes region into a global leader of high-tech research and development are working,” says Gov. George E. Pataki. “New York’s Finger Lakes attracts millions of dollars in new investment and has become the place where cutting-edge research and development takes place, helping to make New York state an international leader in high-tech development, and helping to create new jobs and opportunities for New Yorkers.”

The IT Collaboratory is among eight Strategically Targeted Academic Research (STAR) Centers. Combined, these centers represent one of the largest one-time high technology and biotechnology related investments in state history.

“Today, RIT, and its academic and industry partners, has achieved an important milestone to become an

even greater center for high-technology research,” states Russell W. Bessette, M.D., executive director of NYSTAR.

Bessette adds, “These investments would not have been possible without the proactive leadership that Governor Pataki continues to provide in support of universities and high-tech industry in New York. It is another strong demonstration that the strategy of Governor Pataki is paying significant dividends for New York state.”

Research conducted by scientist and engineers within the IT Collaboratory has already resulted in more than \$26 million in research grants, 27 invention disclosures, 18 patents issued or pending, and four start-up companies established.

Completion of the IT Collaboratory Research Building—a \$30 million project—represents the next stage in the center’s evolution, providing its partners with much need research space and equipment. The first two floors include shared spaces for metrology, sensor development, the Loboizzo Optics Laboratory, the Laboratory for Imaging Algorithms and Systems (LIAS) and Astro-Informatics researchers from CIS. CIS continues to expand its research, education, and physical presence on the RIT campus. There is also dedicated research and faculty space for nanolithography, remote sensing systems and the RF-Analog-Mixed Signal Laboratory. The third floor is equipped as an integrated microsystems laboratory through a partnership with Analog Devices Inc.

RIT President Albert Simone believes research opportunities within the new center are crucial to enhancing students’ academic experiences, which he states has a broader impact.



*Representatives from the U.S. Department of Homeland Security toured the labs within RIT’s new IT Collaboratory in February. Don McKeown, far left, RIT distinguished researcher in the Chester F. Carlson Center for Imaging Science, and Don Boyd, far right, RIT’s vice president for research, were among the presenters.*

“The region and the state as a whole will realize benefits as students become intrigued with the research that they will participate in at this new center, follow that work to the companies that emerge and then stay in western New York to build their careers,” says Simone.

John Kelly, senior vice president of technology and intellectual property at IBM, emphasizes the role that resources, such as the IT Collaboratory, can play in helping to retain the region’s brainpower. In doing so, he credits RIT and its partners for defining the leading edge of collaborative innovation.

“Competition is not just from other parts of the U.S., it’s from all over the world,” explains Kelly. “To compete, we need to collaborate. We need to build centers of excellence and open our labs and our research as never before. I see it happening right here at the IT Collaboratory.”

For more information on the IT Collaboratory, visit the Web at: [www.rit.edu/ITColl](http://www.rit.edu/ITColl).

## Welcome Figer

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from others." Half of the day was spent with his peers at high school and the rest of the day at college. On clear nights he would run home and stay up late to observe stars.

Even at 16, Figer was intent on capturing good data. He realized how important it is to have the right tools as he collected information on observable stars, measuring their brightness and plotting data by hand. Frustrated by the waste of time and potential for error, Figer, along with an electrical engineer, developed a software package that linked the device that measured brightness to his personal computer.

"That way I didn't have to write it down and could concentrate on getting good data, even in those early days," he explains.

Amateur astronomers around the world purchased the device, and Figer funneled the proceeds back into his astronomy habit.

Of his high school class of 200 students in Wickliffe, Ohio, Figer was the only one to go out of state for college. First, he went to Northwestern University to earn his BA in physics, math and astronomy. Then he attended the University of Chicago to earn his MA in astronomy and astrophysics, and, finally, the

University of California in Los Angeles for his Ph.D. in astronomy.

In 1999, he joined the Space Telescope Science Institute as an assistant astronomer, and later as an associate astronomer, where he founded a detector laboratory and developed detector technology for future space, and ground-based astronomy missions for the Hubble Space Telescope and the John Webb Space Telescope.

He is presently working on a project funded by the National Science Foundation and the U.S. Department of Energy to develop the world's largest camera with a four gigapixel detector. The camera will contain several hundred little detectors like those in a digital camera, but highly sensitized. The camera will be mounted on a large synoptic survey telescope in either Chili or Mexico. A site survey is ongoing.

"We're trying to observe the faintest galaxies in order to estimate the effects of dark matter in the universe—the goal of the study."

To do this, Figer is developing detectors to identify objects that are very faint, 10 or 20 photons in exposure. Capturing clean data requires minimal noise from the detectors. Part of Figer's research involves testing detectors in simulated environments to determine

how low he can reduce the noise.

Figer is also working on a wide-field camera for NASA. It will be installed on the Hubble Space Telescope for a shuttle flight at the end of next year. To verify the flight worthiness of the detector, he must test how the detector would survive the launch, vibration, heating and cooling.

Figer's hands-on approach places him in the minority of astronomers, yet right at home at RIT, where Ian Gatley, Dean of the College of Science, is known as a pioneer in developing technology in astronomy.

"Most astronomers are not that directly involved in building instruments," Figer says. "It's something that has always interested me."

At RIT, Figer will build another detector laboratory, this time to explore new imaging applications in fields such as biomedical imaging, biohazard sensing and remote sensing. The Chester F. Carlson Center for Imaging Science has dedicated 2,000 square feet to house a clean room area and office space for Figer and his team. Construction on the lab is expected to be completed by the end of summer.

"Detectors are at the heart of discovery," Figer says. "Without them, we wouldn't be able to discover anything."

*Imaging Connection* is produced by a team of dedicated employees who work with CIS faculty, staff, and students to make this publication possible. Please send comments to managing editor, Colleen M. Desimone at: [desimone@cis.rit.edu](mailto:desimone@cis.rit.edu) or call 585-475-6783. **Newsletter Team Members:** Colleen Desimone, Stefi Baum, Joe Pow, Susan Gawlowicz and Kathy Lindsley. **Get on our email list to learn about the new issues at:** [desimone@cis.rit.edu](mailto:desimone@cis.rit.edu)

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