GEMINI OBSERVATORY NEWSLETTER

Issue 25 December 2002

Naming of the Frederick C. Gillett Gemini Telescope

Inside This Issue

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

(11)

Photos by Kirk Pu'uohau-Pummill

Approximately 200 family, friends and colleagues gathered to honor the naming of the Gemini North telescope, "The Frederick C. Gillett Gemini Telescope" in ceremonies on Mauna Kea and via video to Hilo, Tucson and La Serena. The ceremonies included the unveiling of a dedicatory plaque, a Hawaiian makana (gift) ceremony and speeches by several dignitaries. A reception and banquet in honor of Fred and the telescope's naming followed in Hilo. Pictured here are highlights of the naming ceremony and the banquet. An image key is provided at the bottom of the facing page.

GEMINI OBSERVATORY NEWSLETTER

Published twice annually in June and December.
Distributed to staff, users, organizations and others involved in the Gemini Observatory.
Worldwide Circulation 3,400

THE FREDERICK C. GILLETT GEMINI TELESCOPE

Mauna Kea, Hawai'i, November 13, 2002

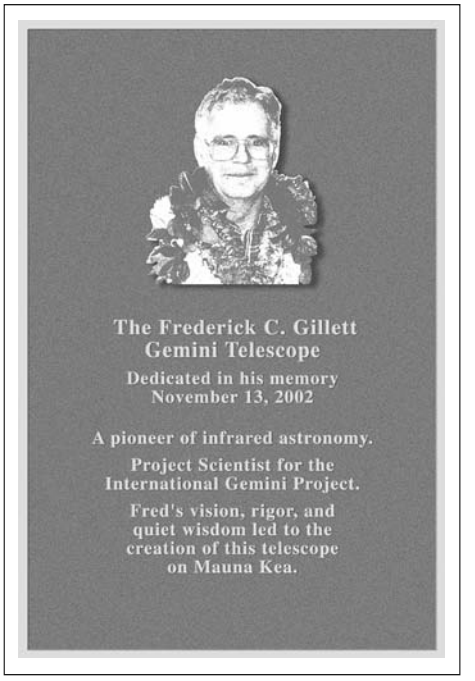
November 13, 2002, was a beautiful day to name a telescope.

A brilliant sun gleamed off the silver Gemini dome on Mauna Kea. This day the thin mountain air, so often so jagged and biting with the high-mountain cold, was almost balmy. And from inside the dome came the triumphant strains of Bach's "Toccata and Fugue in D Minor."

It was a special day. It was a day when everyone came together to name Gemini North "The Frederick C. Gillett Gemini Telescope."

Approximately 60 friends, colleagues, officials and family members watched as the plaque with the telescope's name was officially unveiled. In a way, the plaque itself, a deserved tribute to the man who had done so much to make Gemini a reality, seemed to go beyond the naming. There beneath the great primary mirror, it was indicative of the spirit of Gemini.

Gemini Director Dr. Matt Mountain characterized both Fred's role and the Gemini spirit when he said of Fred, "His vision, rigor and tenacity brought about what makes these Gemini telescopes so unique."



The plaque that is now mounted overlooking Gemini North, "The Frederick C. Gillett Gemini Telescope."

Thanks to Gemini's advanced Internet connection, many others in the Gemini family who were not present on the mountain were also able to participate. The ceremony was broadcast via the Observatory's Internet links to the Gemini offices at the Hilo Base Facility, the Tucson office and to Gemini South in Chile.

One of the highlights of the ceremony was the presentation to the Gillett family of a *makana* (Hawaiian ceremonial gift) by Kimo Keali'i Pihana on behalf of the people of Hawai'i. A cultural practitioner and respected Hawaiian elder in his own right, Pihana also serves as a Mauna Kea Ranger, helping to oversee the safety of those who journey each day up the slopes of Mauna Kea in the pursuit of astronomy. Somehow that seemed fitting, too.

1) Daughter Danuta Gessner (from left), son Michael and wife Marian Gillett stand in front of the plaque 2) Gemini Director Dr. Matt Mountain places a pohaku (stone) into the ceremonial Hawaiian makana (gift) held by Kimo Keali'i Pihana 3) Kimo Keali'i Pihana prepares the makana before the audience 4) Kimo Keali'i Pihana (from left); Dr. Wayne van Citters, Director of the Division of Astronomical Sciences at the National Science Foundation; Professor Robert Joseph, Chairman of the Gemini Observatory Science Committee; and Dr. William Smith, President of the Association of Universities for Research in Astronomy, Inc. (AURA) 5) Kimo Keali'i Pihana presents the makana to Marian Gillett as Observatory Director Dr. Mountain looks on 6) Associate Director Dr. Jean-René Roy presents the dedicatory plaque to Marian Gillett at the banquet 7) Marian Gillett greets guests at the banquet 8) Observatory Director Dr. Matt Mountain addresses audience at naming ceremony 9) Dr. Wayne van Citters addresses the ceremony attendees on Mauna Kea 10) Gemini Board Chairman Dr. Roger Davies addresses the audience on Mauna Kea 11) Celebrating the naming as the telescope moves to strains of "Toccata and Fugue in D Minor."

The spirit of the day was captured by Dr. Wayne van Citters, Director of the Division of Astronomical Sciences at the National Science Foundation, who spoke to the crowd. Standing with the telescope looming above, he mentioned his flight into Hawai'i. It was a flight, he said, on a modern jet equipped with the latest navigational technology in use today.

And then in acknowledgement of where he stood near the highest point in Polynesia, he said, "Of course, ages ago ancient voyagers performed even more amazing feats of navigation, finding Mauna Kea after trips measured not in hours but in weeks and months.

"No maps, no instruments – only what has been called 'An Ocean in Mind'; a visceral understanding of the water, wind, waves, stars, planets, the Sun and Moon – the space that had to be followed.

"Today's feat we call navigation. It has been suggested that theirs might be called wayfinding.

"When I first met Fred, infrared astronomy was an art," Dr. van Citters said. "There was no roadmap to guide the myriad of choices that had to be made in the voyage from then to now. The telescope – indeed the development of infrared astronomy itself, required the wayfinders, those who without maps and fixed signposts knew which direction to take. Fred Gillett was foremost among these.

"But this is only a brief pause," Dr. van Citters told the guests. "We are restless, and still wonder what is beyond where sea and sky appear to meet.

With such telescopes such as Gemini, "We may yet see back to the time when Kane (a Hawaiian god) separated Sky from Earth and light flooded between the two.

"We may see the children of the gods placing the first stars in the sky.

"Fred has taught us well."

As master of ceremonies, Dr. Mountain pointed out that the imprint of Fred's influence could be seen throughout the telescope along with all the trials and struggles to realize the goal.

"How many of us remember those arguments about the exact size of the bevels within the very last millimeter, at the very edge of our secondary mirror? And how the vanes had to be 10 millimeters wide but no more?" he laughed.

"How many of us remember those graphs which showed us why the primary mirror had to have a central hole of not more than two meters to make sure we could focus as much energy as possible into those small images that make Gemini so unique? How many of us remember Fred slipping off quietly to work alone in his lab, taking hundreds of measurements to make sure we had the right recipe for Gemini's silver coatings so his telescope could all but disappear against the IR night sky?

"Fred Gillett, Gemini Project Scientist, had a vision for an infrared optimized telescope here on Mauna Kea," Dr. Mountain said. "This is why we are here today."

Dr. William Smith, President of the Association of Universities for Research in Astronomy Inc. (AURA), spoke at the ceremony of Fred's association with AURA.

"Fred was from AURA's standpoint everything that we value in our scientific staff. He was selfless and committed. He was committed to science and the community.

"I look forward to the day when I read in the headlines where they will say, 'The Gillett Telescope Revolutionizes Our Understanding.'

"I predict that day will come," Dr. Smith concluded.

Dr. Robert Joseph, Chairman of the Gemini Observatory Science Committee, related to the audience some of Fred's many scientific achievements. "He was one of the extremely small group of people who helped define what an infrared telescope actually is," Dr. Joseph said.

He also quoted a colleague who summed up Fred's work: "Patient, solid, committed and always right about the facts."

In the evening, a reception and banquet was held at the Hilo Hawaiian Hotel to celebrate the telescope's naming. Gemini Associate Director Jean-René Roy introduced an evening of talks filled with nostalgia, friendship and love. Indeed, the banquet, complete with laughter and tears, had more the flavor of a family gathering than a formal affair.

As Danuta Gessner, one of Fred's daughters, said at the dinner, "Once when when I was much younger, I asked Fred how he chose to do what he did. And he said he'd looked up at the sky and saw a hole that shouldn't be there.

"I like to think now that he's up there now, and he's filled that hole himself, and now it's complete."

BEYOND THE VISIBLE

The Story of Fred Gillett, a Private Man Who Lived His Life in the Heat of the Night

Ed Kennedy

Note: This article was commissioned as part of the events on November 13, 2002, to commemorate the naming of Gemini North, the "Frederick C. Gillett Gemini Telescope." It is reproduced here in its entirety as a tribute to Fred and a recognition of the important part he played in infrared astronomy and the realization of the Gemini vision.

One bright October morning two years ago, two men were talking as they made their way up Sabino Canyon.

Sabino Canyon is a popular recreation area outside of Tucson, Arizona. It's a good place to get lost in the mountain quiet of the foothills and think things out. Or talk things out. And since the desert clouds had chosen to be generous to the Santa Catalina Mountains that fall, the burbling of Sabino Creek added a meditative footnote to their conversation.

This was more than just an ordinary conversation. It was also a conversation held in metaphor. For what was actually being discussed that morning could not yet be faced. And so the leaves were spoken aloud. The sunlight was spoken. No doubt the stars were spoken aloud, too. For both men were astronomers. And though neither could yet admit it, they'd come up here to say the long goodbye.

Fred and Wayne Stein (background) doing a field experiment as part of their work at the University of Minnesota in the early 1960's.

One of the men was Frank Low. Low had worked all his life at the University of Arizona. The other, a man named Fred Gillett, was more of a peripatetic in academia. But he, too, had spent a lifetime in astronomy.

Low and Gillett were famous – at least among the observatories that sprinkled the mountaintops of northern Arizona and southern California. Out of their work had come some of the seminal developments of infrared astronomy. They were, in fact, two of the founders of the field. Low had produced the first-ever cryogenic bolometer, an infrared eye that led the way to modern infrared astronomy.

Gillett had been a leader in developing infrared spectrometers and a leavener of infrared observatories. Sharing a small University of Arizona telescope that Low had helped build himself, and located on a peak not far from where they were now walking, Low and Gillett had managed to take one of the world's first-ever peeks at the incredibly rich panoply of the infrared sky. Before men like Low and Gillett, the infrared sky was an unknown. What they had first seen as young men back in those heady days of the early 1960's through their rudimentary instruments – a sky glowingly alive with the radiated heat of the universe – had dominated the rest of their professional lives.

But it was not astronomy these two men talked of that warm October day. It was life. And it was about the ending of life, and miracles. As the two old friends walked up the canyon amidst the first signs of the coming winter, they talked of how it is that everything a man has made of his life, his family, what he has given, all the triumphs and trials of one of the most productive careers in science, how everything of meaning can suddenly be cut short. In their rather guarded, careful, metaphorical way of talking about other things that morning, they were actually talking about death. How do you face

such a thing? How do you actually go about dying? And what are the chances of a miracle?

Telescopic Sight

Everything about this story revolves around telescopes. Everything about the men and women involved in this story concerns telescopes. And ultimately, two telescopes in particular. Two new telescopes that ushered in a new paradigm about how astronomers do science. Gemini North, the first 8-meter telescope specifically optimized for infrared research, was dedicated atop Mauna Kea on the Big Island of Hawai'i, June 25, 1999. Gemini South, its twin in Chile, was dedicated on January 18, 2002. Together, the identical telescopes with two of the largest single mirrors in the world make up what is formally known as the Gemini Observatory. The Gemini Project, which was one of the most successful major observatory construction programs in the latter part of the 20th century, had been in part initiated by Frank Low's visionary enterprise. Gemini Observatory had also been Fred's crowning achievement and it is why the Gemini telescope on Mauna Kea, Hawai'i, was named in his honor on November 13, 2002.

Getting the News

Six weeks after the Hawai'i dedication ceremonies for Gemini North, crowded with lei-bedecked dignitaries from throughout the worldwide astrophysical community, Fred learned the worst. Following a routine physical, the caring and careful Dr. Alice Adee in Hilo, Hawai'i, had to tell Fred that he was suffering from Myelodysplastic Syndrome and fibrosis of the bone marrow. This seemed at the time nonsensical. Fred was at the peak of his health, athletic, contentedly married for almost 40 years, a dedicated family man with a son and two daughters, a brood of beloved grandchildren, his name in the scientific annals of astronomy, and plenty of creative and challenging work ahead of him. For the careful, caring and logical man that Fred was, a fatal disease was impossible to assimilate. But death is nothing if not nonsensical.

Myelodysplastic Syndrome, or MDS as it is commonly known, is an extremely rare disease of the bone marrow. Only about 20,000 people each year are diagnosed with it. It is the same disease that killed celebrity scientist Carl Sagan in 1996. What happens is that the bone marrow loses its ability to make new blood cells. Transfusions and bone marrow transplants can sometimes postpone the worst, or in rare cases, even halt it. More often than not, it is fatal.

When Fred found out he had MDS that August in 1999, he told only a handful of people. Anyone who ever knew him knew first of all that he was an extremely private man. Except for a few colleagues and his family, for months no one knew that he was even ill. He exhibited no symptoms of illness. He continued to take long bicycle rides around the Big Island (one of his favorite activities). He hiked up in Volcano National Park, going to see the lava pouring down to the ocean from Pu'u O'o vent. "As far as any of us knew, he was in top shape," recalled Jean-René Roy, a fellow hiking enthusiast and the French-Canadian Associate Director of Gemini North.

But in private, in the thorough, scientifically exhaustive and precise way that was so typical of anything that Fred undertook, he began to research the debilitating disease. He began to spend a lot of time trying to find out everything he could about MDS. He poured over statistics and medical tomes.

Even with his wife Marian, a registered nurse, he shared very little. Certainly not fear. It wasn't Fred's way.

"This was just one more thing we had to go through," Marian said. "Our basic attitude was, well, let's get through it and get on with our lives. Everything will be all right."

What else could they do? Marian continued with the couple's plans for her to go back to Tucson to wind up things with their house, in preparation for their anticipated move to Chile. The diagnosis had come precisely on the cusp of the next phase of the couple's life together. As Gemini Project Scientist, Fred was scheduled to help oversee the completion of Gemini South. MDS was not going to interrupt their lives. Marian went back to Tucson. Fred stayed on in Hawai'i.

It must always be remembered that Fred was a scientist, first, last, and always. Fred had a disciplined, achromatic mind that was famous among his colleagues for the ability to intuitively grasp the nub. Faced with some experimental quandary, armed only with his habitual paper and pencil, he was unrelenting. In his typical way, quiet, low-key, out of the limelight, he worked until he got it. This was his great professional strength, and he was highly respected for it. He'd been a scientist all his life. Every empirical nut would crack if you hit it hard enough. Everything had a logical solution. Everything.

What else could he do? Fred didn't – couldn't – allow anyone else to know. He would deal with it in his own way. He and Marian went quietly about their preparations for moving to Chile. Somewhere in there they'd decided to sell their house. This in itself was indicative of their emotional plight. Fred never loved any place like he loved Tucson. He'd been all over the world, and rented houses in Hawai'i and England. But Tucson was home.

In the midst of all these preparations, Fred disappeared. "We had a meeting in Tucson," Low remembered. "Some meeting that Fred would never have missed. He wasn't there. Suddenly he'd dropped off the radar. Everybody was saying, 'Where's Fred?'"

Fred and Marian had gone to Indianapolis, where their children lived. A lot of things had to be talked over. There were certain medical procedures that could be undertaken. Fred's age

was approaching the cutoff line for a stem cell transplant. But even so, he was still in rigorous, glowing health. Now Fred had to decide if he would undergo the agony of a stem cell transplant with little hope of success. MDS had brought him all the way down to a cliché: a life-and-death decision. Infrared meetings in Tucson somehow seemed not so important any more.

During this trip, Fred and his son Michael took what was to be their last bicycle ride together. Mike recalls, "This was the first time that I noticed that this thing was really affecting my Dad. Things just didn't bother him, so it was shocking for me to see it get to him like this."

When Fred had gotten the news about his illness, he was just 63 years old. He'd been born February 7, 1937 in Minot, North Dakota. He was a product of the forward-looking optimism of post-war America. Infrared astronomy was the perfect choice for a scholar of his bent. Infrared is the newest major field of observational research in astronomy. The entire discipline is only 40 years old. Fred's career almost exactly spanned the time from the field's birth until the time of the Gemini North dedication. His entire professional life had been spent in the infrared.

A Budding Astronomer

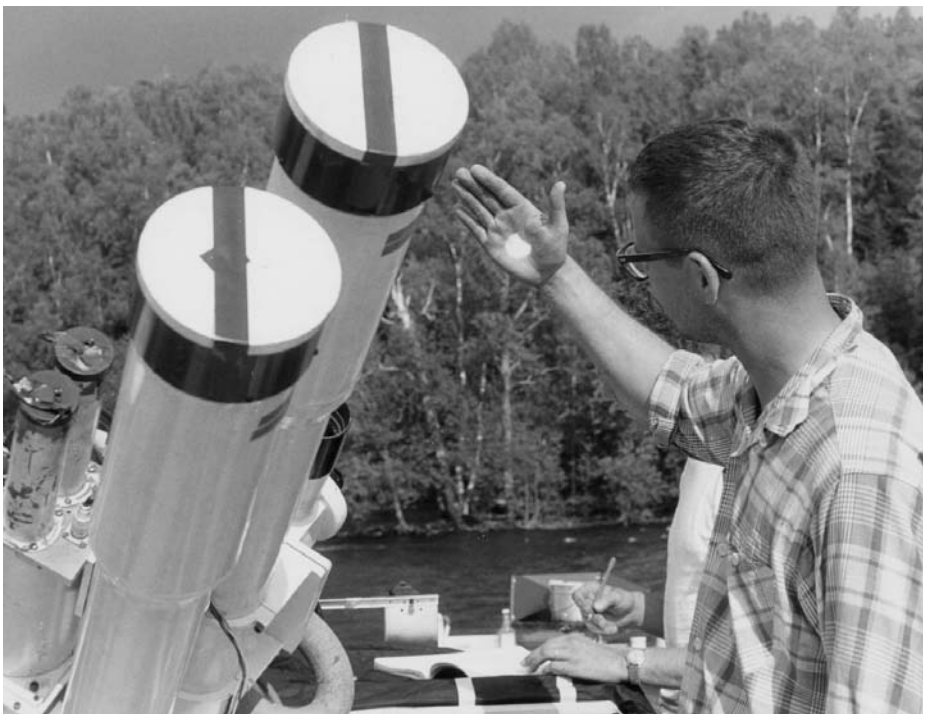
Fred was from what would for years only half-jokingly be called the "Ed Ney School of Science." Ney was a staple at the University of Minnesota for almost 50 years. Ney was a lovable, idiosyncratic character. And because of his penchant for emerging fields of science, was another genuine pioneer of infrared astronomy. Originally a physicist, he drifted into the infrared via consulting with the military and looking at the sky through high-altitude balloons.

Ney, however, was fated to be known more as an artificer of new ideas and nurturer of famous students than a discoverer. As one of his biographies says, "Twice, the position of NASA Chief Scientist was filled by former students of Ney. Another student helped establish the Stratoscope Program at Princeton, and two students constructed one of the world's largest infrared telescopes at Jelm Mountain, Wyoming. One former student is a member of the National Academy of Sciences." Ney once remarked that Fred Gillett was the best graduate student he'd ever had.

Infrared Progress

The field of infrared astronomy emerged at an ideal time for Fred. The discipline was just in its formative stages when Fred was working on his post-graduate degree in physics. Infrared astronomy, which had seen slight development in the early 20th century, had been hindered by the lack of proper instrumentation for imaging the incredibly rich infrared sky. It wasn't until 1961 when infrared astronomy really began to take off. It was in that year that Frank Low at the

Fred performing a field experiment as part of his work at the University of Minnesota in the early 1960's.



A projection of the partially eclipsed image of the sun on Fred's hand during the same field experiment in Page 3 photo.

University of Arizona published his first paper on germanium doped bolometers. This instrument increased by hundreds of times the infrared sensing capability for astronomers, and even lengthened their range of seeing into the far infrared. Because of his bolometer, many have called Low the father of infrared astronomy. True or not, there is no disputing that Low's instrument put infrared research solidly and forever on the astronomical map.

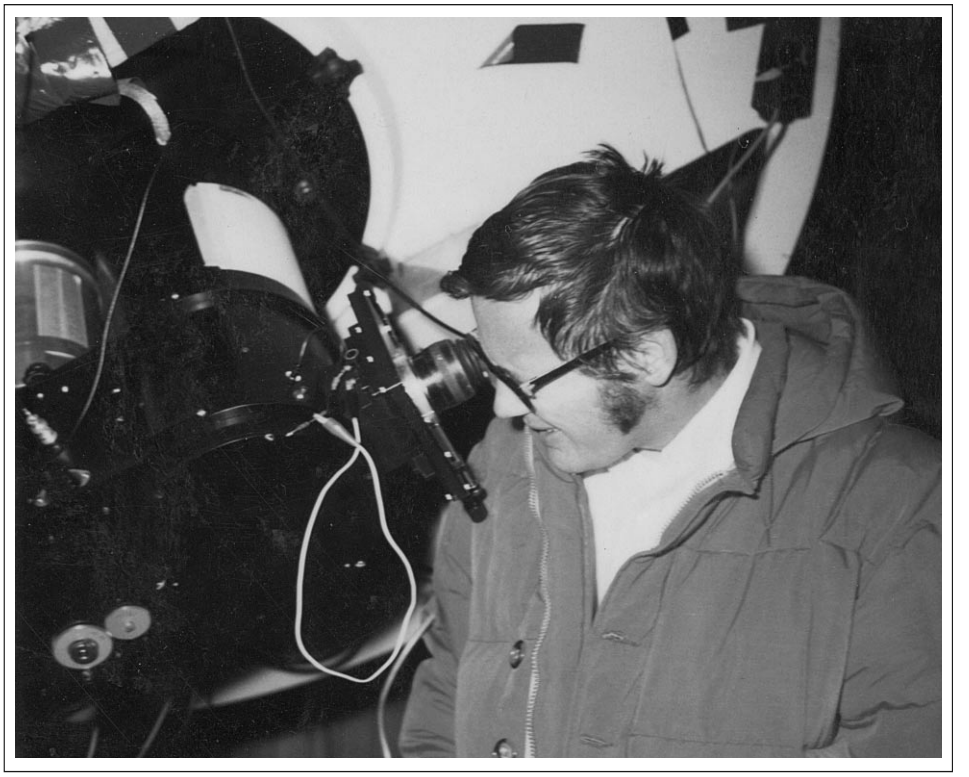
Fred showed up in the early 60's just as Low was taking off – literally. Exploiting the possibilities of his new bolometer, Low was busy flying Learjets into the Earth's stratosphere to reach above the heaviest atmosphere. Meanwhile, a gentleman named Gerry Neugebauer was getting ready to do his famous 2.2 micron survey atop Mount Wilson on the 62-inch reflector. Neugebauer entered the field, as many of those early pioneers, through the military. "I was a lieutenant. They ordered me to go to JPL and work on infrared," was how he put it. He was using lead sulfide detectors. Both types of instruments were analogous to a sort of crude camera which could record a very rudimentary smear of heat.

By the time Fred came along, Ney, Low and Neugebaur were already established and a definite infrared nexus was forming.

Low recalls that Ney urged Fred to visit him in Tucson. "Fred built our first liquid helium cooled spectrometer." Together, the pair took off into the infrared, Low's bolometer hooked up to Fred's helium-cooled spectrometer.

Fred's infrared commute between Minnesota and Arizona went on for a couple of years. And then following a brush with Ney's high-altitude balloon experiments on the East Coast, Fred landed his first real job. He'd been hired as the junior-most assistant research physicist at the University of California at San Diego. In 1966, the brand-new astrophysicist left the snow-choked climes of Minnesota for sunny California. He never went back. Along with him came his family.

Fred and Marian had been married in 1960, the same year he got his B.S. in physics. He'd met her through her cousin. When they moved, the couple already had their two young children, Nancy and Michael. The job at UCSD paid a good deal more than the $200 a month he had earned as Ney's research assistant. "Thank goodness I was a nurse," Marian said. While Fred had been in school, she'd supported the family.



While in San Diego, Fred traveled to Mount Lemmon to observe as in this April, 1972 photo.

In 1967 Fred published his first paper with Low. It was called "Infrared Observations of the Planetary Nebula NGC 7027." It was only the fourth paper he'd ever published. The first three had been with Ney. Eventually he'd publish more than 120 scholarly pieces, the last one in 2000 on Gemini instrumentation, in collaboration with Gemini Director Matt Mountain, then Gemini Project Manager Jim Oschmann, and Robert Nolan, then Gemini Instrumentation Manager.

Right from the beginning, Fred worked in the infrared. "Between 1965 and 1970 there were 14 papers with his name on them," says Gemini Senior Astronomer Tom Geballe, who first came across Fred's work when he joined the new Berkeley infrared astronomy group in 1969. "I suspect that that number represents far more than half of all the papers published in infrared spectroscopy during the first half-decade of infrared astronomy. Fred was not only a pioneer, he probably was the most active pioneer."

The marriage of Fred to Marian Ruth DeGriselles on December 17, 1960 at the Lake Wilson United Methodist Church in Minnesota.

The Vega Phenomenon

Like the radiation that Fred studied, most of his work was beyond the visible, but the early 70's brought the beginning of Fred's claim to true public visibility – his share in discovering the Vega Phenomenon. Many people know about this discovery, but few outside astronomy are aware it has a name or who discovered it. The Vega Phenomenon is the first solid scientific evidence that stars other than the Sun might have their own planets. It launched myriads of speculations about extraterrestrial life. Two men started this - one of them was Fred.

Here's how it happened: In 1975, Low, Neugebauer and Fred were three of nine infrared scientists chosen by NASA to propose an infrared survey mission in space. Their recommendations resulted in the Infrared Astronomy Satellite, or IRAS for short. IRAS eventually became a joint project of the U.S., the Netherlands and the United Kingdom. It consisted of a 24-inch telescope and four different kinds of IR detectors, all cooled to 1.4 degrees above absolute zero by 127 gallons of liquid helium. In 1977 when the project officially got under way, it was pioneering work. Fred was in it from the beginning helping to design and maintain the instrumentation.

IRAS benefited greatly by being a child of NASA. In the 1970's, infrared detector technology was still highly classified military information. Since NASA was backing the project, however, the designers were able to get access to detectors which were unavailable to civilian astronomers.

"It was funny," said George Aumann, who discovered the Vega Phenomenon with Fred. "NASA went to bat for us in getting access to those detectors," he says. "The military wasn't going to let us have them until they learned we were going to cool them with liquid helium. When they heard that, they said sure, go ahead. They figured the helium would explode in space anyway, since nobody had ever tried to put liquid helium in space before. They figured their detectors would blow to pieces with everything else."

They were wrong. IRAS, which was finally launched in January of 1983, would be an extremely successful NASA project and one of the most important landmark experiments in the history of infrared astronomy.

Dr. James Houck, Professor of Astronomy at Cornell University, recalls Fred's meticulous attention to those 62 detectors in IRAS. "He knew those detectors personally," Houck remembers. "He could tell you the characteristics of each one. Like they had personalities."

As a member of the IRAS team, Houck had insisted on extending the IRAS "seeing" capabilities into the longer infrared wavelengths where the Vega Phenomenon was eventually confirmed. It was Aumann and Fred who made the actual discovery. They were in England in 1983 overseeing the orbit-by-orbit calibration of the satellite when Fred noticed an anomaly in the data on Vega. Eventually they figured out the data meant they had discovered a disk of particles around Vega.

Astronomers had long speculated that planets are formed from such disks, but could only speculate until this discovery. "This should give the modelers

NASA press conference in November of 1983 that focused on the achievements of the IRAS project. In the front row, Fred is second from left and Frank Low is second from the right.

something to think about," was Fred's characteristically understated comment when Aumann showed him his conclusions on what they had stumbled upon. It certainly did.

"I remember when the word got out, within 24 hours the BBC was interviewing us. The next day we got an excited call from NASA saying, 'Why do we have to learn about this in the newspapers?'" Aumann laughed. "There wasn't anything we could have done about it. Reporters were calling from all over the world."

As many scientists have learned, bright lights and cameras are often more exciting than the slow progression of hard research. But Fred's brush with public acclaim had little effect on him. Both he and Aumann turned down an invitation from Carl Sagan to lecture at Cornell on what he and Aumann had discovered. They were too busy analyzing the data, he told Sagan. And they were. Fred never much cottoned to the limelight anyway. For him, it was the science that mattered, not the publicity. In private, with his family, he always expressed a droll sense of humor about the ephemerality of "celebrity science."

"But he never really criticized anybody," said his daughter Nancy Richardson, who studied at the University of Arizona while the family was living in Tucson. "Dad would talk at home sometimes about people in the business in a sort of general way," she said.

"But when we were discussing someone, you could tell by the tone of his voice what he really thought about them. At least I could. He had strong feelings about who he admired, and who he thought didn't have it. He never said anything outright. But you could tell by the tone of his voice. Anyway, I could."

At the height of the Vega Phenomenon publicity glare, Fred found himself as a celebrity guest on Ted Koppel's nationally televised "Nightline" television show. His fellow guests were Sally Ride, the first woman in space, and Carl Sagan. It was "Space Night" on "Nightline." First Ms. Ride was interviewed, and talked about the thrill of going into space. Turning to Fred and Sagan, the interviewer remarked that as astronomers, they must be envious of Ms. Ride's opportunity. Sagan confessed to being somewhat jealous of her.

The interviewer then turned to Fred. "Wouldn't you like to go, too?"

"Oh," said Fred, "I'm so tired I'd be happy to retire to my desk with all my information and try to understand what IRAS has told us over this past year."

Later in the interview he said, "I'm enjoying myself a great deal right now and I don't think I'd change places with anyone."

"That was just like dad," Nancy said.

"When the movie 'Contact,' came out, I got a call from my daughter," recalled Aumann.

"She said, 'Dad, go see 'Contact'."

"I asked her what for?"

"She said, 'Never mind. Trust me. You'll get a kick out of it.'"

"We went" said Aumann. "That part in there about how the alien message from

Vega was discovered was based on our work," he laughed.

Soon after the papers had been written and the roar in the media over the phenomenon had died down, Fred went back to building spectrometers and raising his family. It was his 15 minutes of fame. "That was a good time for us," remembers Marian.

Fred in his NASA office in Washington, D.C., summer 1988.

NASA Interlude

Fred rode the success of IRAS all the way to Washington. In 1987, he took a two-year sabbatical to become NASA's Visiting Senior Scientist for the Infrared and Radio Astrophysics Branch.

"He didn't want to do it," says Larry Caroff, who worked with Fred at NASA, managing several of the space agency's IR programs. "They kept talking to him until his ears fell off," said Caroff. "Finally he did it."

The fact that Fred was hired to help establish an IR presence for NASA speaks for itself about what the experts thought of him and his work. Fred had arrived at the top of his field. He didn't like being there in Washington, dealing with the endless administrative minutia that such top-level jobs entail. But he learned a lot about how such projects get done, the pitfalls, the politics, the necessities of so-called Big Science.

"Fred had a natural talent for teamwork," Caroff said who became a dear friend and biking buddy.

During his two years at NASA, Fred was the logistical point man for getting three major projects off the ground. Two of these projects were basically in-depth extensions of the two most significant IR projects to date, IRAS (1983) and Neugebauer and Leighton's 2.2 micron survey (2MSS) in 1969. SIRTF, or the Space Infrared Telescope Facility, is basically a follow-up of IRAS and 2MASS is an extension of 2MSS. Fred also played a key role in the initial stages of SOFIA, the Stratosphere Observatory for Infrared Astronomy.

"A lot of the people at SOFIA don't understand what an important role Fred played on SOFIA," Caroff said. "Fred forced us to crystallize the science arguments for the project. He's the one who focused it.

"That was Fred," Caroff said. "What he brought to any project was the ability to grasp and then to conceptualize the whole. Then he did the analysis – you could never catch Fred out on a limb. He had a natural talent for convincing other people how it should be. And he never gave up, either. Ever!"

Over to NOAO

The great success of IRAS, which catalogued between 250,000 to 350,000 infrared astronomical sources (depending on which celestial camp is doing the counting), kept Fred busy for a long time. He was also getting more and more involved at Kitt Peak National Observatory, outside of Tucson. Fred eventually had his hands in just about every Kitt Peak infrared project in some way or another. He kept on plugging away at his infrared instrumentation until he climbed all the way to the top. For a few months in 1978, he even served as Kitt Peak's Acting Director. Though he didn't much care for the politics of observatory administration. Fred was proud of his association with Kitt Peak and he's still famous enough with Kitt Peak personnel that an anonymous picture of him is posted on a "Guess Who?" web page of important instruments and well-known scientists who have worked at the facility.

Working for Kitt Peak inevitably

Fred using the infrared photometer on the 2.1 meter telescope at Kitt Peak in the mid-70's.

pulled Fred into the administration of the National Optical Astronomy Observatory. Formed in 1982, NOAO serves as the umbrella organization for many of the largest observatories funded with U.S. tax money. It is one of the institutional arms of the Association of Universities for Research in Astronomy (AURA), which operates Gemini, Kitt Peak, the Cerro Tololo Inter-American Observatory in Chile, the Space Telescope Science Institute and the National Solar Observatory, with facilities in Arizona and New Mexico.

Fred's reputation as a solid researcher more interested in good data than politics was inexorably pulling him into the realm of Big Science. "Fred kept us honest," former NOAO director Sidney Wolff told one interviewer. By the time Fred left NASA in 1989 to come home to Tucson, he was recognized by his peers as one of the unquestioned leaders in infrared astronomy. It was Fred's science and his quiet, behind-the-scenes tenaciousness that would see him through the looming uproar in the United States over the Gemini mirror. Beneath his unassuming façade lay real strength.

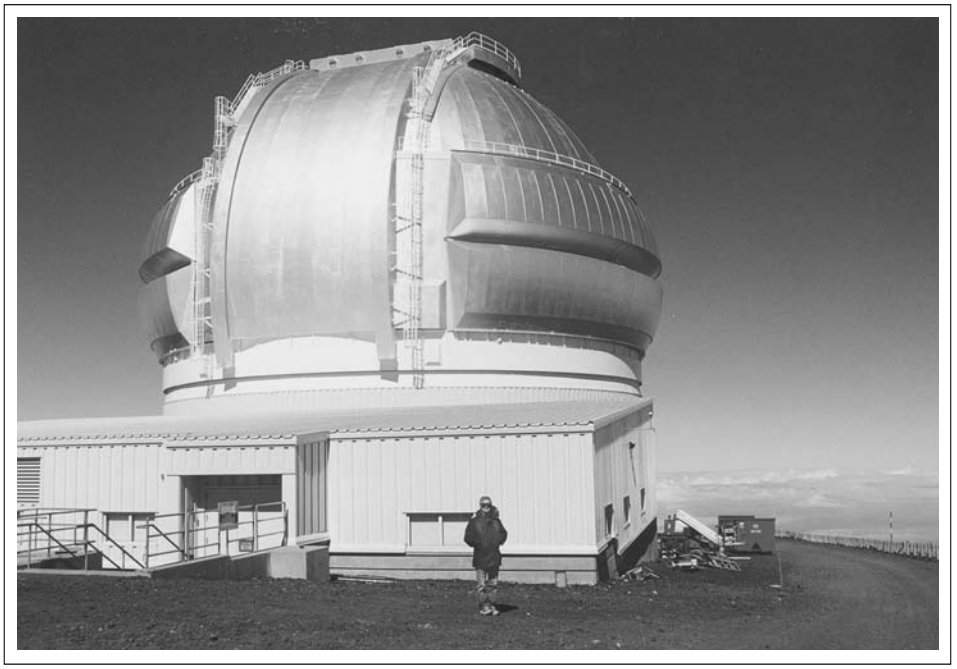
The Decadal Survey

Every ten years the U.S. science community takes a deep breath and considers its priorities for future research. This process is called the Decadal Survey, and is sponsored by the National Academy of Sciences. In 1989, the Academy appointed John Bahcall, with the Institute of Advanced Astronomy at Princeton, as survey chairman for astronomy and astrophysics. Bahcall gathered together more than 300 of the top astronomers in the country to decide the direction astronomy should take in the 1990's. Twenty-five of these experts were assigned to consider what should be done about the infrared. Fred Gillett was appointed committee chair.

One of Fred's great talents was that he always grasped the overview. If it could ever be said that he wore blinders, it was because of his uncompromising focus on doing something right.

Thanks to Fred's vision, when "The Decade of Discovery in Astronomy and Astrophysics" was published in 1991, Bahcall's report cited an 8-meter infrared telescope atop Mauna Kea as its No. 1 priority for American astronomy in the upcoming decade. The committee went so far as to label the 90's the "Decade of the Infrared."

The Decadal Survey placed an 8-meter infrared telescope on the fast-track for development within the American astronomical community. There was a good deal of residual resistance to a major infrared telescope, however, since the great majority of American astronomers observed in the optical part of the spectrum. The unique funding arrangements by Congress also added to the difficulties of getting the Gemini Project off the ground, since Congress had mandated that half the Gemini budget must come from foreign sources – which meant Gemini



Fred in front of what is now the Frederick C. Gillett Gemini Telescope on December 26, 1998.

must move outward from its exclusively American interests and become a truly international project.

Resistance to Gemini's "new paradigm" of both design and international cooperation came to a head with a controversy that erupted in the early 1990's over Gemini's mirror design and manufacture. The traditional way of viewing a telescope was that the heart of any telescope is its mirror. Gemini visionaries, however, had taken a quantum leap in design priorities and adopted the view that the heart of a telescope is simply its "delivered image quality."

This view involved much more than just the mirror. It was also difficult to get the idea across to a great many in the astronomical community, who remained focused on the telescope's mirror as the primary issue in design. Even Fred, who was a member of the Gemini team responsible for choosing the Gemini mirror design, had to go through his own assessment of how he saw telescopes.

The mirror controversy was a painful one for Gemini, but it could be argued that it was one of the best things that happened to the project. Because it helped focus the entire Gemini team, including Fred, on the new paradigm of "delivered image quality" as the designers' overriding goal in creating Gemini. Fred embraced this approach wholeheartedly and in fact became one of its primary advocates.

Why Fred?

When Matt Mountain was asked why the Gemini Observatory Board of Directors, at his urging, had unanimously chosen to name the Gemini North telescope after Fred Gillett, he didn't immediately answer. He mumbled around for a moment, obviously not getting to what he really wanted to say, and then stood up from his chair and walked over to the large blackboard that dominates his office. The board was already crammed to overflowing with supernumerary squiggles and scrawls – the symbolic effluvia of the interminable discussions on science and technology that go on day after day in that office. He reached up and wiped off a big, clean space on one corner of the board, and then he wrote down this formula:

$$S/N \propto (D/\theta) \times (\eta^{1/2}/B^{1/2})$$

"This is why," he said looking around. "This is why."

For a scientist such as Mountain, this tells it all. It does this so eloquently because it so lucidly, so gloriously speaks truth in the form of number. All great formulae do this. There is no "muddle of humanity" in them, only ratiocination. In their pristine symbology, they are the poetry of science. And for those who are

The Frederick C. Gillett Gemini Telescope with the vents and observing slit open at sunset on Mauna Kea.

immersed in their language, they sing as sublimely as a Shakespearean sonnet. Any real scientist can tell you this.

As for the formula above, translated into English, it says: "The quality of the data is dependent upon the quality of the telescope." This formula has another very interesting aspect to it. It is this: Anything you manipulate within the formula affects everything else. It is a scientific expression of integrity.

It is customary to apply the word, "integrity," to describe the human condition. Many people mistake "integrity" for moral excellence, for honesty, or rectitude and uprightness. It is not. This is probity. Integrity means wholeness. Like love, it encompasses these other things. In Webster's Unabridged Dictionary, integrity is defined as "the state or quality of being entire or complete." Integrity is wholeness.

Fred Gillett

Fred had always been an excellent scientist. But it is not for his science that the telescope is being named for him. It is not even for his leadership – at least in the traditional sense of the word. Though Fred chaired many committees, led projects and was in the very thick of the Gemini design, anyone who knew Fred will quickly tell you his type of leadership was not based on charisma, or haranguing the crowds and "bringing the team together."

Fred was in fact so low-key it is interesting to note that most of his long-time colleagues, those men and women who heartily approve of the telescope honor, when asked how they first came to know Fred, will pause for a moment, mentally scratch their heads, and pensively reply they never gave it much thought. As a matter of fact, the great majority have no recollection at all of their first meeting with Fred.

"Damned if I know," said Gerry Neugebauer in a typical reply when asked how he met Fred. "He was always around."

So if it wasn't for his science or his leadership, why, then, is Fred being awarded this singular honor?

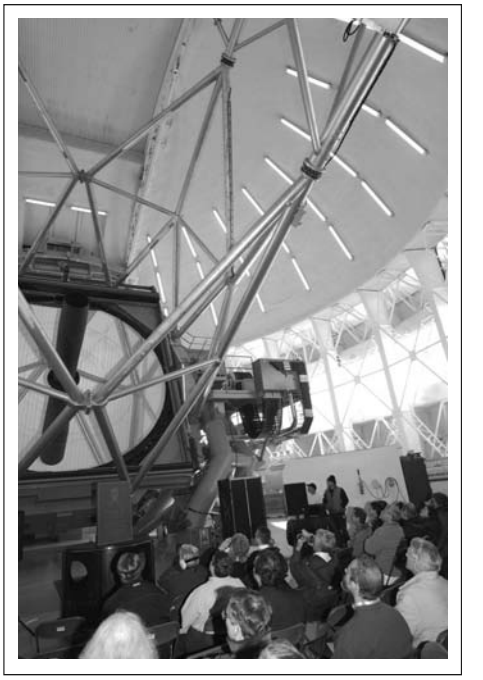
The key to that answer lies not in what Fred did, but in who he was. Especially who he was for Gemini.

No matter who you talk to about Fred, no matter what scientist or instrumentation engineer, or astronomer or physicist, or neighbor or friend – and his colleagues were legion and included some of the best minds in the world – no matter who they are, they all answer the same. One way or the other, often in explanations dense with formulae and jargon they try to describe Fred for you. In a desire to sincerely explain their feelings about Fred, they always work down to one word. They always come down to integrity.

Integrity was the key to Fred's life. It is the reason behind the telescope's naming. No matter what else that could be said about Fred – and many could say a great deal since he had his unassuming, scientific fingers in so many empirical porridges – no one ever questioned his integrity.

The Fred Gillett Telescope

"The post of honor is a private station," Cato once said. So the telescope will get only one man's name upon it. What is to be understood, however, is that by choosing this one man for this singular honor, all who have played a part are honored. The naming of the telescope is public acknowledgement of what Fred fought for in the rigor of his calculations, his meticulousness, his one-pointed, uncompromising insistence on quality as he unhesitatingly urged everyone on with a kind of uncompromising focus incessantly repeating the refrain that Gemini was going to be the best possible infrared telescope that he possibly could make it. That everyone could make it. And he meant it. In the end, this is what he was about. It is this legacy that remains at the heart of the telescope. That's why his name is on the plaque.



The crowd gathered for the naming ceremony beneath the telescope.

What Fred bequeathed to Gemini was a lasting, inner core of integrity. This is not to say, however, there was any conscious intent by anyone – least of all by Fred himself – to place "integrity" at Gemini's core. It was just one of those fortunate, half-intuitive, things in life that sometimes just happen.

Fred was not Gemini's arm, or even voice, but he was certainly Gemini's conscience. In naming the Gemini telescope on Mauna Kea the "Frederick C. Gillett Gemini Telescope," this is what is being honored.

Aloha to Everything

In early October of 2000, Fred and Marian returned to Tucson. They'd talked it out with their kids in Indianapolis. Now they were passing back through Tucson on their way to Seattle. People invited them out. The Sierka's, their closest friends in Tucson, held a very special party for them. Here

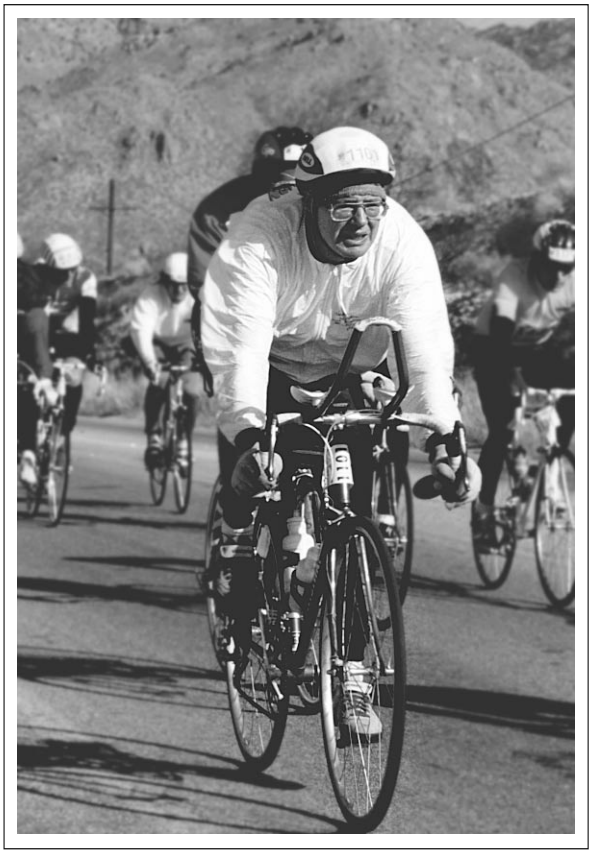
Fred and Frank planned their hike.

So there they were, two hard-core scientists, two old friends, walking and talking as autumn was coming on and the leaves were dying. Edging ever so softly towards the ineffable.

"How do you go about this?" Low remembers Fred asking that fateful autumn morning in the canyon. "Wouldn't it be easier on everyone if I just got on my bicycle and rode away?"

"I don't doubt something like that happened," says Marian.

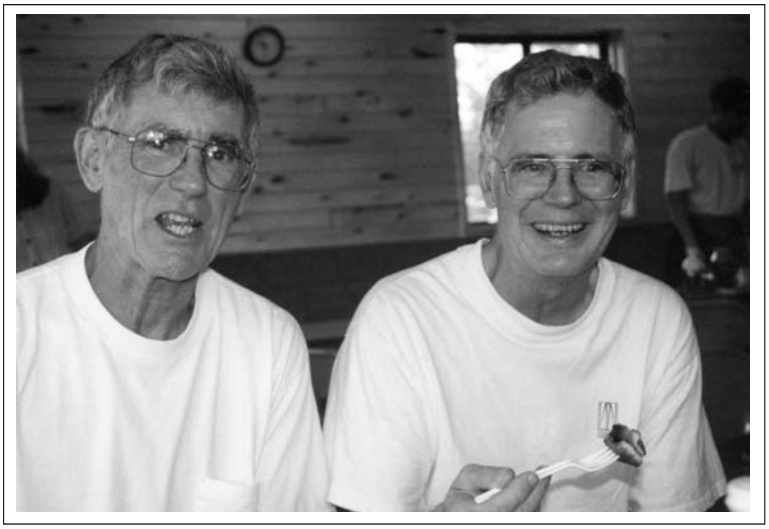
Either there in the canyon, or perhaps even later as he and Marian made their slow way up to Seattle, Fred made his final decision to go through with the bone marrow transplant. Ultimately his decision had nothing to do with logic, or even fear. "I really do honestly believe that if Fred had been on his own, he wouldn't have gone through with it," said Marian. "He knew perfectly well what his chances were. Without us, I think he would have just let nature take its course. He had to try for his family."



Fred riding in the tenth annual "El Tour De Tucson" on November 21, 1992. The route travels around Tucson and totals about 100 miles in one day.

After Tucson, they went on to San Diego, where they visited with friends and old colleagues. They stopped by Neugebauer's office. They spent a week just before Halloween at the home of their *hanai* (unofficially adopted) daughter, Danuta Gessner and her husband Rick. "Fred had a wonderful time playing with our two-year-old Megan," Danuta said. "We all went on a hayride together." Danuta had come into their lives back in 1980 when Fred and Marian had hosted her as a young woman performing in the international singing group, "Up With People." "Our paths were just meant to cross, I guess," Danuta said. Danuta became part of the Gillett family. (Altogether, the Gillett's hosted 95 young people through the years in the "Up With People" program.) They spent a couple of days at the Caroffs' home in Sunnyvale, still visiting, winding up business, still preparing. The friends went for one last, long bicycle ride together.

And then on October 22, 2000, they checked in at the Fred Hutchinson Cancer Research Center in Seattle, and settled into an apartment furnished by the center for families undergoing bone marrow transplants. Everybody staying in the apartments was in the same boat. It was a place rife with fear and hope. And thus, it was an intensely caring group of people. Marian has good memories of it. It was to be Fred's last home.



Fred with his brother Jim (left) who donated bone marrow for the transplant.

"It didn't really matter, though," said Marian. "No place was ever home for Fred except Tucson."

The bone marrow transplant towards the end of November went well. They were lucky. They'd found a good match. Fred's older brother Jim donated the life-giving marrow. Fred felt well enough by Christmas to spend the day at the home of family friends. January was looking even better, until the end of the month when Fred started to have back pain.

By the end of February he was diagnosed with spinal compression fractures and by mid-March the graft cells were beginning to cause major problems with his kidneys, liver and other organs. He was battling painful infections, he was full of IVs, taking all kinds of medicines, in and out of the hospital, full of pain killers, and in severe pain from a series of compression fractures in his spine (brought on by steroid treatments). His organs were failing and his bones were collapsing.

"Those were some bad times. There were so many specialists, so many tests. There was just nothing else we could do," said Marian. "We couldn't deal with it any more." On March 19, 2001, Fred checked back into the hospital for what would be his last time.

"They haven't got a model, Matt," a very sick man fretted to Mountain when he called to check on him a few days

before his death. "They're just trying things."

"Through all of this," said his son Mike, "Dad never gave up." "He realized that with all of his systems failing however, that there was a bigger issue. I'd like to think that because of the way Dad thought everything through, that he was a step ahead of the rest of us."

It was about that time that his old NASA friend Larry Caroff took off work and drove up to Seattle to see him. It would be the last time the two biking buddies talked. And like so many in such situations heavy with implications of mortality, they talked only of mundane things, known equations. But they were both aware finality was hanging in the air between them, in the sterile, antiseptic air of an impersonal hospital room.

On April 20, the couple's children arrived in Seattle to spend the weekend with Fred and Marian. Early Sunday afternoon daughter Nancy with her husband Ed and three year-old Alexandra returned to Indianapolis and Danuta and husband Rick to San Diego. Son Michael with his wife Susan and seven year-old Elizabeth remained. The family's good friends and longtime neighbors Ray and Jeanne Sierka arrived with their daughter at about 3 p.m. from Tucson. With family and friends at his bedside Fred died peacefully at 4:45 p.m. on Sunday, April 22, 2001.

Fred with grandson Eric Gillett in August, 2000.

The great mythologist Joseph Campbell used to tell a famous story about Schopenhauer, which he felt shed light on how a man's life is lived.

"Schopenhauer," he said, "points out that when you reach an advanced age and look back over your lifetime, it can seem to have had a consistent order and plan, as though composed by a novelist. Events that when they occurred had seemed accidental and of little moment turn out to have been indispensable factors in the composition of a consistent plot. So who composed the plot? Schopenhauer suggests that just as dreams are composed by an aspect of yourself of which consciousness is unaware, so, too, your whole life is composed by the will within you. And just as people whom you will have met apparently by mere chance became leading agents in the structuring of your life, so, too, will you have served unknowingly as an agent, giving meaning to the lives of others."

It is all interwoven, intermeshed. Cold Minnesota winters, emissivity, bicycles, stark hospital corridors, stars, paper notebooks dense with penciled calculations, the snow atop Mauna Kea, science, family, love, laughter.

"All nature is but art, unknown to thee;
All chance, direction, which thou canst not see;
All discord, harmony, not understood;
All partial evil, universal good;
And, spite of pride, in erring reason's spite,
One truth is clear, Whatever is, is right."
- Alexander Pope

At the banquet following the naming ceremony, Fred's son Michael presented Gemini a plaque and memento shadow box on behalf of the family which they called, "The Essence of Fred." The box, Michael said, was symbolic of personal memories. Among other things it contained a picture of Fred and his grandson Eric; a Zane Grey novel, "Wild Horse Mesa"; a toy bicycle; a Reese's Peanut Butter Cup; a perfect "Hearts" card game hand; and a Willie Nelson CD entitled "Always on my Mind." These were all items that were special to Fred beyond his professional interests and accomplishments that were included in this newsletter tribute.

The shadow box is hung at the telescope and has a plaque adjacent to it that reads: "The Essence of Fred" Given in honor of Fred Gillett by his family. He was a lover of plaid shirts and fishing hats, Zane Grey novels and Willie Nelson songs; Reese's peanut butter cups and Hearts; cycling and Arizona basketball. Above all else, he was a good and gentle man who so loved his grandchildren... Elizabeth, Eric, Alexandra, Megan, Taylor, Serena, Madison and Frederick. November 13, 2002."

RECENT SCIENTIFIC HIGHLIGHTS

Jean-René Roy & Phil Puxley

Semester 2002A was the first semester with extensive science time with two facility instruments on Gemini North. It was also the last semester with a visitor instrument (Hokupa'a/QUIRC) on the Gemini North telescope.

At Gemini South, we continued to depend on two visitor instruments (PHOENIX, FLAMINGOS-1). New slips in the delivery of our facility instruments (T-ReCS, GMOS-S and bHROS) have pushed science with facility instruments at Gemini South into semester 2003B. CIRPASS, the IFU near IR spectrograph from the University of Cambridge, had a very successful demonstration science run on Gemini South in early August, 2002.

GMOS-N continued to be used very successfully on Gemini North in 2002A, and science programs have now been executed in the queue mode on a regular basis since November, 2001.

Early in 2002, we took the decision to implement the technique of "nod and shuffle" (N&S) that allows a more accurate subtraction of the sky background by alternately shifting charges from one portion of the CCD detectors to another in synchronism with nods of the telescope on the sky by a few, to several arcseconds. In April and May, 2002, we completed the engineering and commissioning work of this mode, and system verification was done over the equivalent of five nights in August and September. The commissioning of N&S on GMOS involved a remarkable collaborative effort between several astronomers and engineers from the Gemini communities working closely with Gemini staff members. This new mode is now being offered to the general communities starting in 2003A.

The 2002A NIRI runs were unfortunately severely affected by the poor weather on Mauna Kea this winter. The weather, along with further mechanical problems, required NIRI to be taken off the telescope. Still, a number of NIRI programs were executed, and the corresponding data was distributed to the Principle Investigators (PIs) this summer.

Hokupa'a/QUIRC

Stephens (Universidad Católica de Chile) & Frogel (NASA Headquarters) employed Hokupa'a/QUIRC to investigate the stellar populations in the central 22" of the nearby Sc spiral M33 ***(Figure 1)***. From the central surface brightness profile, they modeled the central distribution of the stars with a mix of core-spheroid-disk components. The authors derived a mean heavy element content very close to that of our Sun which is 8.5 kpc away from our own Galactic Center. The bolometric luminosities and densities of stars on the asymptotic branch indicate that two main bursts of star formation took place at ~0.5 and ~2 Gyr ago. By combining the Gemini Hokupa'a data with WFPC2 images from the Hubble Space Telescope, Stephens & Frogel were able to establish that the central region of M33 is composed of a mix of young, intermediate and old-aged stellar populations.

Courbin (Universite de Liege) and his collaborators used optical and near-IR HST and Hokupa'a images to explore the gravitationally lensed radio source PKS 1830-211. They found the lensing potential to be composed of a face-on spiral galaxy (apparently the first such case of lensing discovered) with a poorly defined center and probably at z = 0.89, another galaxy with also a poorly defined center and unknown redshift, and a third galaxy, possibly at z = 0.19. These are the first images of a gravitational lens taken with AO on an 8 to 10-meter class telescope. The Hokupa'a images were of crucial importance to measure the positions of the quasar images with a very high precision using a special deconvolution method.

Roe (University of California, Berkeley) and collaborators have investigated the

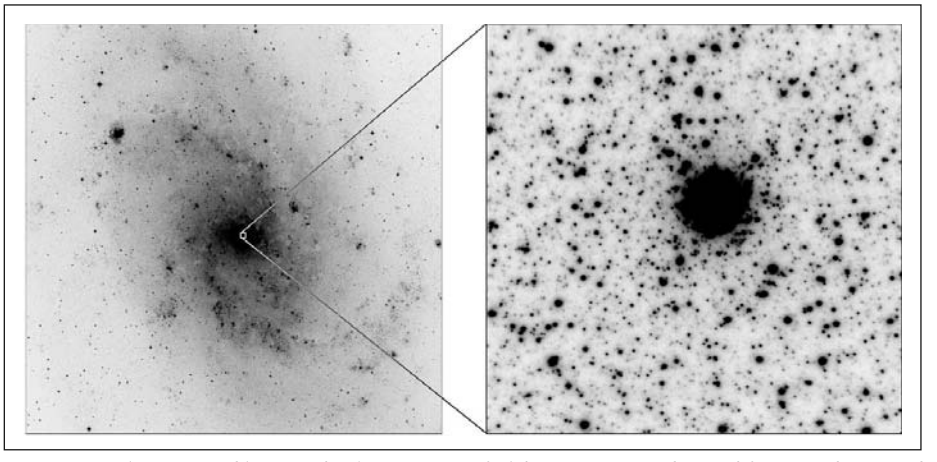


Figure 1*: Relative size and location of Hokupa'a image. The left image is a 30' red DSS of the center of M33, and on the right is the ~22" H-Band Gemini image taken with Hokupa'a. The faintest stars visible in the infrared are H ~ 20.5.*

Titan clouds using imaging with adaptive optics at Gemini North and Keck II. The seasonal North-South asymmetry of stratospheric haze particles is obvious. They report a thin haze and discrete clouds in Titan's south polar troposphere. The discrete clouds vary on time scales of a few hours. A seasonal mechanism may explain the formation of this spring polar tropospheric haze. Assuming that the clouds are located in or above the haze, the authors suggest that convection within this haze layer triggers methane condensation. Subsequent latent heat release leads to vigorous convection and formation of transient clouds. Roe et al. emphasize that their results have significant implications for planning the Cassini mission flyby of Titan. The spacecraft, due to arrive in 2004, will be able to look for these southern polar clouds with its ISS instrument. This should give the opportunity to see the end of southern cloud activity on Titan (linked with Titan's long winter conditions). If the mission remains active for more then four to five years, the start of spring cloud activity at Titan's North Pole could be followed.

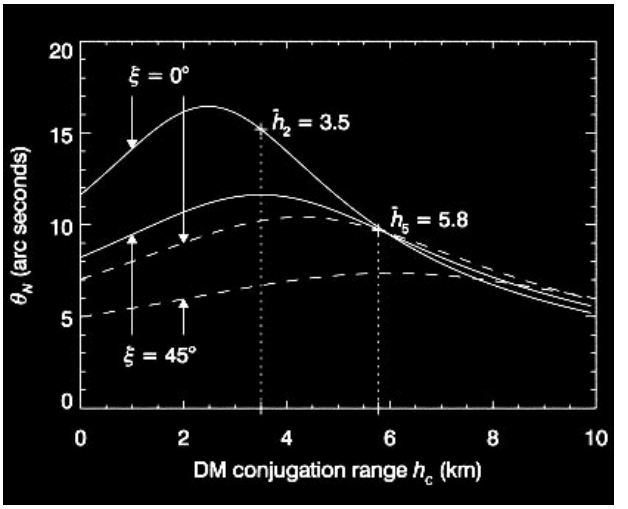


Figure 2: *Flicker & Rigaut (2002) derived the effective isoplanatic angle upon adaptive compensation with one altitude-conjugated DM, as a function of the conjugate range h_c, for two different turbulence models (solid and dashed lines) and two elevation angles as shown by the arrows. Solid lines represent a model tuned to have h = 3.5 km, and dashed lines show for comparison, a five-layer model with h = 5.8 km; h is the effective turbulent height.*

Flicker (Lund Observatory) & Rigaut (Gemini Observatory) analyzed the Hokupa'a Demo Science Galactic Center data set to study the effects of angular anisoplanatism, and to characterize Mauna Kea night time turbulence ***(Figure 2).*** From the current Hokupa'a Galactic Center data set, the authors find for the turbulence above Mauna Kea, a median value h = 3.5 km with 10th and 90th percentiles being 2.2 and 5.6 km. They refer to the study by Racine & Ellerbroek (1995) who reported Mauna Kea night time turbulence is preferentially composed of an underlying background turbulence upon which are often superposed only one or two thin dominant layers. The median effective turbulence altitude would be 6.5 km. Flicker & Rigaut suggest that a significant ground layer was either not present or not detected in the SCIDAR measurements that formed the basis of Racine & Ellerbroek analysis. The significantly lower h found by Flicker & Rigaut could be due to either the presence of such a ground layer or the absence of higher altitude turbulence. However, it is emphasized that the statistical sample of the Galactic Center data study is small, and the timespan of only a month is short.

OSCIR

Recently published results from OSCIR have mainly dealt with regions of star formation – and the late stage of stellar evolution in our own Galaxy.

Here, we give a few examples:

A large population of cold dust clouds has been observed in the Galactic Plane with the MSX satellite. These clouds appear as dark patches of absorbing material against a background of mid-IR emission bands and emission from warm, small dust grains. The so-called infrared-dark clouds (IRDCs) have one to several magnitudes of extinction at 8 microns. The IRDCs possess hundreds of magnitudes of visual extinction and contain large column densities of cold dust. Molecular clouds on the verge of star formation will contain extremely cold and dense condensations. Redman (Herzberg Institute of Astrophysics) and his collaborators have made JCMT/SCUBA mm and Gemini/OSCIR observations of the dense clumps of dust and gas and of young stellar objects (YSOs) associated with the bright, compact sub-mm source G79.3+03 P1 in the nearby MSX infrared-dark cloud G79.3+03. The Gemini observations revealed the presence of three young stellar objects within the cloud, the brightest one being likely a Herbig Ae/Be star. This concentration of stars and YSOs indicates that the IRDC is actively forming low-mass stars. The sub-mm source G79.3+0.3 P1 itself does not contain infrared sources and may represent an even earlier stage of star formation.

The identity of a strong emission feature at 21 microns in a number of proto-planetary nebulae (PPNs) is one of the most interesting unresolved mysteries in astrochemistry. Sun Kwok (University of Calgary) and collaborators used OSCIR on Gemini North to investigate the dust properties of two post-asymptotic giant branch 21 micron sources. They imaged the sources through five filters covering the 11.3 to 21-micron emission features as well as the adjacent dust continuum. The source IRAS 07134+1005 ***(Figure 3)*** shows a clearly resolved shell structure, but no significant variation in morphology is seen between the different filters. There are two blobs possibly representing the edges of a torus. The uniform morphology between the emission features and the continuum suggest that both the carriers of the 11.3 micron aromatic band and the 21 micron feature originates from the material ejected during the asymptotic giant branch phase of evolution. The carriers of the substances responsible for the spectral features share the same spatial location and ejection history as the general dust component. There is no evidence that the 21 micron emission is

created by a sudden ejection at the end of the AGB phase.

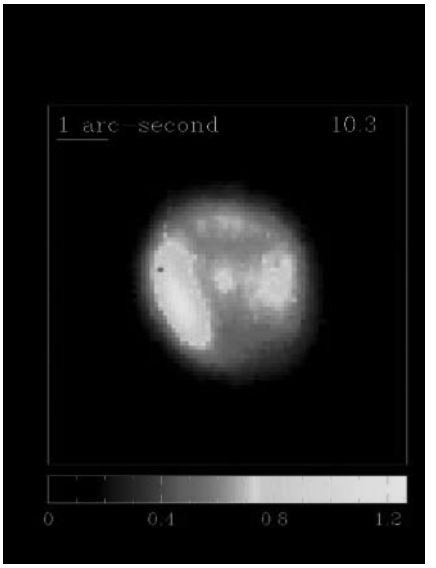


Figure 3: *OSCIR image of proto-planetary nebula IRAS 07134+1005 at 10.3 microns showing a clear shell structure with two blobs possibly representing the edges of a torus. No observable difference in the morphology of the emission can be seen in the emission regions of the 11.3 and 21 micron features in comparison with the dust continuum. (See Figure 1 in the paper by Kwok et al. to view the images at 10.3, 11.7, 12.5 18.2 and 20.8 microns.)*

PHOENIX

The Large Magellanic Cloud is a prime target in which to probe chemical evolution in stellar populations. The trend of [O/Fe] versus [Fe/H] can be a crucial relation in establishing star formation histories in stellar population. For example, oxygen is made preferentially in the most massive stars, while iron comes from both massive, core-collapse supernovae (SN II) and the binary Type Ia supernovae. The run of the O/Fe ratio with Fe/H in a stellar system is a measure of the history of SN II to SN Ia rates, and hence, of the formation history of the LMC. Using the high-resolution infrared spectrometer PHOENIX on Gemini South, Smith (University of Texas, El Paso) and a large international team have determined the abundances of the isotopes C-12, C-13, N-14 and O-16 along with abundances of Fe, Na, Sc and Ti in 12 red giants spanning masses between 1-4 M_{sun} – a range of mass lower than in previous works of 8-10 M_{sun}. The iron abundance sampled ranges from [Fe/H] = -1.1 to –0.3. Both [Na/Fe] and [Ti/Fe] are found to be consistently lower than their Galactic values by ~0.1 to –0.5 over the metallicity range sampled in the LMC. These characteristic underabundances of Na and Ti seem to also occur in a number of dwarf spheroidal galaxies. The LMC red giants in this sample all show evidence of the mixing of CN-cycle material to their surfaces via the first dredge-up, with N-14 enhanced by +0.4 to +0.8 dex over its estimated initial values, and C-12 decreased by –0.3 to –0.5 dex. The C-12/C-13 ratios in the LMC red giants are found to decrease with decreasing giant star mass in a manner similar to that found for Galactic red giants. However, the LMC trend appears to be shifted to lower C-12/C-13 ratios for a given red-giant mass. This shift may be due to the increased mixing associated with lower-metallicity giants. The [O/Fe] values in the LMC are smaller by about 0.2 dex than those in the Milky Way. This can be explained by both a lower supernovae rate (caused by a lower star formation rate) and a lower ratio of supernovae type II to supernovae type Ia.

GMOS

Davidge (Herzberg Institute of Astrophysics) used GMOS system verification g'r'i'z' imaging to investigate the stellar content and distance of the dwarf irregular galaxy Kar 50, an unusually faint dwarf galaxy belonging to the M81 Group at ~3.5 Mpc. Dwarf galaxies allow us to understand how such systems may have been affected by hierarchal interactions. The presence of a significant population of bright blue stars, coupled with the blue integrated colors of the galaxy and the flat color profiles indicate that the stellar content of the galaxy is well mixed and that Kar 50 has experienced a recent galaxy-wide star-forming episode. Kar 50 has a remarkably flat central surface brightness profile over a linear scale of ~ 1 kpc, even at wavelengths approaching 1 micron, although there is no evidence of a bar. The distance estimated from the brightest blue stars indicates that Kar 50 is behind the M81 group. In the absence of subsequent star-forming episodes, Kar 50 will evolve into a very low surface brightness system to become a system similar to the low surface brightness galaxies of the Virgo Cluster, some of which also have flat central light profiles.

Ledlow (Gemini Observatory) and his team have identified the optical counterparts to two sub-mm sources, SMMJ09429+4659 and SMMJ09431+4700 ***(Figure 4)***, seen through the core of the z = 0.41 cluster Abell 851. These objects belong to a population of distant dusty, active galaxies that may represent the formation phase of massive spheroidal galaxies. One of the SCUBA galaxies observed with GMOS has the highest spectroscopic redshift measured so far, at z=3.35 – breaking the z = 3 barrier for this population for the first time. Its luminosity of $L_{FIR} \sim 1.5 \times 10^{13} L_{sun}$ makes

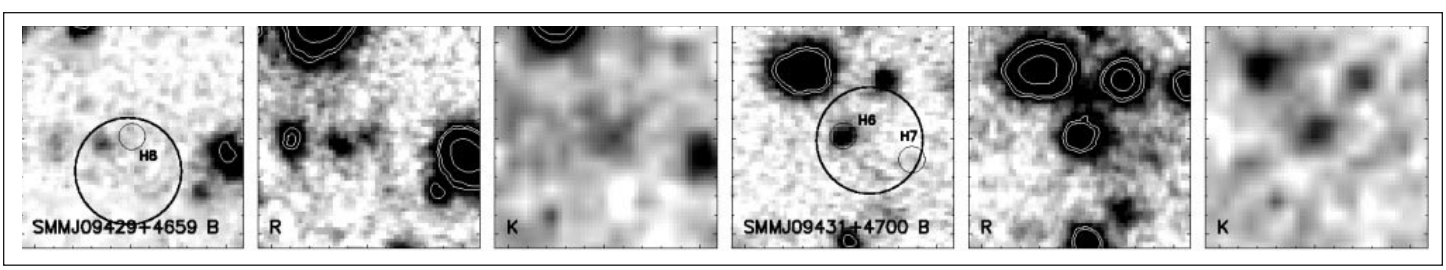


Figure 4: *12"x12" image zooms in on the bands B, R and K on the fields of the sub-mm SCUBA sources SMM J09429+4659 and SMM J09431+4700. The large circles show the nominal 6" error circle diameter for the SCUBA source, while the smaller circles show the positions of the radio counterparts. H6, H7 and H8 are sources with optical counterparts. Note the strong contrast between the optical/near-infrared colors of H6 and the Extremely Red Object, H8.*

this galaxy a Hyperluminous Infrared system. If purely powered by massive star formation, its immense luminosity would require a star formation rate of ~10^4 M_{sun}/yr! However, the spectrum shows the signatures of a weak AGN. Actually, both systems host an AGN. The AGN activity may have a profound impact on the evolution of these galaxies: The AGN in SMMJ02399-0136 appears to be driving a substantial wind which may in time sweep the central regions of the galaxy clear of gas and dust.

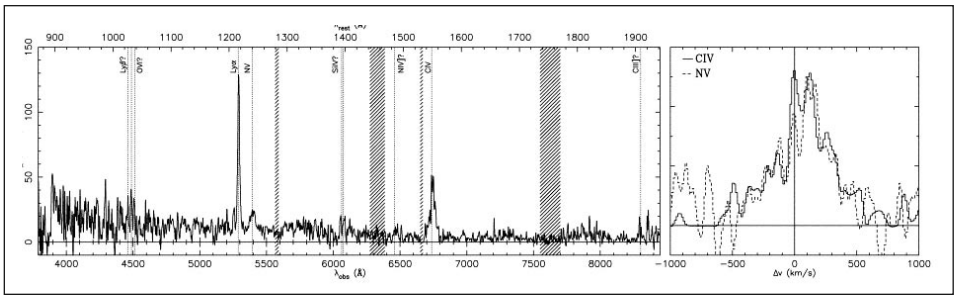


Figure 5: *GMOS spectrum of SCUBA galaxy SMM J09431+ 4700 (object H6 in Figure 4). This z = 3.35 galaxy shows spectral features of a narrow line Seyfert 1 galaxy. There are hints of blue-shifted absorption troughs on the stronger lines. The right panel shows the line of CIV and NV (AGN features) plotted on the same restframe velocity scale as the Ly-alpha line.*

ALTAIR REPORT

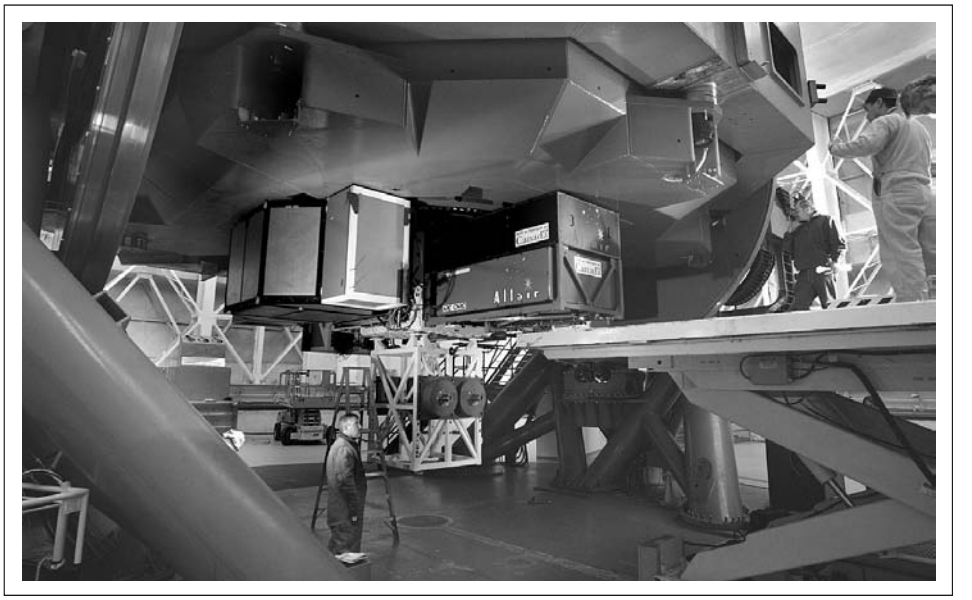
Brent Ellerbroek

The Gemini North Altitude Conjugate Adaptive Optics System (Altair) arrived in Hilo October 11, 2002, and was trucked to the Mauna Kea summit on October 14. Three weeks of intensive and entirely successful integration and test work followed, culminating with the installation of Altair on the Gemini Telescope November 5, 2002.

The Herzberg Institute of Astrophysics/ Gemini integration team has reassembled the Altair opto-mechanical system, verified optical alignment and performance, checked the operation of all actuators, detectors and electronics, established software interfaces to the Gemini telescope control systems, and successfully exercised the real-time control loop on the artificial star reference source and "turbulator."

All components and subsystems perform as well or better than in Victoria, with the exception of increased detector read noise in the wavefront sensor CCD which will be investigated now that Altair is mounted on the ISS.

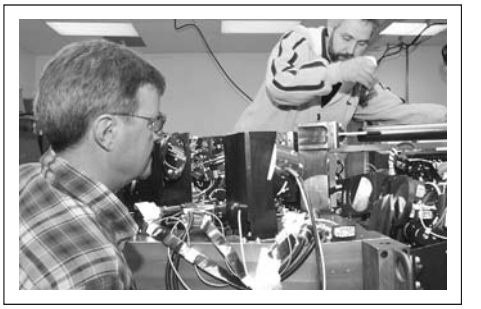
The first Altair commissioning run with NIRI was scheduled to begin on November 19. Work remaining before that date included verifying the interface to the Gemini interlock system, flexure testing, and integrated software and closed-loop AO tests with NIRI and the telescope control system.



Dean Samao, Gemini Mechanical Technician, John White, Gemini Electronics Technician and Kei Szeto of the HIA in Victoria, Canada make a visual inspection of Altair after it was mounted on the telescope.

The first commissioning run from November 19 through November 28 was to verify the basic functionality of the Altair AO system on the sky, characterize performance, and to begin exercising the software and procedures that will enable Altair to be used simply and efficiently in support of science observations.

The commissioning run was also to be supported by the Multi-Aperture Scintillation Sensor (MASS), a new sensor developed by CTIO for monitoring the vertical distribution of atmospheric turbulence. These measurements will be extremely valuable in characterizing Altair's actual performance against theoretical predictions and models.



Glen Herriot, (left) Altair Program Manager, and Andre Anthony with the HIA in Victoria, Canada, inspect the optics on Altair.

GALACTIC CENTER WORKSHOP

Ed Kennedy

More than 100 scientists from around the world attended a Galactic Center Workshop hosted by Gemini Observatory during the week of November 3-8 in Hawai'i.

Called "The Central 300 Parsecs," the conference was sponsored by several observatories on Mauna Kea to stimulate discussions on the galactic core. The conference was held at the Keauhou Beach Resort in Kailua-Kona, on the west side of the Big Island.

More than 50 talks were given during the six-day conference and almost 50 posters were presented. All of them concerned research into the diverse objects and phenomena found within the central 1,000 light years of the Milky Way.

Attendees of the Galactic Center Workshop pose for a group picture.

Dr. Tom Geballe, Gemini Senior Astronomer, served as chairperson of the conference. He was assisted by a local organizing committee of approximately 10 Gemini staff and members of other observatories. An international 14-member Scientific Organizing Committee formulated the program.

"The study of the Galactic Center is unique because it involves understanding a great many diverse phenomena. It also combines many observational and theoretical sub-fields of astronomy," said Dr. Geballe.

According to Dr. Eric Becklin, Professor of Physics and Astronomy at UCLA, and the scientist who summarized the information at the conclusion of the conference, probably the most important information to come out of the meeting was the fact that scientists now have evidence which comes very close to being characterized as a "smoking gun" that the radio source known as Sgr A* is indeed a black hole at the center of our Galaxy.

Possibly the most compelling observational data, presented by independent research teams from the University of California and the Max Planck Institute in Germany, were the observations of stars whizzing extremely close around Sgr A* at much higher speeds than any other stars in our Galaxy. One example presented was the young OB star S16, which appears to be moving at approximately 9,000 kilometers per second, or 3 percent the speed of light. (As a comparison, the Earth orbits around the Sun at approximately 30 kilometers per second.)

Another interesting topic which emerged is that Sgr A* "seems to be rather isolated and starved," according to Dr. Heino Falcke of the Max Planck Institute for Radio Astronomy. Dr. Falcke presented the introductory lecture for the conference.

"Rather than being a powerful monster in the Galactic Center, this black hole is more like the Cowardly Lion," said Dr. Geoffrey Bower, radio astronomer at the University of California, in his presentation.

One other significant conference outcome was the presentation of some of the initial Chandra X-ray data from the galactic center which are now beginning to make their way into the scientific journals.

As an entertaining highlight on the next-to-last day of the conference, Dr. Miller Goss with the of National Radio Astronomy Laboratory, and a pioneer researcher of the galactic core, gave an informative and amusing history of the discovery of Sgr A* and how it acquired its name.

Gemini also hosted several public and private school teachers at the conference as part of the Observatory's Outreach Program. The conference paid for all their expenses (including the cost of substitute teachers) and provided staff astronomers to assist them while attending.

Conference attendees were also treated to a shoreline cruise and an opportunity to snorkel and view the coral and marine life beneath Kealekekua Bay. An outdoor Hawaiian banquet was held under the stars on November 7.

Dr. Geballe termed the conference a great success: "Here in Hawai'i, experts interested in the galactic core in many areas were able to share their knowledge with each other. I think everyone learned a great deal – in addition to having a great time."

THE DUKE OF YORK VISITS GEMINI SOUTH

Ma. Antonieta Garcia

In 1999, His Royal Highness the Duke of York, participated in the dedication of the Gemini North Telescope in Hawai'i. Now – three years later – the staff of Gemini South had the opportunity to greet him in the middle of the Andes.

Dr. Malcolm G. Smith, Director of Cerro Tololo Inter-American Observatory (foreground); and Gemini South Associate Director Dr. Phil Puxley greet His Royal Highness the Duke of York at Gemini South. Gemini Public Information Outreach Assistant Antonieta Garcia and David Orellana, of RedLaser/CTIO looks on with the StarLab portable planetarium in the background.

Expectations were high, and so was the security, since the Duke of York's visit was classified as a private visit by the British Embassy. No media were allowed. Only Gemini South staff members were present for his visit November 7, 2002.

A lot of preparation went into the anticipated visit by Gemini personnel before the day arrived. And then there he was. His helicopter landed at 10: 30 a.m. next to the CTIO facilities. Greeting the Duke of York and the British Ambassador to Chile, Mr. Greg Faulkner, were Gemini South Associate Director Dr. Phil Puxley and Dr. Malcolm Smith, Director of Cerro Tololo Inter-American Observatory (CTIO).

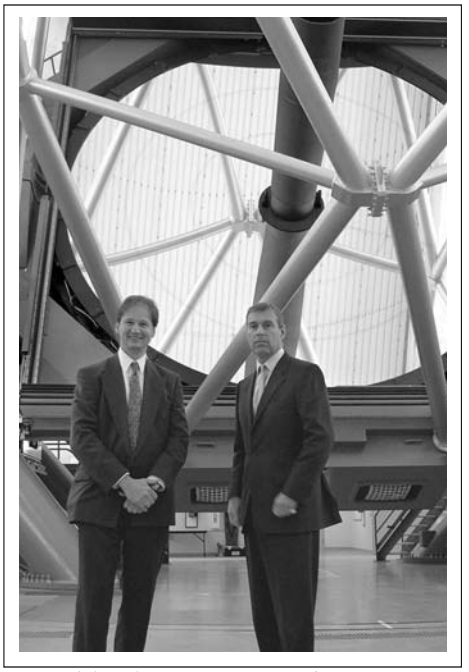
After 30 minutes of driving up to the site on Cerro Pachón, His Royal Highness the Duke of York was greeted upon entering Gemini South by the Mayor of Vicuña, the Warden of the United Kingdom in the region, other dignitaries and 12 children chosen from local schools who sponsor astronomy clubs.

There was time for a little theory, explanations, questions and some humor. During the the Duke of York's 50-minute visit to the telescope, he managed to meet many staff members of Gemini South and learn about the state-of-the-art technology of Gemini South. At the same time, he spoke with the Gemini North personnel via Gemini's Internet video connection as they worked on Mauna Kea. He also managed to ask a few questions of Gemini North Associate Director Dr. Jean-René Roy.

Gemini South personnel also got the opportunity to demonstrate their StarLab portable planetarium, which had been set up near the telescope instrument lab. The Duke of York asked about this popular project, which had been made available by Gemini during a celebration in 1999 of the Sister City relationship between Hilo and La Serena. He expressed interest in seeing a similar project established in the United Kingdom for the country's students.

At the end of the Duke of York's visit, the Cerro Pachón workers presented a demonstration of the telescope's capabilities during which the telescope's movements, music and the flags of each partner country were "choreographed."

Shortly before the Duke of York's departure, Gemini South Associate Director Dr. Phil Puxley presented him with a sphere made of the same specially cast glass which was used for the 8-meter Gemini mirror.



Dr. Phil Puxley, Associate Director for Gemini South (left), stands beneath the telescope with His Royal Highness the Duke of York.

SAFETY FIRST AT GEMINI

Melissa F. Welborn

Gemini Observatory continues to dedicate resources to improve safety performance. This is because our goal is to ensure that every employee at every site is safe and injury-free. Employees are trained and equipped to perform their jobs in a safe manner, which puts safety training at the top of our priorities.

Consistent with our commitment to safety every day in every way, we recently held fire safety and prevention classes at Gemini North. The Hilo Fire Department arrived with their big truck and several firemen swung off the truck, ready to talk fire safety and give hands-on opportunities to operate a fire extinguisher.

Gemini Purchasing Agent Alice Dakujaku practices with a fire extinguisher as Peti Singletary, Gemini Safety Officer, looks on.

"The state of safety is improving day by day," says Peti Singletary, Gemini's new Safety Officer. "In the last four months, training has been conducted for our employees at Gemini North in personal fall protection, ladder safety, fire prevention and the use of snow chains. Inspections and audits also help us gauge how well our program is working."

Peti recently completed an audit of the Hilo base facility that was instrumental in the discovery of some areas where we can improve safety. An audit is currently under way at the telescope on Mauna Kea. Steps have been immediately undertaken to correct any problems revealed by the audits.

In fact, the safety program is so active that the list of accomplishments is extensive. Some examples of these new efforts include the inspection of outside lighting and building emergency lighting, compliance with newly enacted county regulations for signage for our disabled parking, retro-wiring of exit signs, striping the parking lot, inspection of our fire suppression system (FM-200 system) and fire extinguisher inspections at our three Hawai'i sites. In Chile, boom lift instructions in Spanish were posted and radios have been replaced. Safety Committees at both sites are meeting to discuss current issues and housekeeping tasks are on-going.

"I plan to travel to Chile in January to collaborate with Pablo Diaz, who is our Gemini South Safety Officer," says Peti. Recently in Chile, Pablo conducted tool-box safety talks on lock out/tag out, safety harness use, hazardous materials handling, safe driving habits and general safety precautions.

Upcoming training at Gemini South will include instruction on electrical risks and First Responder training, along with AED (Automatic External Defibrillator) training. First Responder training is an essential part of our integrated safety program because of the remoteness of our sites. We recently purchased a Spanish language AED device for Chile which will be in use shortly.

We have also undertaken the task of comparing the availability of the medical and other emergency resources of our two sites in the event of a medical emergency or natural disaster. This examination of the relative accessibility of services and resources at or near our two sites is still in progress.

All of this is possible because of the top-down support we receive from management – from the President of AURA to our own Observatory Director. "It is the desire and intention of Gemini Observatory to provide a safe and healthful working environment to all of our employees," said Observatory Director Matt Mountain in his Reaffirmation of Safety Policy.

Building trust – demonstrating our commitment to employee safety, mitigating safety problems, continuously improving safety through implementation of employee suggestions, creating an attitude of willing compliance, taking seriously our obligation to ensure employees are properly trained and equipped to do their jobs safely, pro-actively preparing for emergencies, providing a safe and healthful environment and staying abreast of safety regulations.

NEW GEMINI INTERNET LINK

Ed Kennedy

Gemini Observatory observed another milestone in August, 2002, when officials from four locations participated in a "virtual inauguration" of the new high-speed Internet link between Hawai'i and Chile.

The event electronically connected many key individuals who made the Internet link possible. Officials participated from Hilo, Hawai'i, Washington D.C., Miami, and La Serena, Chile.

Hosting the event in Hilo was Gemini Director of Operations Dr. James Kennedy. Kennedy led the Gemini initiative in creating the Internet pathway. The high-speed link runs from Hilo to Miami via Internet2's Abilene backbone network, through an international Internet exchange called AMPATH to South America.

Speaking for AMPATH (short for AmericasPATH) during the four-way hookup was Julio Ibarra, Director of AMPATH and Advanced Research Networking at Florida International University. The NSF provided substantial funding for the AMPATH gateway.

Inaugurating the completed Internet connection at Hilo Base Facility (from left): Associate Director Dr. Jean-René Roy, Director of Operations Dr. James Kennedy, Big Island Mayor Harry Kim, Observatory Director Dr. Matt Mountain and Big Island Representative Helene Hale.

Dr. Thomas Greene, Senior Program Director with the Advanced Networking Infrastructure and Research (ANIR) Division of NSF spoke on behalf of his work coordinating the various scientific and governmental agencies that made this a reality.

Others who participated from Hilo were Gemini's Director Dr. Matt Mountain, Associate Director Dr. Jean-René Roy, Big Island Mayor Harry Kim and State Representative Helene Hale. Heather Boyles of Internet2 also participated from Washington D.C.

Dr. Malcolm G. Smith, Director of Cerro Tololo Inter-American Observatory (CTIO), hosted the Chilean portion of the event. Also speaking from Chile was La Serena Mayor Adriana Peñafiel and Dr. Smith's wife, Mrs. Anamaría Maraboli-Smith.

Mayor Kim and Mayor Peñafiel, as well as Mrs. Maraboli-Smith and Representative Hale participated on behalf of the Sister City connection between Hilo and La Serena. Mrs. Maraboli-Smith and Representative Hale were instrumental in establishing the Sister City relationship in 1994.

Also announced was Gemini's new StarTeachers Exchange Program which has been made possible by the new Internet link *(see accompanying story)*.

Dr. Wayne van Citters, Director of the NSF's Astronomy Division, said of the new Internet link, "Gemini has laid the foundation for a new way of doing astronomy that will allow us to see farther, fainter and sharper than ever before. This exemplifies what can be achieved through international scientific cooperation."

For more information see Page 17 of the December 2001 Gemini Newsletter; or go to http://www.gemini.edu/project/announcements/press/2002-11.html

StarTeachers Exchange Program

In conjunction with Gemini's new high-speed Internet link, Gemini's Outreach Office has created an innovative new link of its own between educators in Hawai'i and Chile called the StarTeachers Exchange Program.

This novel exchange program will allow 6 teachers (3 each from Hilo and La Serena) to integrate Gemini's Internet videoconferencing capabilities into a remote teaching experience. Each teacher will visit the other Gemini host community for a period of 2 weeks and work closely with a partner teacher and their classes to share ideas on teaching, culture and educational strategies. Most importantly, each teacher will be asked to prepare a lesson for their students back home that will be presented using the Gemini Internet videoconferencing system. The results from this experience will be carefully documented and evaluated so that "lessons learned" from these experiences can be used in future Internet-based educational programming from Gemini.

As this newsletter went to press, almost 30 teachers have applied for the program and the selection process had begun. In late January, 2003, the 6 selected teachers will be announced and introduced at a press/videoconference from the Gemini facilities in Hilo and La Serena. The 3 Hilo teachers will visit La Serena in March and the La Serena teachers will visit Hilo in October, 2003.

This program was initiated as part of the Sister City relationship between Hilo and La Serena that began in 1994. In 1999, Gemini presented both communities with portable StarLab planetariums that have become an integral and very successful part of the Gemini and CTIO outreach efforts.

StarTeacher logo

UNITED STATES

Taft Armandroff

The U.S. community responded enthusiastically to the Gemini Call for Proposals for semester 2003A. Overall, U.S. scientists submitted 131 proposals for 2003A, which represents a 27% increase over the number submitted in 2002B.

On Gemini North, 148.6 nights were requested in 86 proposals. GMOS was the most popular instrument on Gemini North (84.3 nights requested in 47 proposals), followed by NIRI (50.4 nights requested in 29 proposals), followed by Michelle (13.9 nights requested in 12 proposals). On Gemini South, 45 proposals requested 83.6 nights. PHOENIX was the most popular instrument on Gemini South (57.6 nights requested in 31 proposals), followed by CIRPASS (18.1 nights requested in 9 proposals), followed by AcqCam (8.0 nights requested in 6 proposals). The oversubscription factors are 4.0 for Gemini North and 3.4 for Gemini South.

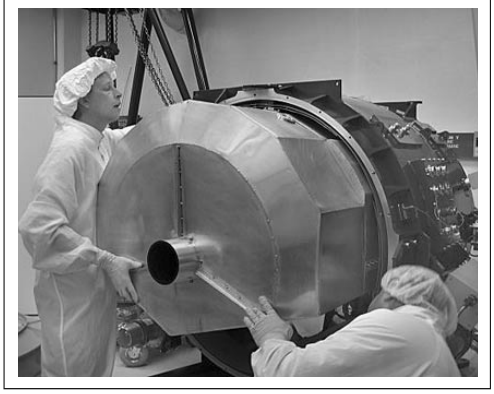
NOAO's high-resolution infrared spectrograph PHOENIX has been the most used instrument on Gemini South during semesters 2002A and 2002B. The U.S. Gemini Project (USGP) staff was present during all of the PHOENIX queue observing nights to provide instrument support.

GNIRS

The Gemini Near-InfraRed Spectrograph (GNIRS) is an infrared spectrograph for the Gemini South telescope that will operate from 1 to 5 microns and will offer two plate scales, a range of dispersions, and both long-slit and integral-field modes. The project is being carried out at NOAO in Tucson under the leadership of Project Scientist Jay Elias and Project Manager Neil Gaughan.

The GNIRS project achieved a major milestone in late September and early October when GNIRS was integrated, vacuum tested, and then cooled to cryogenic temperature. GNIRS came very close to its desired operating temperature. While the instrument was cold, the GNIRS Team verified the cryogenic performance of the GNIRS mechanisms, the on-instrument wavefront sensor and temperature control.

As expected, some areas need work. However, the tests have revealed excellent performance in most cases. The second GNIRS cooldown will feature an engineering-grade detector and imaging tests using it. After that, two-axis flexure tests will be performed on GNIRS using the NOAO Flexure Test Facility.



GNIRS Team members Paul Schmitt and Ron George "button up" the instrument in preparation for the cold tests in late September.

Overall, 94% of the work for GNIRS delivery has been completed. Finally, the GNIRS Team won the Grand Prize for Modeling in the 2002 SolidWorks SolidGallery Design Contest (see www.solidworks.com/swdocs/gallery/contest2002/winners.cfm).

NICI

The Near Infrared Coronagraphic Imager (NICI) will provide a 1 to 5 micron dual-beam coronagraphic imaging capability on the Gemini South telescope. Mauna Kea InfraRed (MKIR) in Hilo is building NICI, under the leadership of Doug Toomey. The NICI Critical Design Review (CDR) took place in Hilo on June 24-25, 2002. NICI passed its CDR; and USGP, Gemini, and MKIR received valuable guidance from the CDR Committee Report. MKIR has been authorized to proceed with the fabrication, testing, and delivery of the instrument.

Currently, a great deal of procurement activity is under way for the NICI optical, mechanical and electronic components. NICI delivery to Gemini South is planned for December, 2004.

GSAOI

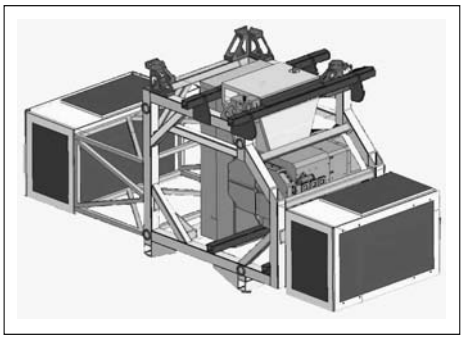
The Gemini South Adaptive Optics Imager (GSAOI) will be used with the Multi-Conjugate Adaptive Optics (MCAO) system being built for the Gemini South telescope. The imager will cover wavelengths between 1 and 2.5 microns, and will be based on a 4K x 4K HgCdTe detector mosaic. GSAOI's imaging area will cover the well-corrected field of view of the MCAO system. NOAO was selected as one of two teams to develop a conceptual design for GSAOI. Bob Blum leads the NOAO GSAOI Team scientifically with assistance from Jay Elias and Dick Joyce. Neil Gaughan serves as the Project Manager. Technical personnel from Tucson and La Serena are participating in the GSAOI effort.

The NOAO GSAOI design study results were documented as a report for Gemini. The NOAO Team presented their results to the Gemini Design Review Committee on August 21, 2002, in Hilo. After some significant changes

in requirements from Gemini, NOAO submitted a revised GSAOI proposal, as did the other design team from the Australian National University.

T-ReCS

T-ReCS, the Thermal Region Camera and Spectrograph, is a mid-infrared imager and spectrograph for the Gemini South telescope under construction by Charlie Telesco and his team at the University of Florida. The team is continuing tests and resulting adjustments of the assembled and functional instrument. Particular attention is being paid to detector readout speed and other detector performance tests and enhancements to insure that T-ReCS meets its performance specifications. This will allow USGP, Gemini and Florida to carry out the Pre-Ship Acceptance Test of T-ReCS.



Rendering of the complete NICI instrument, as it will be mounted on Gemini South. The boxes at either end of the assembly are the cooled electronics cabinets. The squat box in the center is the NICI dewar, and the tall rectilinear shape to the left represents the warm adaptive optics system.

Finally, planning is under way in the U.S. for participation in the Gemini Next-Generation Instrumentation Meeting, to be held in June, 2003, in Aspen, Colo. USGP is planning a U.S. workshop to explore science and technology drivers for future Gemini instrumentation in advance of the Aspen meeting.

UNITED KINGDOM

Isobel Hook & Pat Roche

This is a very busy period for United Kingdom instruments destined for Gemini, with engineering, testing and commissioning activities on all of the major UK Gemini instruments. Following is an update on their status.

GMOS-S

The second Multi-Object Spectrograph (GMOS-S) was placed on the flexure rig at the ATC in Edinburgh for a final series of tests in early October, 2002. Acceptance tests were passed in late October, allowing shipment to Chile in November, 2002, for installation as the first facility instrument on Gemini South. The UK and Canada Engineering and Science teams have worked very hard to maintain the schedule that was established earlier in the year. One outstanding issue has been that one of the three blue-optimized EEV CCDs has an intermittent fault which has resulted in only 2.5 of the 3 CCDs operating reliably. This has no impact on the imaging performance of GMOS-S, but may truncate the spectra at one end. The malfunctioning CCD detector, or possibly the whole focal plane array, if devices with improved overall performance can be obtained, will be replaced when the opportunity arises.

Michelle

Almost a year after it started open-time observations on UKIRT, Michelle has been removed from the telescope in preparation for a period of engineering prior to being installed on Gemini North. The detector array is being upgraded, new fore-optics fitted, and changes made to two of the grating orientations.

The instrument is scheduled to go on Gemini North early in 2003. After a period of commissioning and system verification, Michelle is scheduled to be made available for community use late in Semester 2003A. Michelle proved to be reliable and popular on UKIRT, conducting a number of imaging, spectroscopic and polarimetric programs. We expect the large increase in sensitivity offered on Gemini will increase the demand further.

bHROS

The fiber-fed, high-resolution bench spectrograph (bHROS) is now integrated

Pat Roche Steps Down As Gemini Project Scientist

Patrick Roche stepped down as UK Gemini Project Scientist on Septtember 30, 2002. He has held this post for the past six years. His tenure covered the completion of the construction of both telescopes, their dedication and the beginning of operations.

Pat Roche

His contributions to the success of the Gemini Observatory are legion, both in leading the UK effort and as a key participant in the Observatory's development.

Pat joined the UK Very Large Telescope Project (VLT) team in Oxford in 1989 to take responsibility for the infrared aspects of the telescope design and instruments. He played a vital role in marshaling support for an 8-meter telescope, particularly among the UK's community of infrared astronomers.

We would like to thank Pat for his leadership of the UK Gemini Support Group and for his dedication to the success of the Gemini Observatory. We also wish him well in his future research and look forward to a continuing close relationship.

and has been undergoing final tests in the optics laboratory at University College London. This instrument, too, has suffered from CCD problems with only 1.5 of the 2 CCDs in the focal plane operating correctly. This will not have a significant impact on the laboratory tests, but will further reduce echellogram coverage until a replacement becomes available.

The fiber-feed to bHROS is under construction and a fit check of the pick-off module designed to sit near the focal plane of GMOS was planned to be made before GMOS-S was shipped to Chile. On-telescope commissioning of bHROS will wait until after GMOS-S has been commissioned.

CIRPASS

Meanwhile on the telescopes, GMOS-N continues to perform well, producing large amounts of high-quality data. In August, CIRPASS, the near-IR intrafield spectroscope's (IFU) commissioning was completed. Built at the Cambridge University Institute of Astronomy, CIRPASS made a very successful nine-night Demonstration Science run at Gemini South. CIRPASS will be available as a visitor instrument in 2003A.

Observing Activity

This summer has seen major changes in the UK ground-based telescope programs with the initiation of the UK's participation in the European Southern Observatory (ESO) at the end of June, 2002. However, applications to Gemini for Semester 2003A were at a record level (58 proposals), confirming the strong demand for observing time.

Bearing in mind the UK's involvement in other large telescopes, strategic decisions on the next generation of Gemini instrumentation are clearly important. We are preparing for the Aspen 2003 workshop on Gemini future instrumentation by holding general UK preparatory meetings in January, 2003, to discuss the UK's future requirements in the context of the workshop's scientific themes.

Data Reduction Workshop

Now that many UK observers have received Gemini data, the UK Gemini Support Group (UKGSG) has held the first GMOS data reduction workshop. This took place over two days in September and involved short overview talks followed by hands-on data reduction sessions using example imaging, long-slit and MOS data. Fifteen people attended from around the UK. The presentations, example data and scripts will be made generally available via the web.

The UKGSG has also been experimenting with remote "eavesdropping" on Gemini North by connecting to the summit and Base Facility via a video link. In August, 2002, this was used for three nights (days in the UK!) and was found to be very effective. Almost-real-time analysis of the data was possible, and several telescope and instrument status (and control) screens could be watched in real time. Eavesdropping may be useful for National Office support for queue observing, mini-queues and for classical programs with large observing teams.

Staff Changes

There have recently been some staff changes at the UK Gemini Support Group. Dr. Pat Roche's term as UK Project Scientist came to an end at the end of September *(see accompanying story)*.

Dr. Isobel Hook has moved to Oxford after spending two years in Edinburgh, followed by a year at Gemini Base Facility headquarters in Hilo, Hawai'i, working towards the successful commissioning of GMOS-North. As well as particular responsibility for the GMOS spectrographs, she is now taking over many of Pat's duties, including leadership of the UK Gemini Support Group.

Dr. Reba Bandyopadhyay remains in Oxford and is responsible for support of near-IR instruments.

Since August, Dr. Alistair Glasse (the Michelle Project Scientist, currently based in Hilo) has been providing user support for Michelle, and this will continue until March, 2003.

Finally, as an added bonus, the group in Oxford has now moved into new offices with splendid purple chairs!

CANADA

Dennis Crabtree

Canada received 32 proposals for Semester 2003A, 29 for Gemini North and three for Gemini South. This is a subscription rate of 3.5 and 0.3 respectively.

The lack of facility instruments in the south clearly had a devastating effect on the subscription rate for Gemini South. GMOS was the most popular instrument, receiving 20 proposals for 75% of the total time requested on both telescopes.

The Gemini North facility Adaptive Optics system, Altair, was delivered to the summit of Mauna Kea in October *(see accompanying article on Page 18)*. Its first night on the telescope was scheduled for mid-November. By the time you read this article, Altair should have produced

many spectacular images.

The Canadian Gemini Science Steering Committee (CGSSC) met in early October prior to the Sydney Gemini Science Committee meeting. The main topic of discussion was the priorities for commissioning the instruments and instrument modes that will be arriving at Gemini over the next 18 months or so.

The CGSSC also discussed the plans for Canadian preparation for the second Gemini Instrumentation Workshop (Aspen 2003). Canada will be forming small working groups for each of the four Aspen science themes. These working groups will lead the development of science cases that will culminate in a meeting in Montreal in early May, 2003.

Canadian Students Use Gemini

This summer, the Canadian Gemini Partner Office sponsored an extremely successful outreach project initiated by Gemini Project Scientist Dr. Harvey Richer.

The program was an essay contest in British Columbia to promote astronomy in area schools. The contest was sponsored by the Canadian Gemini Partner Office, the H.R. MacMillan Space Centre, the Herzberg Institute of Astrophysics (HIA), the National Research Council of Canada, and the University of British Columbia.

The original contest prize was to be an image of the essay winners' favorite celestial object taken by Gemini, but due to a serendipitous set of circumstances it went much further than this.

When 13-year-old Ingrid Braul's Trifid proposal was imaged on Gemini North by the Gemini Multi-Object Spectrograph (GMOS) a software glitch in the new commissioned instrument created a great deal more data than was originally intended. The resulting image is featured on the cover of this newsletter. Thanks to unanticipated in-depth data, Gemini Astronomer Dr. Colin Aspin realized the image had scientific value due to information it provided on a Herbig-Haro jet within the nebula. He has proposed further studies of the jet. Because of this, Ingrid's essay and image resulted in a large amount of media interest, especially in Canada. Ingrid is a student at the Southlands Elementary School in Vancouver.

Contest winners Ingrid Braul, 13, right, and Harveen Dhaliwal, 9, look at a projected image of Gemini Associate Director Dr. Jean-René Roy who congratulated the essay winners from Hilo via an Internet link at the award ceremonies at the H.R. MacMillan Space Centre in Vancouver, B.C. Canadian Gemini Project Scientist Dr. Harvey Richer looks on.

The other winner (from the younger category) was 9-year-old Harveen Dhaliwal from Harry Sayers Elementary School in Abbotsford, B.C. Harveen requested an image of the planet Pluto which was obtained with GMOS and combined with some earlier adaptive optics images obtained by Gemini in 1999.

Dr. Richer, said that the Canadian group has already launched plans to expand the essay contest nationwide for the upcoming year.

AUSTRALIA

Warrick Couch

It has been a busy time for the Australian Gemini community, especially in the last month. In mid-October, the Australian Gemini Office hosted the 19th meeting of the Gemini Science Committee (GSC). This was held at the University of New South Wales Conference Centre at Little Bay, a beautiful seaside and golf course setting on the coast just south of Sydney harbor. Despite the obvious distractions at such a venue, it was a very productive meeting, with many important developments on both the scientific and instrumentation fronts for the GSC to consider and discuss in detail. On the day following the GSC meeting, the Australian community met at the same venue for a "Pre-Abingdon-II" Workshop, the first step in its preparation for the second Gemini Instrumentation Workshop at Aspen next year. This was well attended, with astronomers from as far north as Queensland and as far south as Melbourne being present.

The presence of all three of the Gemini Observatory's Associate Directors was very much valued and appreciated, particularly the briefings they gave on the Abingdon process, the Aspen 2003 meeting, the Gemini instrumentation program, and Multi-Conjugate Adaptive Optics (MCAO). We were also very fortunate to have colleagues from the U.S., Canada and UK National Gemini Offices (NGO) present who provided interesting insights into the preparations and priorities of their communities in the context of Aspen 2003.

The majority of the workshop program was devoted to talks from members of the Australian community, covering a broad range of scientific interests and aspirations that they have for Gemini in the post-2006 era. The workshop concluded with a lively discussion of the issues and the formulation of a plan for coordinating Australian efforts for Aspen.

Two days after this workshop, a very successful GMOS Data Reduction

Workshop was held at the Anglo-American Observatory (AAO). This was lead by Dr. Isobel Hook of the UK National Gemini Office, who kindly agreed to stay on after the GSC meeting and repeat the same workshop she had organized and run for the UK community in September. Isobel was ably assisted by Dr. Melinda Taylor from our NGO, without whose heroic efforts in getting the IRAF/Gemini package and scripts installed and running on the various workstations and laptops that were used, the workshop would not have happened. Twelve people attended the workshop and, with Isobel and Melinda's expert assistance, spent most of the day doing hands-on reduction of MOS data. Although this severely tested people's patience at times (with expletives heard on a number of occasions!), there was a great sense of pride and achievement at the end of the day when participants completed their reduction, armed with nice plots of all their fully calibrated and fluxed spectra.

Australia's first Gemini instrument, NIFS, our Near-Infra Red Integral Field Unit Spectrograph, being built by Peter McGregor and his team at the Research School of Astronomy & Astrophysics, Australian National University (RSAA/ANU), completed its first cooldown in May, 2002. Overall, this was a success, with only two mechanisms performing below specifications when driven at cryogenic temperatures. These were the grating turret and the On-instrument Wavefront Sensor (OIWFS) gimbal mirror. Both of these problems have since been fixed. NIFS is currently pumping down for its second cooldown, this time with all its optics and an engineering detector installed in the cryostat. The optics were installed in September, and have since undergone a lengthy alignment process. The integral field unit works extremely well in producing a reformatted "staircase" slit image that is fed to the spectrograph. This bodes well for the success of the instrument. A small gap exists in the present slit pattern between each slit image. This has been traced to a manufacturing error in the field mirror array. A new mirror is being manufactured and will be installed before the fourth cooldown. The first spectrum of the Na I D doublet using the J grating in second order was recorded warm with the bare MUX on October 11, 2002.

Isobel Hook assisting attendees at the Australian GMOS Data Reduction Workshop with the intricacies of handling MOS spectra.

Finally, the 2003A proposal deadline has just recently passed, and the response was disappointing. Only nine proposals were received, a factor of two less than the numbers received in each of the past two semesters. However, demand still remains high for GMOS, with four of the six proposals received for Gemini North requesting this instrument (the other two being for Michelle).

The overall subscription factor for Gemini North was 1.32. In contrast, Gemini South was undersubscribed, with only three proposals received, requesting a total of 11.75 hours (27 hours were available).

Peter McGregor and his team have also been busy in preparing a Concept Design Study for the Gemini South Adaptive Optics Imager (GSAOI). They put together an excellent submission, which they presented to the Instrument Review and Selection Committee in Hilo in August.

ARGENTINA

Nidia Morrell

Members of the Argentinian Gemini Office participated in a special program offered by the Planetarium of Buenos Aires City during the school winter vacation (July 20 to August 4, 2002).

In a tent placed for the event within the planetarium garden, several short talks were given about the Gemini Observatory followed by questions and comments from the public, mostly composed by children.

A special session was also devoted to Gemini during the annual meeting of the Asociación Argentina de Astronomía, held in Buenos Aires City, September 16-19, 2002.

Two members of the Argentina Gemini Office (AGO) visited the Instituto de Astronomía y Física del Espacio (IAFE, Buenos Aires) on Oct. 4, 2002, to discuss the current observing facilities offered by Gemini and the projects presently being developed by members of the Argentinian community, making use of Gemini data.

The Argentinian Gemini Office received eight proposals for the observing semester 2003A: five of them for Gemini North (three for GMOS and two for NIRI) and three for Gemini South (one for AcqCam and two for CIRPASS).
The total requested time is 20.2 hours, making a subscription factor of 1.0 for GN and 0.76 for GS.

BRAZIL

Max Faúndez-Abans

Our colleague Albert Bruch has handed over his duties as Brazilian Gemini Project Manager. His successor is Max Faúndez-Abans, also from the Laboratório Nacional de Astrofísica/MCT (LNA).

Naturally, Albert's departure does not mean that he will not be involved in Gemini matters in the future.

On the contrary, as Director of the LNA, the Brazilian National Gemini Office, he will continue to work for the success of the Gemini partnership. "So this is not a 'goodbye,' but rather a 'Hello,'" Albert said. "And I am looking forward to a good collaboration with all of you in the future." The Brazilian community thanks him for his dedicated work and all the spirit he displayed as Project Manager and on NTAC duties.

As for the proposals in Semester 2003A, totals requested were 42.59 hours for Gemini North, representing a pressure factor of 2.13; and 27.10 hours for Gemini South, a pressure factor of 2.26. This is an average oversubscription factor of 2.18 for both telescopes. There has been a clear rise in the number of proposals submitted by the Brazilian community in comparison to Semester 2002B.

After the successful Gemini PIO Liaison meeting in La Serena in the first semester, 2002, Brazil has increased significantly its participation in the effort of bringing the latest Gemini scientific results and technological achievements to the public through the distribution of national press releases.

The first steps toward establishing proactive science monitoring throughout the country, in order to develop press releases that can be multi-partner coordinated, have been taken. The number of accepted Brazilian telescope requests has now reached a minimum critical mass, so we expect to produce a lot of media material very soon!

CHILE

Luis Campusano & Sebastian Lópes

The Chilean submission process for 2002B went smoothly once again. This was due to the experience acquired in previous semesters by both the Chilean National Gemini Office (CNGO) and the Principle Investigators (PIs).

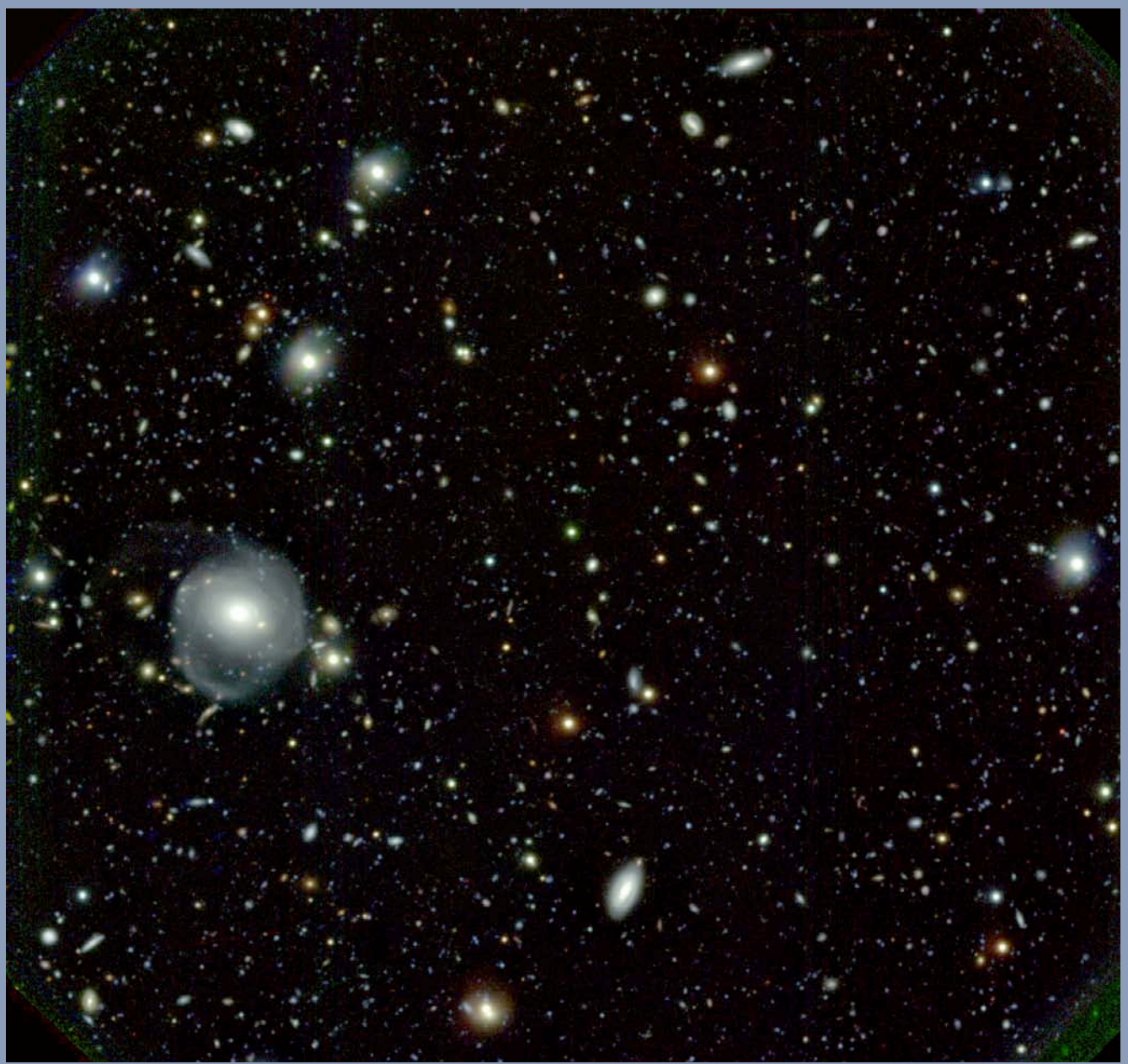
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICYT) received seven proposals for the Gemini-South telescope, with a total of 111 hours requested. This corresponds to a record subscription factor of 2.5.

Four proposals were for FLAMINGOS and three for T-ReCS. The International Time Allocation Committee (NTAC) assigned time to the four best-ranked proposals (one for T-ReCS and three for FLAMINGOS). One of the FLAMINGOS proposals was a Chilean-Argentinean joint program.

We continued using a simple and fast email submission procedure. In this procedure, the proposals must be prepared using the PIT and then the .XML file and figures are emailed to CONICYT. In addition, our deadline is two to three weeks later than other observatories. This provides PIs extra time to prepare their Gemini proposals. The deadline for semester 2003A was October 21, 2002.

During the technical review of the proposals we usually do not encounter major problems. Minor difficulties are found in the observing conditions specifications, building and attaching useful figures and their captions, writing references, and calculating time overheads (which are mostly too optimistic). There were no Helpdesk queries in 2002B.

After two years of very successful functioning of the Chilean Gemini Time Allocation Committee, three members completed their terms and were renewed. The current membership is as follows: Chairman Jose Maza (Universidad de Chile), Leonardo Bronfman (Universidad de Chile), Douglas Geisler (Universidad de Concepcion), Leopoldo Infante (Pontificia Universidad Catolica de Chile), Elizabeth Lada (University of Florida), Mark Phillips (Carnegie Mellon University) and Paul Schechter (Massachusetts Institute of Technology).



Gemini Observatory, Isobel Hook and the GMOS System Verification Team

GEMINI NORTH

PROBES DEEP SKY WITH GMOS

From the Milky Way Suburbs to the Edge of the Universe

This recently released image obtained during commissioning and system verification of the Gemini Multi-Object Spectrograph (GMOS) on Gemini North demonstrates Gemini's ability to see virtually to the edges of the known universe.

The z=4 quasar (PMN2314+0201), visible here as the small greenish object at center, is probably more than 10 billion light years away – taking us back close to the beginnings of our universe. Some of the smallest and faintest objects in this image are thought to be coalescing galaxies or proto-galaxies falling onto each other. Also shown in this image are foreground, low mass stars in the outer regions of our Milky Way that are currently under study.

The final image is a combination of several frames using g',r' and i' filters. The image covers 5.5 arcminutes x 5.5 arcminutes and the image quality (fwhm) is: 0.7" in g' and r' and 0.5" in i'

For more information on this data see: http://www.gemini.edu/science/gemdf.html

GEMINI OBSERVATORY NEWSLETTER

THE GEMINI OBSERVATORY
is an international partnership managed by the
Association of Universities for Research in Astronomy
under a cooperative agreement with the National Science Foundation.

Gemini Observatory
Northern Operations Center
670 North A'ohoku Place
Hilo, Hawai'i 96720, USA
Phone (808) 974-2500 / Fax: (808) 935-9235

Gemini Observatory
Southern Operations Center
c/o AURA, Casilla 603
La Serena, Chile
Phone 011-5651-205-600 / Fax: 011-5651-205-650

Gemini Observatory - Tucson Office
950 N. Cherry Ave., P.O. Box 26732
Tucson, Arizona 85762-6732, USA
Phone: (520) 318-8545 / Fax: (520) 318-8590

e-mail: pubinfo@gemini.edu ***http://www.gemini.edu***

UNITED STATES • UNITED KINGDOM • CANADA • CHILE • AUSTRALIA • ARGENTINA • BRAZIL

Gemini North Base Facility

On The Cover:
"The Heart of the Trifid"
The Gemini North GMOS image featured on the cover was obtained as part of an outreach program in Canada.
See story on Page 26 for details.
Gemini Observatory/GMOS image