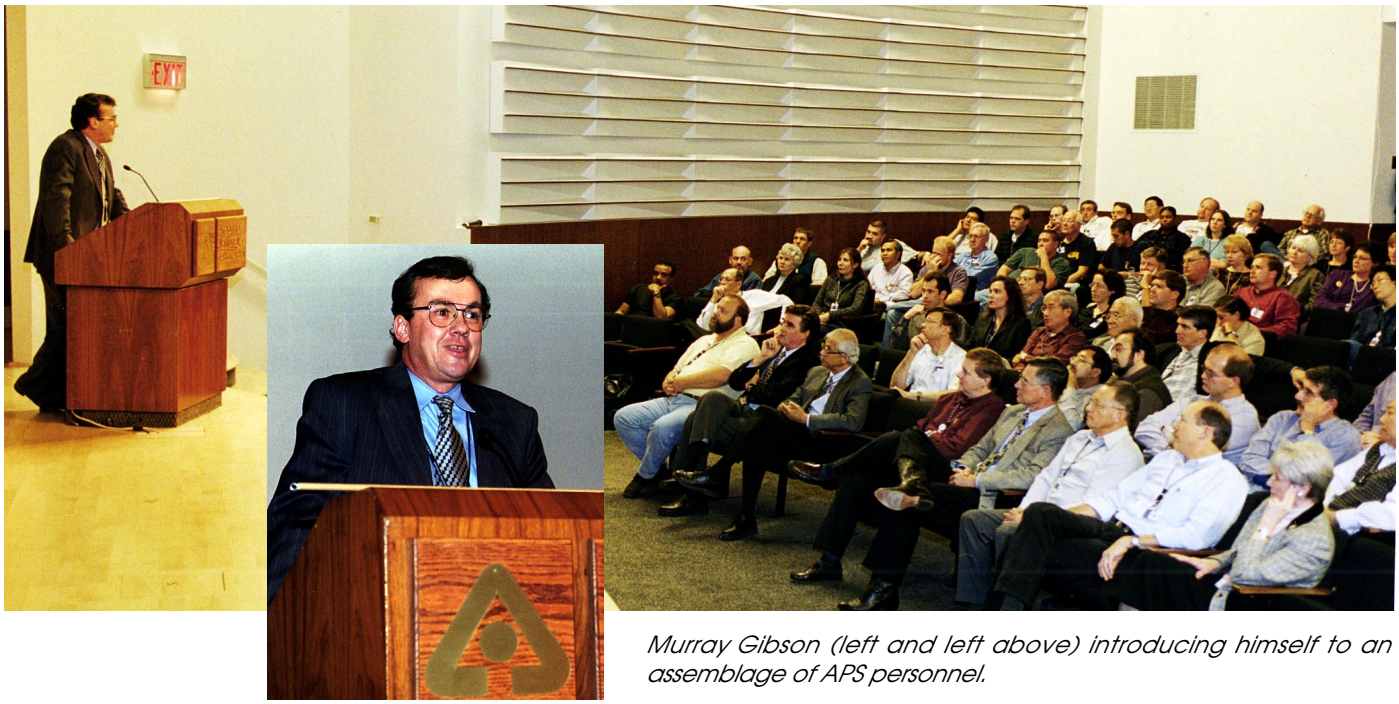
THE SOURCE

NOVEMBER 2001 • *NEWS FROM THE ADVANCED PHOTON SOURCE AT ARGONNE NATIONAL LABORATORY* • NUMBER 9

APS Marks a Transition Moment



George Joch (ANL-MED) - pgs. 1-5

Murray Gibson (left and left above) introducing himself to an assemblage of APS personnel.

J. Murray Gibson, newly appointed Associate Laboratory Director (ALD) for the APS, got acquainted with the APS staff at a gathering in the APS Auditorium on October 23 and later that day at an afternoon pizza-and-refreshments reception. The group also heard remarks from ANL Director Hermann Grunder and an appreciation of Gopal Shenoy (former Director of XFD, APS Senior Scientific Director, and interim APS ALD) by AOD Director Tony Rauchas.

Murray Gibson: It is a great privilege for me to stand in front of you as the new Associate Laboratory Director for the Advanced Photon Source. I believe this is the greatest job in the world, and the thanks for that goes to all of you, the APS staff. I am committed to earning this privilege and leading you to even bigger and better things in the future.

The APS is an outstanding organization. You have built and are operating a facility that is unique in the Western Hemisphere, and is in fact the envy of the world. It is now approaching its peak in terms of operational performance, and the science that is emanating from the experiment hall floor is growing every year by leaps and bounds. The ingredients for future success are all in place here, and that is what makes this job so exciting. My challenge is to create an environment where we can all build on this facility's considerable strengths and move it ahead to even greater accomplishments in the future.

The APS is a great partnership between the staff, the users, and the broader scientific community, which is really our customer. The most successful companies recognize that although the customer is extremely important, the employees are number one. And I must say, I sense a great family atmosphere at the APS, with everybody justifiably proud of what they do.

You can see this in many ways: the pride in making the x-ray source the best, resulting in almost 96% availability in the 5000 hours of beam time in fiscal year 2001, and the determination to increase the mean time between faults. This is the first synchrotron source to implement top-up beam storage and to

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achieve low emittance during top-up operation. There are the floor coordinators who cycle around the floor in the experiment hall to help users with their problems. The staff who respond in the middle of the night to calls from users who need help. The dedication of the user office in hand-holding new users and helping them is very critical. And the devotion of everyone to safety, which is always "job number one," which results in systems that are emulated by Argonne and the DOE. I'm looking forward to learning a lot more about the many activities that go on behind the scenes at the APS.

Last week, the DOE carried out the first peer review of the APS, and I was lucky to be present during all of it (although I had the privilege of not having to prepare it, for which I greatly thank Gopal, the managers, and all of you), and it was extremely impressive.

When independent scientific reviewers look at a unique organization like the APS, they're naturally going to make suggestions as to how that organization can improve. This is a facility that is evolving into the future. The reviewers take a snapshot of this facility at this time and identify the challenges that we face for the future. I found those suggestions very informative, some surprising, some not surprising, but all very, very positive. I think we all recognize these challenges; things like making sure that CATs are maximally effective and attracting more independent investigators, for example.

But, again, the review was extremely positive. It's very clear that the DOE will support APS in the future and expects even greater things from all of us. All of the reviewers commented on the outstanding performance of the machine, and of course that's made possible by your dedication and innovation, and I commend you for that.

The support of the users is also greatly appreciated. Their work is where we're only beginning to see the fruits of this great enterprise. So in a very short period of time, the APS has developed a strong, productive, and ever-increasing user community. For example, in 2001 there were 1,989 users who came to the APS to perform experiments. That's extremely impressive. They came from 40 different states — soon we'll have 50, I hope — the District of Columbia and 17 other countries.

It would take more time than we have today to list all the scientific accomplishments that have come out of the APS, but let me mention a couple of recent highlights. One is the solution of the structure of integrin, a critical protein that controls biological functions such as providing a pathway into cells for viruses like the AIDS virus. Another is the development of a premier capability for x-ray structural studies of muscle. Another is elemental analysis of interplanetary dust particles collected from the Earth's stratosphere. And revolutionary new synchrotron techniques, like inelastic nuclear resonant scattering, coupled to ultrahigh-resolution monochromators, for which the APS is justifiably famous. And a 3D x-ray microscope for studying crystallography inside materials, which is providing new information on longstanding metallurgical mysteries. And there's so much more.

The APS facility itself is continually evolving. The seventh lab office module, funded by the DOE and the National Institutes of Health for completion early next year, will be home to several macromolecular crystallography CATs. The State of Illinois budgeted $2 million for design work on the Center for Nanoscale Materials, with a promise to construct the building at APS beginning in FY 2002. And the beamlines associated with that, to be called Nano-CAT and which will essentially provide an ultrahigh-resolution x-ray microscope, will be started in fiscal year 2002 with DOE funding, we've been told.

So I'm personally extremely excited, not just by what you've achieved, but by the science that's yet to come. Together we have to carefully consider how we can best support and facilitate our users so that these important discoveries continue to be developed and to grow.

I hope we'll get to know each other very quickly. And I hope you will welcome me into the APS family.

What can I offer you? Well, I have experience working in industrial research, in academic research, and in the national laboratory system. I think that background will help me to interface with the broad user community. I've also worked with the Department of Energy, which of course is very critical. I'm an active materials scientist whose work has always involved diffraction physics. I've also worked very closely at the instrumentation-science interface, which gives me an understanding and appreciation of the importance of innovative instrumentation very closely coupled to exciting science, which is what the APS is all about.

I'm looking forward very much to learning more about this wonderful source and its potential. In the next few months, together with the division directors and others, I'll be reviewing the budgets and functions across the organization, and we will be articulating the goals and missions of APS. We need input from all of you as we develop a plan for the future, and we'll be seeking that.

I see the need mostly for tweaking. There's nothing wrong here; it's a wonderful operation. It's a great enterprise, and stability is very important. But a change in course is occurring as the APS matures to the next level and becomes a full-fledged user facility.

What is my vision for the APS? I think it's very simple: to maximize the scientific impact of this wonderful third-generation source. I think of science as the product of the facility and photons as the raw material. Whether the science comes from users of the APS or in-house staff is irrelevant. Any science or technology from the APS benefits the entire community and benefits us.

Our mission will be achieved in many ways. Continued user-beam reliability is essential, as is innovation in the machine. Attracting and supporting the very best users is critical. The in-house science programs, instrumentation development, and outreach are very important. I'm very aware of the importance of retaining the best people to operate this facility and allowing them the freedom to innovate, as well as the importance of the seamless connection between science and service.

My job is to make sure that all of the activities here

support this mission. I will be seeking advice and input from the staff, management, from the users and the CATs, and from users and managers at other light sources in order to find the best way to help us all get to where we want to be. I'm always open to input and questions as we work together on this enterprise.

I am very confident that our future will be successful. It's all a question of how successful. And that's what makes this job very exciting.

❋

Hermann Grunder: Something very significant happened today. The Secretary of Energy had a talk with all of his national-lab directors to outline what he sees as the mission of the Department of Energy.

It is very obvious that we are becoming a national lab in the regional sense. To the extent that we have resources to combat terrorism, we will make them available. You here, for instance, are a very important part of the defense mission, not only in the sense of Bob Wilson's (founding Director of Fermilab, Robert R. Wilson) famous remark to congress that science makes the country worth defending, but that the situation we are facing depends very heavily on sophisticated technologies and on sophisticated human minds. It is very clear that only a changed United States will be able to cope with that situation.

At the same time, it is essential to maintain our standard of scientific excellence. Don't forget that Enrico Fermi and his colleagues did fantastic work on the weak force at the same time they built a bomb. Our challenges are slightly different, but there is absolutely nothing wrong with doing something for your country while you are enhancing the fundamental knowledge on which we depend for our future economic well being. It is precisely that future well being that is worth defending.

I am so proud that Murray Gibson has accepted this job. He has been an outstanding scientist for all of his career. He has the kind of leadership quality I'm looking for, namely, he is a consensus builder, a person who stands up to management and doesn't stand for nonsense. Murray will, in the next few days and weeks, build his own team. He has my full and complete support. We need to integrate all of our capabilities. We need to integrate our wisdom and our can-do attitude and make the APS and its science the best that it can be.

❋

MG: Thanks, Herman, for your confidence and support. I'm sure we're going to reward it.

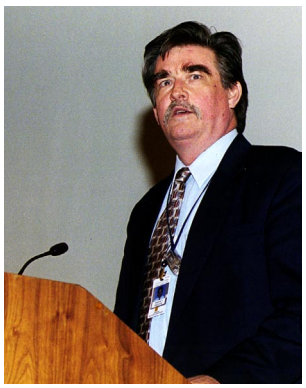
There's one last and important thing that I want to do. All of you are the people who have made APS what it is today, together with many leaders—Dave Moncton, Gopal Shenoy, Yanglai Cho, John Galayda, and the division directors, Rod Gerig, Efim Gluskin, Denny Mills, and Tony Rauchas. David was appropriately honored at the user meeting. It was a very nice occasion and I'm sure there will be many others.

Today I want to focus on one person who, probably more than anyone else, has made APS what it is today, and who has passionately dedicated his life to the APS. That person is Gopal Shenoy. I personally admire Gopal tremendously. And I hope that my own dedication can replace his and allow him to return to more peaceful activities, since he's put so much energy into APS. I'm sure we're going to benefit from his return to his first love, science. Gopal is now appointed to the level of 710, which is the highest level of senior scientist at Argonne, reserved for a handful of people, and Gopal brings further honor and stature to that group. His title here at the APS will be Senior Scientific Advisor, and I'm certainly going to be calling on him frequently in this role, through I promise not to make him go to any management meetings, at his request. I owe a personal debt to Gopal for his excellent interim leadership of the APS. You know, he had his 30th anniversary just last month at Argonne, and I hope and expect we'll get quite a number of years of service from him.

I've asked Tony Rauchas to say a little bit about Gopal's history here before we present Gopal with a special memento.

❋

Tony Rauchas: It is indeed an honor to be up here talking about Gopal Shenoy. There are probably a lot of people in this audience who have known Gopal longer than I. But then I realized I've known Gopal for almost two decades. We go back quite a ways, and I've known Gopal from a lot of different perspectives. So I hope to convey some of these historical aspects to you.



We will have to start at the beginning, around the mid-`80s. A group of accelerator people at Argonne was organized by Yanglai Cho. The high-energy-physics machine had been shut down and the accelerator people had been scattered throughout Argonne; some to HEP, some to IPNS, others to Chemistry, Physics, and so on. But Yanglai pulled all these people together—sort of the vagabonds of the Laboratory—and proposed writing a conceptual design for a new machine, a synchrotron radiation facility to be built at Argonne.

You have to realize that, at the time, synchrotron radiation was totally new, from the accelerator standpoint, to anybody here at Argonne. But Yanglai said, "We can do it." And then he told us that there was also a parallel effort going on at the Solid State Physics Division, which was later absorbed into the Materials Science Division. There was a parallel effort being led by a physicist by the name of

Gopal Shenoy to organize a team of synchrotron radiation facility users to work with us in developing a proposal for this new facility. For accelerator people, especially people who come from the high-energy-physics community, there's a very basic tenet that one has to emphatically state: "If it wasn't for the users, we sure would have fun with this machine!" So it was no surprise that things got off to a rather rocky start here, because you had these two factions—"It's them and us"—working together, trying to put together this proposal for a machine, which nobody really thought Argonne had a chance to achieve.

I remember that there were many meetings. Yanglai always characterized Gopal and his team as not being aware of big science. I think Gopal probably remembers that. Yanglai was not questioning the science itself, but rather the process. His point was that one can't build beamlines by having two scientists slap something together. For an endeavor like the APS, you need something bigger; you need engineers, you need designers, and project managers. That's the big science that Yanglai was talking about.

It is ironic: I found out recently that during preparation for the nanotechnology facility to be constructed here, Gopal has been making the case for big science. So I think that 20 years later, Gopal has come around and now understands the big-science aspects of facilities.

But back to our tale. The two teams, working apart and together, spent days and nights developing the concept for what would be the APS. The tensions were somewhat high, but this is when Gopal brought out his secret weapon: Bonnie (Meyer). It was her enthusiasm, her lust for life, that kept things in perspective, kept everybody together, and kept the tension level at a controllable level. Soon the proposal became a conceptual design. Before long, Argonne, which was a dark horse in this field, ended up being the prime contender for the new light source.

Gopal had proposed a total of 15 beamlines, 12 based on insertion devices and three on bending magnets, each one with a specific purpose. It's not the concept that was finally developed for the project, but the first beamlines that were built by the collaborative access teams (CATs) actually mirrored very closely what Gopal had in this original proposal. Gopal's foresight has become very evident over time.

The conceptual design was reviewed by DOE, and the results were very positive and encouraging. But it was about that time that I started doubting Gopal's sanity. This was late 1986, we had just finished a conceptual design, and Gopal was out there organizing the first APS user meeting. The ink wasn't dry on the conceptual design report and here we are, calling together potential facility users! It seemed ludicrous at the time, but when 300 people showed up for the meeting, it made us all step back and go, "Whoa! Maybe we really have something over here!" And I think at that time DOE also began to realize that maybe we really did have something. Pretty soon, it was a proposal that became a project.

Gopal then had to organize a division—hire people, build on the core of people that he had put together for the conceptual design—and he also had to start learning the lingo of managing a project: work breakdown structures, ACWP, BCWP, cost accounts, which Gopal and I worked on together during many nights. He also got his own WBS number: 1.4 Experimental Facilities. I think Gopal still remembers that the accelerator people considered 1.4 as contingency funds. But the success we see here speaks for itself.

Gopal has always worked endlessly and tirelessly in making sure that everything is just right. I think he literally dragged user groups together to form CATs, a term that I believe Gopal coined. I think he thrived on sleeplessness; the less he slept, the better he worked. I remember the time that we in Gopal's Experimental Facilities Division were preparing for beamline commissioning, and part of the commissioning process required a readiness review, which in turn required that a readiness process be put in place. Gopal said to me, "Why don't you put together a plan?" I worked for about a week, thought it out, wrote two or three pages, and said, "Gopal, here's my plan." I gave it to him on a Friday. On Monday morning he came in with an 80-page book complete with a work breakdown structure that defined the readiness process, defined the details of the process, defined the people who'd have to sign off on the various aspects of the process. He must have worked the whole weekend through. And we still use that same process, or most of it, today.

Gopal was driving himself so hard that many of us were really concerned about his health. In fact, a few years back Gopal had multiple heart-bypass surgery. In a way, many of us were kind of happy. Don't get me wrong: We were happy in the sense that we thought he was going to be forced to relax. I think Bonnie can attest to the fact that two weeks after the operation she received her first e-mail message from Gopal. And the e-mails just continued to come, more frequently, wider distribution, with longer and longer instructions on what had to be done, what had to be taken care of. Pretty soon it was business as usual. The convalescent period was maybe a week and a half at best. But I think Gopal thrives on that. I think he has to stay busy. He has this relentless perseverance and energy, he exudes it.

It is fitting that, after spending 20 years conceiving and building this first-class user facility, Gopal has essentially unburdened himself of all the responsibilities of bureaucracy and management and now has come full circle again, back to science. He has been given the opportunity to actually have fun. So Gopal, congratulations. I wish you the best for all that has been and all that will come. Gopal, I salute you.

❋

Gopal Shenoy: It is a great honor to be recognized here. Almost every bit of that recognition comes because of you who work at the APS. I think you have all served this project well. We are in a very progressive state right now. As I

indicated at the user meeting earlier this month, there is just no stopping the successes here. This is an internationally recognized facility. We have taken the world leadership in synchrotron x-ray science and Murray will be taking the APS to its next level of success. I think he is the person to lead the facility, and you are in very good hands.

We might have some tough years, but Murray is ready to take care of that. He has tremendous support from Argonne's director, Hermann Grunder, and I expect Hermann to continue to be as supportive as he has been in the past. I am sure that Murray will derive a lot of support from the DOE, which is also essential to the future success of the APS. Without the support of the Lab Director and the DOE, the facility cannot progress to the next level.

This is a great opportunity for you, Murray, and I am sure that you will live up to expectations. ❍

← Well-wishers gather for a photo-op with Gopal Shenoy and the "special memento" presented to him at the all-hands meeting.

Pizza and refreshments for all at the reception. ↓

↑ Lee Teng (right, ANL-ASD) and Murray Gibson at the reception.

Gopal Shenoy shares a laugh with Dick Prien (ANL-ASD). →

NIH to Fund Three New Biology Beamlines at APS

To advance structural studies of biological molecules, the National Institute of General Medical Sciences (NIGMS) and the National Cancer Institute (NCI) are supporting the design and construction of a user facility consisting of three new beamlines at the APS.

NIGMS and NCI plan to spend a total of around $23 million on the project and estimate that the three beamlines will be fully operational in about three years.

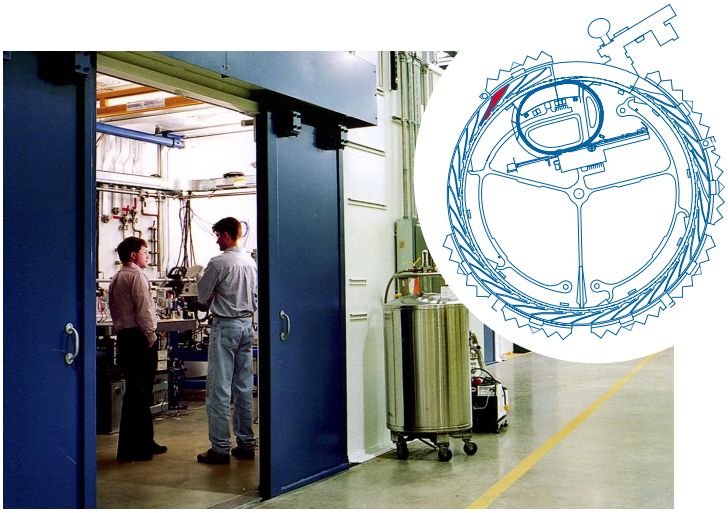
"The primary motive for the project is to benefit the scientific community by facilitating access to synchrotron beamlines. This is particularly important as the structural genomics effort at NIGMS begin to pick up speed," said Dr. Marvin Cassman, director of NIGMS.

NCI is particularly interested in how the synchrotron facilities will advance the study of cancer-related molecules. "A detailed understanding of protein structure will help cancer researchers develop drugs targeted to specific types of cancer," said Dr. Dinah Singer, director of NCI's Division of Cancer Biology

The NIGMS/NCI beamlines will be designed to optimize certain properties of X-rays most useful for specific biological studies. NIGMS and NCI anticipate that these studies will reveal the structures of proteins and other molecules involved in human health and disease. Scientists can use information about these structures to help develop new medicines and diagnostic techniques. In addition to such structural studies, the new synchrotron beamlines can be used for work in cancer biology, immunology and virology, and basic studies in biochemistry, cell biology, molecular biology and biophysics.

- from a National Institutes of Health press release

MediChem Signs Contract to Operate COM-CAT at APS



Stanley J. Neihoff (ANL-MED)

Stephen R. Wasserman (left), formerly of Argonne and now vice president of AXAS, in the first-optics enclosure of the COM-CAT facility at sector 32 (red on the facility diagram).

Advanced X-Ray Analytical Services, Inc. (AXAS), a newly formed subsidiary of MediChem Life Sciences, has been awarded the contract to operate the Commercial Collaborative Access Team (COM-CAT) beamline (sector 32) at the APS.

AXAS will provide a commercial x-ray analytical service capability that will use the high-brilliance x-ray beam from the APS, a national synchrotron radiation user facility. For the first time, companies that do not have the resources to join a collaborative access team will have access to just-in-time, fee-for-service state-of-the-art x-ray analysis using techniques such as protein crystallography, powder diffraction, and x-ray spectroscopy.

"Our new AXAS subsidiary offers an opportunity for pharmaceutical and biotechnology companies to easily and affordably take advantage of this state-of-the-art facility," said Michael T. Flavin, Ph.D., MediChem's president and CEO. "The result will be faster development of new and better life-saving therapeutics."

"The COM-CAT at the APS will support a broad spectrum of small- and medium-sized businesses that do not have the resources or expertise to benefit from this national resource in order to improve their products," said Gopal Shenoy, senior scientific advisor at the Advanced Photon Source. He added that many organizations have worked hard over the years in making it possible for the APS to establish COM-CAT and finally award the contract to AXAS, a subsidiary of MediChem.

"We are particularly grateful to the Civic Committee of the Commercial Club of Chicago for fostering the idea back in 1996, the Illinois Department of Commerce and Community Affairs for providing funds to the APS for building the COM-CAT x-ray beamline, and Argonne National Laboratory management and the Department of Energy for their continued support," Shenoy said.

COM-CAT was designed as a multipurpose beamline to service a wide range of industrial applications. In addition to equipment for protein crystallography, COM-CAT has a unique detector array for the analysis of polymorphs in drugs and other materials through powder diffraction at a resolution that far surpasses anything that can be achieved with a laboratory X-ray source. Automated sample handling is also being introduced by AXAS to allow for high-throughput analysis of protein crystals. During commissioning of the beamline, the structures of more than 50 proteins were determined by industrial and academic users of COM-CAT.

— Chad Boutin (ANL-OPA)

DOE Review Brings APS Achievements into Focus

The just-completed Department of Energy scientific review of the APS afforded an opportunity for evaluating how the facility and its users are faring. Some of these, in particular the outstanding performance of the accelerator, were highlighted in Murray Gibson's remarks on October 23 (page 1 of this issue). Here are some others:

• The APS is the first synchrotron radiation facility in the world to achieve both top-up and low-emittance top-up modes for storage ring operations.

• The low-energy undulator test line has demonstrated self-amplified spontaneous emission physics in the 120-580-nm wavelength range, giving significant impetus to R&D toward a fourth-generation light source.

• Eighteen collaborative access teams now manage 25 sectors at the APS. Requests have been received for all but one of the remaining nine sectors.

• During calendar year 2000, APS research produced over 440 publications, including 21 in Physical Review Letters.

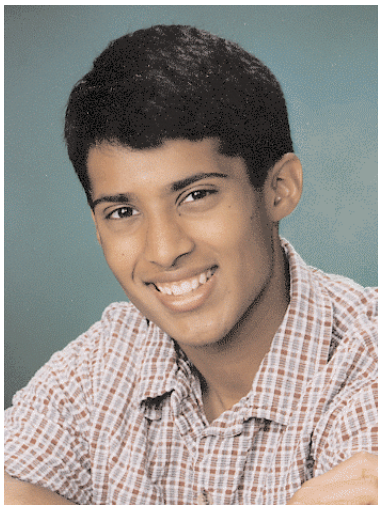
• A critical performance measure for macromolecular crystallographers is the number of deposits in the Protein Data Bank (PDB). In 2000, APS research accounted for 23% of PDB deposits from all U.S. synchrotrons.

• To date, 43 Ph.D. degrees have been awarded based on research at the APS.

• The State of Illinois has budgeted $2 million for design work on the 40,000 sq. ft. Center for Nanoscale Materials building, with a plan to construct the building at APS beginning in FY 2002.

• The seventh lab/office module, funded by DOE and the National Institutes of Health, will be completed early next year.

Youngest APS Users are Outstanding Achievers



Courtesy of A. Madduri

Last summer, Achintya Madduri (pictured at left) became the youngest-ever user of the APS. That research culminated in a paper published in Physical Review Letters ("Novel Broken Symmetry Phase from N_2O at High Pressure and High Temperatures," M. Somayazulu, A. Madduri, A. F. Goncharov, O. Tschauner, P. F. McMillan, H.-k. Mao, and R. J. Hemley, Phys. Rev. Lett. **87**, 135504 (2001)). Madduri was presented with a special plaque at a ceremony on October 11 during the 11th Annual APS Users Meeting.

Madduri was a 17-year-old senior at the Thomas Jefferson High School for Science and Technology in Alexandria, Virginia, when he obtained a science internship at the Carnegie Institution in Washington, D.C. He worked with a group of scientists that included Russell J. Hemley of Carnegie's Geophysical Laboratory and NSF Center for High Pressure Research. As a part of his internship, Madduri's project involved experiments that required the use of the APS.

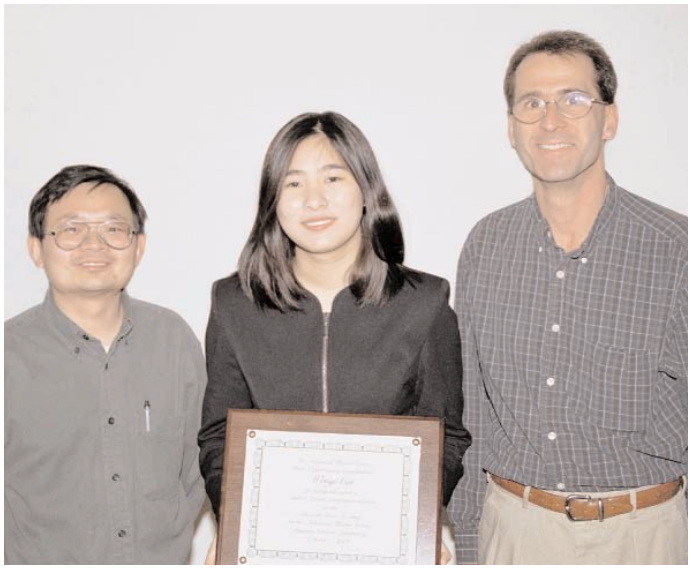
"At the time, Achintya was legally too young to set foot in the APS experiment hall," Hemley said. "Using techniques at our laboratory in Washington, D.C., he discovered that nitrous oxide (N_2O) transformed unexpectedly into a different form when under high pressure. His work set the stage

Cont'd as "Madduri" on page 8

Wenyi Cai, a senior from Naperville Central High School who turned 17 years old on October 12, was one of three winners of a student-poster presentation award at the 11th Annual APS User Meeting.

In her poster entitled "Quantitative and Time-resolved Characterization of Highly Transient Gasoline Sprays by X-radiography," Cai illustrated a comprehensive technique for deconvoluting line-of-sight radiographic images to obtain 3-dimensional fuel distribution in highly transient sprays. Such an analysis promises a better understanding of fuel-spray characteristics, which may lead to higher fuel efficiency and lower pollutant emission in internal-combustion engines. Wenyi has garnered many national academic

Cont'd as "Cai" on page 8



Jin Wang (left, ANL-XFD) and Paul Zschack (right, UNI-CAT and Univ. of Illinois at Urbana-Champaign) present a student-poster award to Wenyi Cai.

APS Holiday Luncheon Set for 12.14.01

This year's by-now traditional and always festive APS Holiday Luncheon will be on **Friday, December 14,** at the Argonne Guest House Restaurant. The sumptuous buffet luncheon, still only $12.00 per ticket, will be periodically interrupted by the awarding of door prizes, brief speeches, and a visit from the Big Guy in the red suit.

11:30 a.m.-12:00 noon: Social time in the Lounge (cash bar)
12:00 noon-1:30 p.m. -- Luncheon in the Restaurant
Purchase your ticket Wednesday, November 28, through Wednesday, December 12, from:

Jodi Canaday (401-C3243D)
Barb Dalton (401-A4121A)
Cathy Eyberger (401-C4249)
Sara Hahn (401-B4205)
Laura Morisco1o (432-B003)
Jane Pransky (401-B4148D)
Cyndi Salbego (401-B3209E)
Marcia Wood (401-B4165)
Jill Hebding (438-D007 Mon.-Thur.)

The Menu

Freshly Baked Breads w/Butter
Caesar Salad • Field Greens w/Assorted Dressings • Pasta Salad
Braised Chicken in White Wine, Fennel, & Tomatoes
Roast Pork Loin Accented w/Sweet-Potato Gravy
Shrimp & Chicken Jambalaya
Sauteéd Gnocchi w/Onions, Garlic, Bacon & Asaigo Cheese
Roasted Vegetables
Dessert Table
Freshly Brewed Coffee & Decaffeinated Coffee
Premium Herbal Tea Selection • Ice Tea
Soft Drinks

"Madduri" cont'd from page 6

for the measurements we made at APS. He prepared the samples for the APS and also analyzed the data."

Madduri experimented on samples of N_2O, which under high pressure and temperature transformed unexpectedly into a form known as an ionic solid. After the senior scientists illuminated the N_2O samples with the APS beam, Madduri's analysis of the results was included in the paper submitted to Phys. Rev. Lett.

Madduri is a freshman attending Rice University on full scholarship and has already been invited to assist with a project researching trace gases in the atmosphere. His major is undecided but he is leaning toward engineering.

"Whatever I decide to study, I'm sure the experiences I had at Argonne are going to help me," Madduri said. "So much of physics and engineering overlap these days anyway, and I'll be using a lot of the same research tools and techniques whichever field I go into."

— Chad Boutin (ANL-OPA)

"Cai" cont'd from page 6

awards for high school students, including two Siemens Advanced Placement Awards.

Because she was a high school junior when she started the project, Cai was too young to participate in the hands-on experiments involving the high pressure apparatus in the synchrotron radiation environment due to stringent government liability issues. Instead, she developed an analysis program to realize the tomographic-type characterization of the highly transient fuel sprays. Without physically obtaining the data herself, she was able to grasp the key experimental issues and the important features in the data by discussing these with members of the research group and seeking references. Since this was the first experiment and analysis of its kind, Cai began her first scientific voyage without existing models to follow. Within one week of joining the research team, Cai developed a host of new models and selected the best-suited and most efficient ones, which were eventually used in her final analysis procedures.

Cai was new to scientific programming and to the C++ language used for this application. After another week of trial-and-error-style learning, she was able to implement all the model calculations that were needed to arrive at the results. According to Jin Wang, Cai's mentor in the project, "Due to her independent thinking, the research scope has been broadened significantly since her participation. Wenyi accomplished in two months what other researchers have long attempted. Her achievements can be judged by any scientific standard. The results are so significant in both the scientific and engineering communities that her results will soon be submitted to a prestigious journal."

All of the other competitors in the poster competition are graduate students from major research universities. The other winners were Matthew DeCamp (Univ. of Michigan), "Time-resolved Pendellösung Oscillations in Laser-heated Crystals;" and Martin Holt (Univ. of Illinois, Urbana-Champaign), "Determination of Phonon Dispersion in Nb from X-ray Transmission Scattering."

Wenyi is the daughter of former Argonne engineer Yigang Cai and Xiaochun L. Cai. She has a student appointment through Argonne's Division of Educational Programs to work with Jin Wang of the Experimental Facilities Division, and she is now a finalist in the Siemens-Westinghouse science competition based on her work done at the APS.

— Dean Haeffner & Jin Wang (both ANL-UPD)

If you would like to contribute to *The Source* (professional achievements, suggestions for articles, marriages, births, anything of interest to your coworkers at the APS), contact your divisional correspondent. They are:
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