Physics Flash

July 2017
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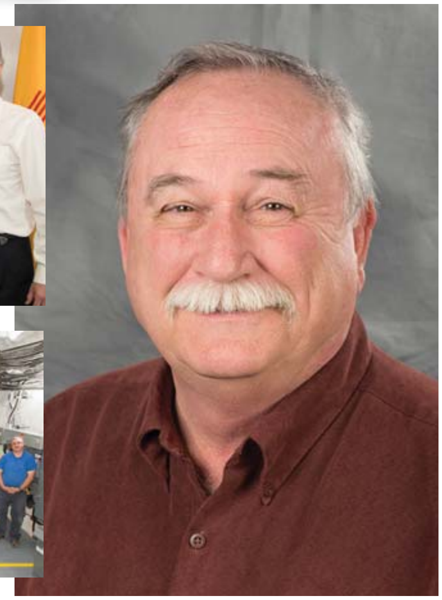
INSIDE

Los Alamos NATIONAL LABORATORY EST. 1943



Clockwise from upper left: David Holtkamp in the control room of U1a, an underground laboratory at the Nevada National Security Site; being recognized for 35 years of Laboratory service with Principal Associate Director for Science, Technology, Engineering Alan Bishop (left) and Director Charles McMillan (right); and with his colleagues at the Nevada National Security Site.

"I'm the luckiest guy at the Lab. I say this because I've gotten to work with smart, creative people on important challenges facing the country."

Editor's note:
David Holtkamp passed away June 16 after retiring from Neutron Science and Technology (P-23) earlier in the month.
He was interviewed just prior to his retirement.

In memoriam: David Holtkamp

Deciphering the code to a successful career in physics

By Kris Fronzak, ADEPS Communications

As a youngster in small-town Texas, David Holtkamp was a ham radio enthusiast with a passion for transmitting Morse code around the world, much to the dismay of his neighbors. "My little, poorly built 40-watt transmitter would interfere with TVs for blocks around," Holtkamp said.

Little did Holtkamp imagine that his interest in tinkering with electronics would lead to a varied and satisfying career in nuclear physics—one that included 35 years at Los Alamos National Laboratory and numerous distinguished contributions to the Lab's national security science mission.

Yet the signals were clear. As an interdisciplinary honors student at the University of Texas (UT) at Austin, Holtkamp took a part-time job helping with low-energy nuclear experiments on the Physics Department's tandem accelerator. When some UT professors began exploring the medium-energy nuclear physics available at the Los Alamos Meson Physics Facility (now the Los Alamos Neutron Science Center), Holtkamp came along as a summer student. He later earned a PhD in physics from UT and joined the Laboratory staff in 1982.

continued on page 3

From David's desk . . .

This issue's cover profile was written after David B. Holtkamp announced his retirement. It was intended to celebrate his many accomplishments and contributions to the Laboratory and the Division. Unfortunately, shortly after retiring, David had a massive heart attack and died on 16 June 2017. I decided to keep the profile in the *Physics Flash* to honor his memory. I will always remember the proud look he got on his face when talking about the achievements of his mentorees. He will be greatly missed.

As I was writing this, I learned that Geoff B. Mills, a long-time P-25 staff member died on 3 July 2017 after a one-and-a-half year battle with cancer. Unfortunately, I only met Geoff once, but I became aware of the influence that he had on the Division.

In both cases, I send my sincerest condolences to the family and friends of these scientific leaders who had such an impact on the Division.

I understand the impact that the shipping pause is having on all of you. I hope by the time this is published, non-hazardous shipping will have been resumed. I ask for your patience in this matter and will do anything I can to help.

On a brighter note, it is summer and a lot of students are here. It is a pleasure to see this influx of hungry learners. I had the pleasure of meeting some of the students at an All Hands meeting I had with them (see the photo of me with the students, below). Mary Hockaday attended and asked each of the students to explain what they were going to be working on so that, hopefully, they could start learning about things that were beyond their primary tasks.

Having all of these students present in our laboratories places additional responsibility on all of us. Some of the students have limited experimental experience. Some will come from institutions that have significantly different safety cultures. All of the students will have to be carefully mentored both in the physics that they are doing and in how to do that work safely and securely. We are all accountable for this. If you see something that seems unsafe or insecure, be proactive, speak up, and if necessary pause work, even if involves people on a different team or in a different group. This applies to all Division activities, not just those involving students.

Finally, it is always a pleasure to be able to congratulate Division staff for awards they receive. Congratulations to Alex Zylstra (P-24) for receiving a Postdoctoral Distinguished Performance Award (see article in this issue) and to Matthew Freeman (P-23/25) for being named one of the outstanding presenters at the "Science in 3" postdoc presentations.

Physics Division Leader David Meyerhofer

"*. . . it is summer and a lot of students are here. It is a pleasure to see this influx of hungry learners.*"

David Meyerhofer with some of this year's new and returning Physics Division students.

Holtkamp cont.

"I'm only any good at doing things that I'm having fun with," he said. For Holtkamp, that means "I've worked in basically anything in physics I could get my hands on: nuclear physics, particle physics, atmospheric remote sensing, strategic defense, and shock wave physics."

Holtkamp received two Laboratory Distinguished Performance Awards, two Defense Programs Awards of Excellence, and two R&D 100 Awards. The first R&D 100 was for the Multiplexed Photonic Doppler Velocimetry (MPDV), a diagnostic technology allowing researchers to gather shock physics data in unprecedented detail. The second stemmed from the Miniature Elastic Backscatter Lidar, a remote sensing technology based on a device created in 20 days for the United States' efforts in the Gulf War (see "David Holtkamp's favorite experiment" below).

"I'm the luckiest guy at the Lab. I say this because I've gotten to work with smart, creative people on important challenges facing the country," he said.

For two decades, Holtkamp contributed to the country's subcritical nuclear testing program at the Nevada National Security Site, which safeguards the nation's nuclear stockpile without conducting nuclear tests. For these small-scale, underground experiments, Holtkamp served as diagnostic coordinator for the Lyra series, collaborating with scientists who developed the high-tech diagnostics and who analyzed the experiments' resulting data. Lyra's last shot, Vega, will take place later this year with new diagnostic coordinator Chris Frankle (P-23) at the helm.

Performing multidisciplinary, complex work across multiple organizations was challenging, yet Holtkamp said, "There's such a variety of expertise and intelligence here. It's a wonderful time of innovation." He highlighted the MPDV project, a joint effort that included National Security Technologies LLC and Lawrence Livermore National Laboratory, as an example. "It revolutionized the quantity and quality of data obtained in hydrodynamic experiments."

Science Program Deputy Program Director Michael Furlanetto (Associate Directorate of Weapons Physics, ADX), seconded Holtkamp's opinion.

"MPDV is now the standard diagnostic on implosion experiments at LANL, and both Lawrence Livermore National Laboratory and Atomic Weapons Establishment are moving in the same direction," Furlanetto said. "When the Dual Axis Radiographic Hydrodynamic Test Facility asked me to lead the development of a new generation of MPDV … the first person I asked for help was David, and it was his deep understanding of MPDV that put us on the right technical path."

"It's hard for me to imagine Los Alamos without David. His scientific contributions, his varied interests, and his strong personality made him almost a larger-than-life figure. I think everyone who worked with him feels the hole left by his absence," Furlanetto said.

"[Holtkamp] had a particular kind of old-timer spirit," said postdoctoral student Thomas Hartsfield (P-23), who Holtkamp mentored in pyrometry research. "He believed in what the Lab does and viewed that as a mission: it's not a research career stop but a place that fulfills a distinct need for the country. His excitement and enthusiasm were incredibly genuine and they remain infectious for those of us who worked for him."

Holtkamp is survived by his wife Irma, a retired Laboratory librarian and longtime genealogy researcher. He has two children, David Michael and "Katy," and two grandchildren. An informal memorial service celebrating his life was held in late June at Camp May, near the Los Alamos Ski Hill.

David Holtkamp's favorite experiment

What: Although our recent work with the subcritical experiments in Nevada has been extremely satisfying, one of the career activities that I'm most proud of is helping build the Lidar for Desert Storm in the Gulf War. We were challenged to build an airborne volume-imaging Lidar, test it, and deploy it in a matter of a few weeks.

When: In 20 days, over the 1990 Christmas holiday.

Where: TA-3, Los Alamos National Laboratory

Who: The core team was maybe a dozen people, but the whole team included people from all over Los Alamos, including the Physics, Chemistry, and MST Divisions.

How: Because the instrument had to be built so quickly, we couldn't use the normal design/fabricating/testing methods. We took an old water heater from TA-35 to use as a telescope, and ended up putting all the pieces on a pallet that you could slide into a C130, the plane it was designed to fly on. We worked as close to 24 hours a day as possible, seven days a week. It's the closest I've come to how the scientists must have felt during the heyday of the Manhattan Project, and it enormously increased my admiration for what they did.

The "a-ha" moment: The first time we ever tested it was midnight, on a cloudless night. We happened to see an airplane flying overhead and decided to scan its contrail. That proved to us that this instrument could work. We'd never before built a Lidar that was so big or able to work from a C130.

Searching for dark photons with the SeaQuest spectrometer

Ordinary matter makes up only about 5% of the universe. The rest is dark matter (~25%) and dark energy (~70%). Dark matter particles do not appear to interact with ordinary matter via most known forces. However, they could interact weakly via some new mediator particle, such as a postulated dark photon. If such a particle exists, it might show up in high-energy particle experiments.

The SeaQuest experiment at Fermi National Accelerator Laboratory (Fermilab) was designed to study the quark and anti-quark structure of the nucleon and its modification inside nuclei. This experiment uses the high intensity 120-GeV/c proton beam from the Fermilab main injector, impacting on various target nuclei.

A team from Subatomic Physics (P-25) realized that this experiment's configuration (Figure 1) is also suitable to search for some of the dark matter mediators. A relatively small addition to the hardware and electronics would enable the experiment to become sensitive to dark photons. This additional capability was given its own experiment number: Fermilab E1067.

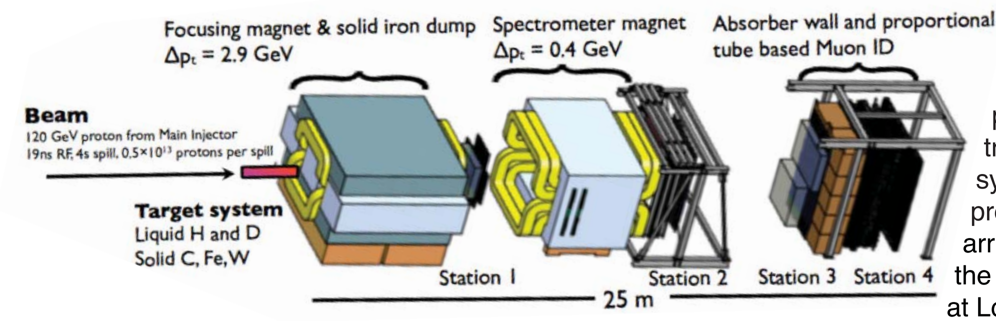


Figure 1: The SeaQuest spectrometer consists of two dipole magnets and four tracking stations. The first magnet is filled with solid iron and functions as a beam dump. The target, upstream of the first magnet, is only about 10% of a nuclear interaction length, so most protons interact with the beam dump, providing a large number of proton-iron collisions for the dark photon search.

Accessing the dark sector

One promising channel to access the dark sector is through the so-called "dark photon" labeled A′ in the Feynman diagram below (Figure 2). In this diagram, a quark and an antiquark (from the beam and the iron) annihilate to form a regular photon, <gamma>. This photon then turns into the A′. Later, the inverse happens: the A′ turns back into a regular photon, which then decays into a pair of muon particles. A normal photon has no chance of traversing many feet of iron, but to the A′, being a member of the dark sector, the iron is practically nonexistent. Thus, if a pair of muons appears coming from far inside the iron, this could be a sign of the A′, the dark photon.

According to dark matter phenomenological models, the mass of a dark photon is likely to be between 1 MeV/c^2 and 10 GeV/c^2, and the current SeaQuest spectrometer has an excellent capability to detect dark photons produced in this mass range.

Los Alamos's contribution

A modest upgrade of the Fermilab experiment to allow the trigger to identify dark photon events was proposed in 2015. Initial studies showed that two fast, position-sensitive detectors located near the SeaQuest tracking stations 1 and 2 could be used to trigger selectively on dark photon decays inside the beam dump and reject the background of muons created near the target. Extruded plastic scintillators, read out using wavelength-shifting fibers and silicon photomultiplers, were identified as an appropriate technology for these detectors. Such detectors are robust and cost-effective compared to previous scintillator technologies, and have vastly superior position resolution.

These detectors were designed and built between September 2016 and April 2017 at Los Alamos, and they were commissioned at Fermilab in April and May. The power distribution and control boards, trigger logic boards, and the calibration system were designed at Los Alamos and produced locally. A field-programmable gate array trigger algorithm designed to process the detector hit patterns was also developed at Los Alamos

Parasitic data-taking with the ongoing SeaQuest experiment will continue through the summer of 2017 when the SeaQuest experiment is expected to switch to a new program with a polarized proton target designed and built by the same Los Alamos group (experiment E1039). This data collection with E1039 will continue for two more years to further improve sensitivity. Based on the current beam condition at SeaQuest, researchers expect to see about 10^{18} protons on target (POT) in two years. Figure 4 show the expected sensitivities to dark photon and dark Higgs searches using this data set.

The project was funded by the Laboratory-Directed Research and Development program. It supports the Lab's fundamental science mission and its Nuclear and Particle

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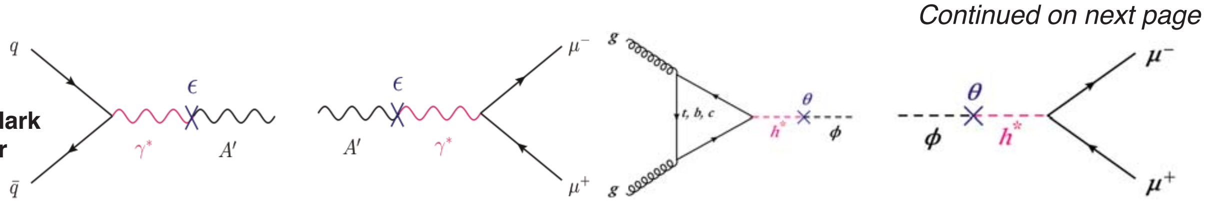

Figure 2: Feynman diagrams for production of dark photon (right) and dark Higgs (far right) and their decays into muon pairs.

Figure 3: A view of two of the four boxes of trigger station 1. The scintillator strips (white) were custom designed and produced at Fermilab. They are read out with wavelength-shifting fibers and Silicon photodiodes (SiPMs). The stamp-sized SiPM preamplifier cards were developed in collaboration with Fermilab.

Searching cont.

Futures science pillar by broadening the Lab's Nuclear and Particle Physics, Astrophysics and Cosmology (NPAC) capability. The fundamental science of this project is of DOE Office of Science priority, highlighted as one of five science drivers identified by a subpanel of the High Energy Physics Advisory Panel.

Researchers: Ming Liu, Kun Liu, Hubert van Hecke, Pat McGaughey, Sho Uemura, Sanghoon Lim, Xuan Li, and Alexander Wickes (P-25).

Technical contact: Ming Liu, Sanghoon Lim

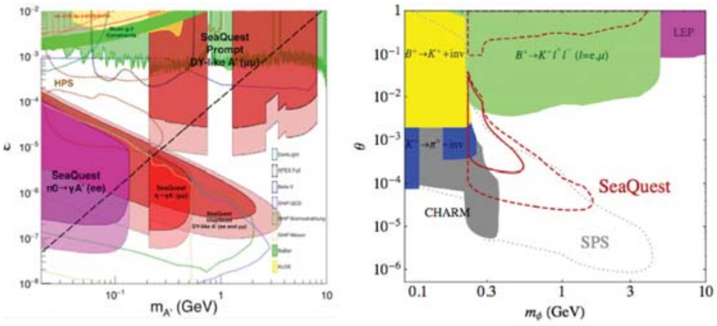

Figure 4: The projected 95% sensitivity on dark photon (left) and dark Higgs (right) searches in the Seaquest/Dark Photon experiments.

Alex Zylstra wins Postdoctoral Distinguished Performance Award

Alex Zylstra (Plasma Physics, P-24) was awarded a 2016 Los Alamos Postdoctoral Distinguished Performance Award. These annual awards recognize outstanding and unique contributions by postdocs that result in a positive and significant impact on the Lab's scientific efforts and status in the scientific community. The awards also honor outstanding creativity, innovation, dedication, or level of performance substantially beyond expectations.

Zylstra was recognized for his work developing a new experimental platform at the National Ignition Facility (NIF). The "wetted foam" campaign is studying implosions where the standard deuterium-tritium (DT) fuel ice layer is replaced by liquid DT, which is supported by a foam. By going to liquid instead of ice, the fuel vapor pressure is higher, which reduces the implosion's convergence ratio and may lead to implosions that behave closer to hydrodynamic simulations. This campaign was proposed and designed by a team of Los Alamos scientists, with Zylstra leading the experiments at NIF.

Zylstra is a recipient of a National Science Foundation Graduate Research Fellowship and a Department of Energy National Nuclear Security Administration Stewardship Science Graduate Fellowship. He graduated from Massachusetts Institute of Technology with a PhD in physics in 2015, joined the Laboratory as a Reines Distinguished Postdoctoral Fellow later that year, and now studies fusion energy, high-energy-density physics, and plasma physics as a Lab staff member stationed at the NIF.

Technical contact: Alex Zylstra

First test of an aerogel Cherenkov detector for characterizing the Cygnus x-ray source

A team from Physics Division (Yongho Kim and Hans Herrmann, Plasma Physics, P-24; with Amanda Gehring, Todd Haines, and John Smith, Neutron Science and Technology P-23; and Michelle Espy, Applied Engineering Technology, AET-6) and National Security Technologies, LLC has led a proof-of-concept test of an Aerogel Cherenkov Detector for Cygnus (ACD/C).

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First cont.

The development of the ACD/C detector is part of a broader effort by the NNSA Science Program to improve overall understanding of the physics of dense object radiography including detectors, converters, cameras and data recorders, and detailed analysis techniques, complementing large Science Program investments in radiation sources, all in support of the weapons program. Specifically the ACD/C measurements characterize the time-dependent x-ray energy spectrum from Cygnus, an intense flash x-ray source operated at the Nevada National Security Site (NNSS). The ACD/C effort is supported by Campaign 3 (LANL Program Manager Bob Reinovsky) to provide a useful, in situ, off-axis, time-dependent, x-ray spectral detector, and complements measurements made by a "MiniMe" Compton spectrometer, also developed by the Physics Division team. Understanding the spectrum from Cygnus is helpful in reducing uncertainties in density determination for subcritical experiments like the Gemini/Leda/Lyra series. *Review of Scientific Instruments* published the detector development and calibration.

The ACD/C employs an array of SiO_2 aerogels and solids (i.e., quartz) at different densities (50–2500 mg/cc) and hence varying Cherenkov energy thresholds (> 2.8 MeV x-ray energy for aerogel with 50 mg/cc down to > 0.32 MeV x-ray energy for quartz with 2500 mg/cc). Aerogels (synthesized by Chris Hamilton, Engineered Materials, MST-7) allow this detector to access thresholds unobtainable with solids and liquids (below 0.5 MeV) and gases (above 2 MeV). The energy range of ACD/C is adequate to characterize the Cygnus spectrum, where the maximum energy of the spectrum is nominally around 2.25 MeV. The ACD/C also has a fast-time response, on the order of 1 ns, which can provide the temporal resolution needed to characterize the ~ 50 ns radiation pulse of Cygnus. Figure 1 shows the

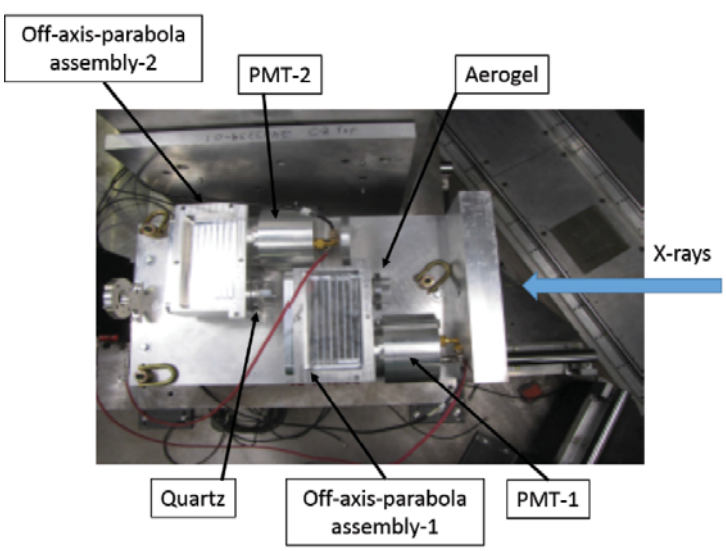

Figure 1: A dual-module ACD/C installed at the U1a complex at the Nevada National Security Site.

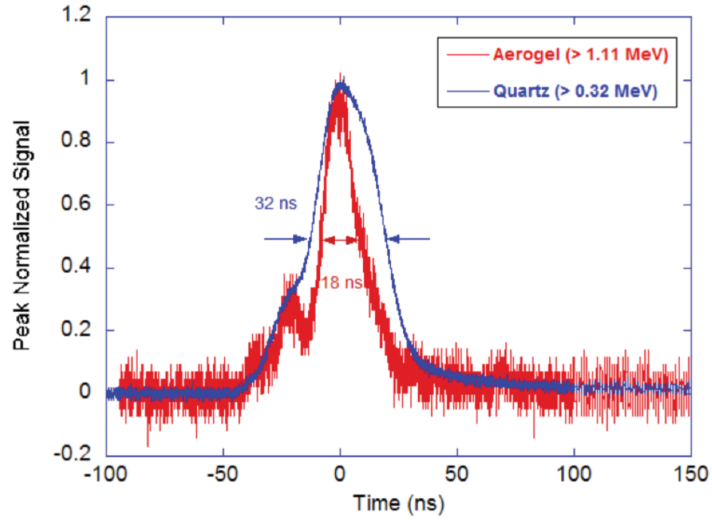

Figure 2: Temporal evolutions of Cygnus x-ray signals. ACD/C can track Cygnus spectral variation as a function of time.

prototype of the ACD/C system fielded at U1a complex at the NNSS. The prototype ACD/C is a two-channel detector, made of aluminum instead of tungsten. For the proof-of-principle test, the prototype detector allows Cherenkov radiators such as quartz or aerogels to be exchanged shot by shot. The full ACD/C would be many more channels.

For the initial proof-of-concept test, two energy thresholds (0.32 MeV by quartz and 1.11 MeV by aerogel with 260 mg/cc) were tested simultaneously. For a 50-ns full width at half maximum (FWHM) Cygnus electrical power pulse, the ACD/C signal from the quartz detector at 0.32 MeV threshold was approximately 32-ns FWHM and the aerogel signal of 1.11 MeV threshold was approximately 18-ns FWHM (Figure 2).

These data qualitatively suggest that the Cygnus x-ray spectrum is evolving in time, and the high-energy x-ray peak exists on a shorter timescale than the Cygnus voltage or current pulse. This is expected to occur as the voltage on the diode requires approximately 10 ns to rise to full value. The ACD/C signal ratio of the 1.11 MeV threshold to the 0.32 MeV threshold responded to variations in diode voltage intended to vary the spectral end point energy. This will be further quantified by comparison with Compton Spectrometer data.

The initial test was performed downstream of the Cygnus bulkhead, in the "zero room" where the bulkhead provides good background shielding. The challenge going forward is to demonstrate a tungsten ACD/C and extract adequate Cherenkov signals above background when the ACD/C is installed in the unshielded, Cygnus source room. In the future, a multichannel ACD/C may support a neutron-diagnosed subcritical experiment (NDSE) by measuring prompt-fission gamma-rays.

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Reference: “Aerogel Cherenkov detector for characterizing the intense flash x-ray source, cygnus,spectrum,” *Review of Scientific Instruments* **87**, 11E723 (2016). Authors: Y. Kim, H. W. Herrmann, A. M. McEvoy, C. S. Young (P-24), C. E. Hamilton (MST-7), D. D. Schwellenbach, R. M. Malone, M. I. Kaufman, A. S. Smith (National Security Technologies, LLC). Other collaborators not included in the reference: T. J. Haines, J. R. Smith, M. E. Gehring (P-23), G. W. Pokorny (Joint Division Nevada Operations, J-NV), M. A. Espy (AET-6), R. A. Howe, R. Owens, S. E. Mitchell, J. A. Green, I. Garza, M. Larson, N. Prock (National Security Technologies, LLC).

This work, which supports the Laboratory’s Stockpile Stewardship mission and Nuclear and Particle Futures science pillar, is funded by Campaign 3, which is managed by Bob Reinovsky.

Technical contact: Yongho Kim

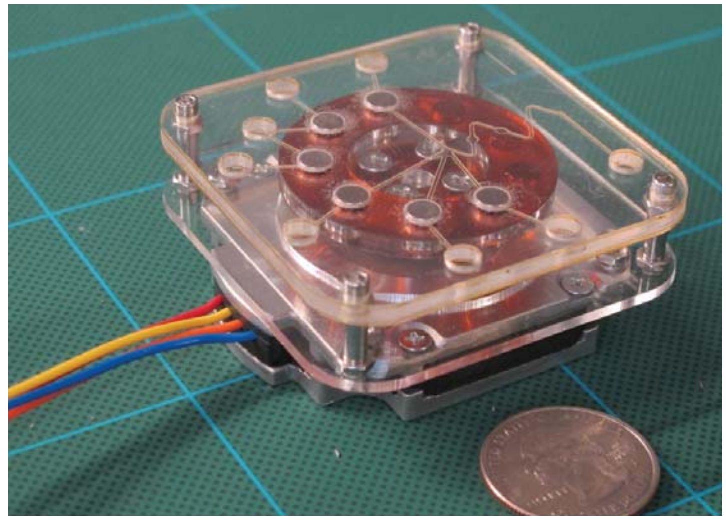
Innovative microfluidic platforms advance a flood of Lab’s research

A unique manufacturing capability developed by Pulak Nath (Applied Modern Physics, P-21) and his team is efficiently and affordably making adaptable and disposable microfluidic devices that advance a range of national security science at Los Alamos National Laboratory.

The capability is designed to manipulate tiny volumes of liquids within narrow channels, and is a unique hybrid of additive and subtractive manufacturing. Sheets of materials are precision cut with a laser and layered and laminated to create the parts—the pumps, valves, micro-channels, mixers, filters, separators, dispensers, and sensors—of the final device. The results are customizable platforms that save researchers time, money, and space.

At Los Alamos, such microfluidic platforms are streamlining a range of research. With a specific hybrid manufacturing method called Liquid Logic, Kate McIntosh and George Havrilla (Chemical Diagnostics and Engineering, C-CDE) collaborated with Nath to build and refine a customizable microfluidic device enabling x-ray fluorescence with small volumes of liquid. The result met the specific requirements for work done by the International Atomic Energy Agency into nuclear safeguards at nuclear energy facilities. It functions as well as or better than more expensive commercial devices, and can reduce radiation risk while improving data quality and workflow.

The ATHENA project (Advanced Tissue-engineered Human Ectypal Network Analyzer) was funded by the Defense Threat Reduction Agency to develop microfluidic, miniaturized laboratories in the form of artificial human organs. The collaboration between Nath, Rashi Iyer (Information Sys-



Part of a Liquid Logic device being developed to automatically extract DNA from blood. Pulak Nath’s team is developing the technology in conjunction with Alina Deshpande (B-10).

tems and Modeling, A-1), Srinivas Iyer (Bioscience, B-DO), Jennifer Harris (Biosecurity and Public Health, B-10), and others, created a benchtop artificial lung, heart, and liver—vital organs that are key targets for toxins and infections. The platforms provide reliable testing of potential remedies and bypasses the time, accuracy, and ethical challenges of conventional testing.

In collaboration with Nath, Shawn Starkenburg (B-10) has developed droplet microfluidic platforms to advance critical Energy Security work studying different strains of algae as a source of biofuels. One platform creates a million uniform microdroplets for culturing algae and bacteria, thus accelerating the pace of different testing combinations, reducing collateral chemicals and equipment, and controlling key environmental factors.

In an effort to take this science to the next level, Nath and collaborators plan to develop devices that include sensors to enable “automated if-then decision making,” that is, to perform specific functions based on specific results. For example, a new project aims to use the Laboratory’s capabilities in microfluidics and portable low-field nuclear magnetic resonance for chemical threat detection.

The work supports the Laboratory’s Energy Security and Nuclear Deterrence missions and its Materials for the Future science pillar. Reference: “Liquid Logic,” *1663* (May 2017).

Technical contact: Pulak Nath

Accurate prompt fission neutron spectrum measurements at LANSCE

Accurate nuclear data on neutron-induced fission form the basis of criticality calculations, as well as nuclear reactor and nuclear weapons design. The spectra of neutrons pro-

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Accurate cont.

duced in neutron-induced fission reactions are a significant contributor to reactivity in such fast neutron systems, and Science Campaign 1 has supported an effort at the Los Alamos Neutron Science Center (LANSCE) to improve these experimental data. This effort is called the Chi Nu project, after the mathematical symbol for the desired measured quantity, the chi matrix for neutrons. Data of interest are from the neutron-induced fission of both ^{235}U and ^{239}Pu.

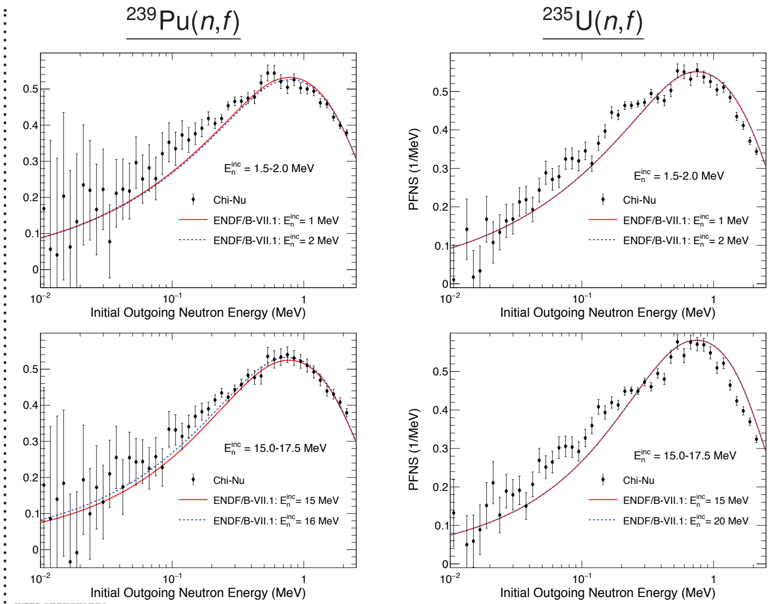
Chi Nu uses the LANSCE Weapons Neutron Research Facility "white" source of neutrons, created by spallation of the LANSCE 800-MeV proton beam on an unmoderated tungsten target. The resulting neutron beam covers a wide range of energies, hence "white," and relies on measurements of the time-of-flight of the neutrons to determine their energy on an event-by-event basis. Since Chi Nu is measuring both the incoming and outgoing neutron energies, it uses a double time-of-flight technique: the time from the neutron production to fission and the time from fission to outgoing neutron detection. The fission time is provided by a parallel-plate avalanche counter 21.5 meters from the neutron production source. Subsequent neutron detection time is provided by either 1 of 22 ^{6}Li glass detectors for lower energy neutrons, or 1 of 54 liquid scintillator detectors for higher energy neutrons.

Since neutrons scatter off of any material, their detection and energy measurement via time-of-flight is complicated by the possibility of scattering off of any of the material in the experimental area. These issues require a careful analysis, and an extensive Monte Carlo model is used to accurately reflect the experimental environment. Backgrounds from neutrons detected from processes other than fission need to be taken into account. The methods employed for solving these problems are documented in recent papers by J.M. O'Donnell[1] and K.J. Kelly, et al.[2].

The figure shows some of the resulting data for two incident neutron energy ranges and for neutron-induced fission of both ^{239}Pu and ^{235}U. The corresponding ENDF/B-VII.1[3] evaluation is also shown for nearby energies. Some of these data have been incorporated in the next ENDF evaluation and the complete program will provide a firm foundation of prompt fission neutron data for applications in the future.

Los Alamos researchers are Jaime Gomez, Keegan Kelly, John O'Donnell, Hye Young Lee, Shea Mosby, Bob Haight, Terry Taddeucci (all LANSCE Weapons Physics, P-27), Denise Neudecker and Morgan White (both Materials and Physical Data, XCP-5), and Principal Investigator Matt Devlin (P-27). Researchers from Lawrence Livermore National Laboratory are Ching-Yen Wu, Matt Buckner, Brian Bucher, and Roger Henderson.

Technical contact: Matt Devlin



A comparison of the recently measured prompt fission neutron spectra for two incident neutron energy ranges for neutron-induced fission of ^{239}Pu and ^{235}U, and the corresponding ENDF/B-VII.1 [3] evaluations.

References:
[1] J.M. O'Donnell, "A new method to reduce the statistical and systematic uncertainty of chance coincidence backgrounds measured with waveform digitizers," *Nucl. Instrum. and Methods A* **805** (2016).
[2] K.J. Kelly, J.M. O'Donnell, J.A. Gomez, T.N. Taddeucci, M. Devlin, *et al.*, "Numerical integration of detector response functions via Monte Carlo simulations," *Nucl. Instrum. and Methods A* (2016) *accepted*.
[3] M. B. Chadwick, M. Herman, P. Oblôzinsky´, M. E. Dunn, Y. Danon, *et al.,* "ENDF/B-VII.1 nuclear data for science and technology: cross sections, covariances, fission product yields, and decay data," *Nucl. Data Sheets* 112 (2011).

Got news?

Physics Flash highlights science and technical accomplishments from across P Division and has a distribution that includes Laboratory staff and senior management as well as external readers. If have unclassified news you'd like to see featured, please send it to your group leader to be forwarded to ADEPS Communications Project Manager Karen Kippen.

HeadsUP!

Physics Division Housekeeping Day

Homes accumulate their own clutter—magazines, ill-fitting clothes, old cables and electronic chargers, mysterious frozen foods—but the importance of housekeeping takes on increased significance in our LANL offices and laboratories. Housekeeping here is a safety practice, a security measure, a sustainability effort, and a simple way to make the workspace a source of pride.

Physics Division recently hosted a TA-53, Building 001 Housekeeping Day. Employees at the Los Alamos Neutron Science Center (LANSCE) cleaned out their work spaces and transferred, salvaged, recycled, or disposed of a number of items, all in keeping with the directorate's goal of "Cleaning the Past," as outlined in the ADEPS FY17 Environmental Action Plan (hsrasweb.lanl.gov/emsdb/print_plan.asp?id=427).

P Division collected and coordinated the following at LANSCE.

- 15 recycle bins that were picked up and emptied
- Two metal trash bin pick-ups within two days
- More than 17 burn boxes worth of material
- 11 barcoded laptops
- 2 barcoded servers
- 17 barcoded computer workstations
- 2 barcoded oscilloscopes
- 8 boxes of computer peripherals
- 8 small electronic items
- 18 monitors
- 2 uninterruptible power supply backup systems
- 1 fax machine
- 2 printers
- 6 cabinets/shelving units
- 7 chairs
- 2 fans
- Uninterruptible power supply batteries and fluorescent light bulbs
- More than 20 boxes of printer cartridges
- Many miscellaneous office supplies

Helping make the Physics Division Housekeeping Day a success were, from left, Jeff Bacon (P-25), Frank Naranjo (ASM-PM), Howard Nekimken (ADEPS), Irene Martinez (P-25), and Gerri Barela (P-DO).

Gerri Barela (Physics Division Office, P-DO) coordinated the LANSCE housekeeping initiative. Property Specialist Frank Naranjo (Property Management, ASM-PM) ensured property tagged items were transferred or disposed of properly. Jeff Bacon (Subatomic Physics, P-25) delivered items to salvage, Irene Martinez (P-25) managed the pickup of recycle bins, and Howard Nekimken (Associate Directorate for Experimental Physical Sciences, ADEPS) assisted the enterprise. David Meyerhofer (P-DO) served as the ADEPS/Physics Champion.

Celebrating service

Congratulations to the following Physics Division employees recently celebrating service anniversaries:

Glen Wurden, P-24 .... 35 years
Melynda Brooks, P-24 .... 35 years
John Kline, P-24 .... 15 years
John Perry, P-21 .... 5 years

PhysicsFlash

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