

# National Instruments Expo Features LENR

Christy L. Frazier and Jim Dunn

National Instruments' annual graphical system design conference, NIWeek, was held in Austin, Texas from August 6-9 at the Austin Convention Center. Amid its usual fare of technology and software presentations, this session featured an LENR panel, three speakers on the topic and a demonstration by Dr. Francesco Celani of the Italian National Institute of Nuclear Physics (Frascati, Italy).

According to National Instruments, more than 3,500 engineers and scientists gathered at NIWeek 2012 to learn about new technologies "that provide disruptive competitive advantages when developing software-defined systems for measurement and control."

On Tuesday, August 7, National Instruments co-founder and CEO, Dr. James Truchard, mentioned cold fusion in his keynote address. He explained that National Instruments had taken an early interest in the field: "[I]n 1989 we were working with some of these early Edisons and we actually offered everybody who wanted to prove cold fusion existed a copy of LabVIEW, and everybody who wanted to prove it didn't exist a copy of LabVIEW. And as far as I know, only the ones trying to prove it took us up on the offer. So we actually did an AppNote of how to do cold fusion with LabVIEW. We've been there all along in this very controversial area. . . So in the experimental process in this case, it's kind of been stuck at this first step of observation. So our goal in life is to make sure these Edisons can move on to the process, get the measurements they need, have the capability they need in a graphical system design to solve these really, really important problems as we go forward." He concluded his comments about LENR with the open-minded statement: "We don't judge, we measure."

Expo attendee John Abrahamsen has posted exceptional quality video of much of the NIWeek material on YouTube.

View the entirety of Truchard's keynote address at: <http://www.youtube.com/watch?v=NxjxFdFEBsw>

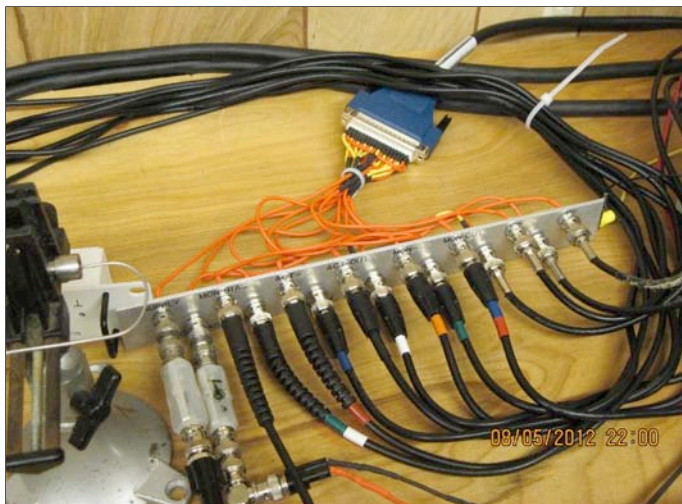
In his keynote address, Truchard also referenced the LENR demonstration of Dr. Francesco Celani on the showroom floor. Celani demonstrated the nickel-hydrogen device during the entirety of the meeting. The experiment utilizes a specially treated, thin nickel-copper wire enclosed in a chamber filled with hydrogen gas. Because the convention center would not allow gas cylinders on the expo floor, Celani loaded the nickel wire before coming to Texas and then LENR experimentalist Dennis Letts, who lives nearby in Austin, also did some loading the night before.

National Instruments engineers Chad Evans, Brian Glass and Kyle Klufa provided the LabVIEW software and PXI hardware to measure experimental parameters. Other engineers created a wiring assembly for measurements. The device output thermal power during the three days of the expo was estimated at 58 to 68 Watts.

Abrahamsen captured a short video of the device and spoke to Celani about the set-up and performance: <http://www.youtube.com/watch?v=Xe5rcEvsek0>

On August 7, the Science & Big Physics summit included a one-hour panel discussion, "The Quest for Alternative Energy: Anomalous Heat Effect (aka Cold Fusion)." It is estimated that over 100 people attended the discussion. The panel was moderated by Dr. Robert Duncan (University of Missouri) and included Dr. Andrea Aparo (Ansaldo Energia SpA), Dr. Akito Takahashi (Osaka University), Dr. Frank Gordon (Retired, SPAWAR) and Dr. Michael McKubre (SRI International).

Duncan opened the discussion with a general overview of the history of anomalous heat effects, including early work in the 1920s by Paneth and Peters and Russian muon



Wiring assembly improvised by National Instruments engineers to make measurements for Celani's reactor. (Photo by Dennis Letts)



Celani charging the reactor with hydrogen at LettsLab in Austin, Texas, before NIWeek demo. (Photo by Dennis Letts)

research in the 1950s. Duncan concluded, “When you look at the level of heat release from these very, very small structures, it’s much more intense than what you would expect from the enthalpies of the chemical reaction, often by a factor of 1,000 or 10,000. . . The excess heat is real and that is confirmed by many. So this motivates greater scientific investment. . . This deserves really, really close study. . .”

Each panelist presented a short summary of their work and interest in LENR, to get the audience more familiar with work being done in the LENR field.

McKubre stated that “something about nuclear physics needs to be fundamentally interrogated and re-evaluated.” He related an interesting story about being summoned to the Stanford office of Dr. Edward Teller in the early 1990s to discuss the LENR-related research that McKubre’s team was doing at SRI. Teller said, “You haven’t convinced me yet. But if what you say is true, it would take a very small change of the laws of nuclear physics as I understand them to explain this effect.” McKubre said that Teller made two suggestions that he ignored at the time but now has found very useful. In particular, Teller suggested that they make the experiments “a function of the ratio of deuterium to hydrogen in the electrolytic system—change the D to H ratio.” McKubre lamented, “I didn’t do it. Should have. Had I done it then, we would have been well in advance of the situation we find ourselves.”

Aparo, Senior Advisor of Research and Development at Ansaldo (known primarily as Italy’s leading producer of thermoelectric power plants), mentioned recent European meetings on emerging energy technologies. EU politicians, he said, are interested. Aparo indicated that his department presented a report on various anomalous effects, including LENR. He said, “What we showed them is very simple. Data. Factual data. That’s more than enough to convince people.” EU officials have apparently encouraged further work, saying, “Go where the data leads you. We will not follow you, we will walk with you towards that direction.”

Takahashi pointed out that “the biggest obstacle to LENR research in Japan is funding, which has been reduced dramatically to almost nothing.”

Gordon explained the importance of using the scientific process in which they conducted experiments and published the results in peer-reviewed technical journals. They have published over 20 papers that document the production of excess heat, hot spots on the cathode, transmutation to elements that were not present when the experiment started, and the production of nuclear products including radiation and neutrons. While these results address many of the objections raised by physicists, theory is still lacking. Gordon stated, “They said it doesn’t match theory. And it still doesn’t match theory. And, in fact, one of the theories it doesn’t match is it doesn’t produce as many neutrons as theory predicts it should, which is fortunate for us because otherwise I think we’d all be dead.” He suggested that the levels are 6-7 orders of magnitude less than predicted.

When the discussion was opened up to the audience, numerous questions were asked about theory and experiment. National Instruments’ Truchard took the opportunity to introduce Dr. Peter Hagelstein. In his keynote, he mentioned that Hagelstein “has worked on some 282 theories about how it works. His latest one he thinks is his best one.” Hagelstein briefly discussed a new model he has proposed based on coupling between vibrations in the lattice and

nuclear excitations.

Celani spoke for a few minutes about the work that led up to his demonstration. Alex Xanthoulis, CEO of Defkalion Green Technologies, indicated that they have nearly finished all the R&D on their Hyperion reactor and are in negotiations to open branches in numerous countries, including moving their headquarters to Vancouver, Canada.

Video of the full panel discussion is available at: <http://www.youtube.com/watch?v=iS4qNbMCBL0>

On August 8, three individual LENR presentations were given. John Hadjichristos (Defkalion) presented “Hyperion: Commercialization of LENR.” He said that, “Defkalion’s understanding of the physics involved in LENR controlled phenomena is performed in Hyperion lab prototypes.” They have found, like others, that “the common environment in which LENR occurs is vacancies on the crystal lattice of a ‘nuclear active environment’ with a heavy metal, such as nickel, with proper size and geometry where excited atoms of hydrogen interact, resulting in different transmutation paths followed by a resonance process that dissipates excess heat energy.” They propose that commercializing LENR “requires a plethora of future needs such as the development of new materials, new instrumentation and test protocols, and even the establishment of an international independent scientific and standards body for this new scientific and industrial sector.”

Akito Takahashi (Osaka University) presented on the “Status of CMNS/CF/LENR Research at Kobe-Technova.” The speech covered his team’s work to “elucidate the underlying physics of anomalous heat evolution effects in deuterium and protium gas-loaded nano-metal-compound systems.” He said that they have “reproducibly observed anomalous heat effects with isotopic differences using time-dependent (dynamic) data of thermal power evolutions, D(H) metal-atom loading ratios and temperature dependence (for Ni-based cases).”

“Commercialization of LENR Technology” from the perspective of Robert Godes (Brillouin Energy) included a discussion of research attempts to understand the intense heat release of Pd-D or Ni-H reactions. He spoke about ways in which Brillouin Energy has “demonstrated control over the reaction” and discussed more generally what types of sys-



Dennis Letts, Francesco Celani and Chad Evans, Systems Engineer for National Instruments. (Photo courtesy of Dennis Letts)

tems might move to commercialization and the applications these systems will address.

Video of Hadjichristos' full talk and part of Takahashi's is available at <http://www.youtube.com/watch?v=GG5FKjibgAw>.

Also on August 8, Duncan joined National Instruments' software architect Greg Morrow and Director of Software Marketing Shelly Gretlein for an informative keynote discussion on "Anomalous Heat Effects." (See the video by clicking on the title of the talk, under the date and names above: [http://www.ni.com/niweek/keynote\\_videos.htm](http://www.ni.com/niweek/keynote_videos.htm).)

Gretlein opened by saying that National Instruments, as software tool providers, are working towards "empowering engineers and scientists that are working on these unsolved problems." Morrow explained how the company's interest in LENR has evolved. He said, "Whenever I see Dr. T[ruchard] talking more often than usual or more excitedly than usual with my chief scientist Dr. Lothar Wenzel, I know the game is afoot. In this case, they were getting excited about the anomalous heat experiments, not just because of the potential for new science and technology or a novel energy source but also because such a longstanding mystery seemed like a great opportunity to apply LabVIEW and accelerate the science."

Cutting edge science needs advanced instrumentation. The company has worked closely with LENR theorist Prof. Yeong Kim (Purdue) to develop software that addresses theory. Morrow said, "Under Dr. Kim's guidance, we've created a number of different simulations in LabVIEW to explore more basic aspects of the theory. One of the common threads in several of the theories is the notion of lattice vibrations in the solid palladium, so we created this VI [virtual instrument file] that helps us understand and visualize the fundamental vibrational modes of a palladium lattice when it's been loaded with deuterium."

And, National Instruments has also worked with experimentalist Dennis Letts. Morrow explained, "Our goal was to optimize certain experimental parameters, and find the optimal value that gives us the greatest generated heat and to do so we needed a fast, accurate temperature measurement at



Alex Xanthoulis, Frank Gordon, Andrea Aparo, Peter Hagelstein, James Truchard, Michael McKubre, Robert Godes, Stefano Concezzi and Robert Duncan. (Photo courtesy of Brillouin Energy)

the cathode, which is the site of the generation of the heat." They ran into problems with IR imaging the cathode, because the cathode is submerged in an electrolytic bath which is opaque to IR radiation. They needed to get creative. He described an "inverse solver" that deduces the hot spot measurement below the water line based on what is happening above the water line.

Duncan touched on the work that will be undertaken by the Sidney Kimmel Institute for Nuclear Renaissance at the University of Missouri. He stated, "We are very committed to expand the experimental range of inquiry, our experimental approach—expand that following strictly the scientific method to the point where we'll be able to get at what the actual underlying mechanism is."

The presentation ended with a quote by Duncan that seems fitting for ending this report: "There's always risk whenever you explore the unknown. But what history has shown us time and time again is that the risk of not taking a risk is often far greater than the risk itself."

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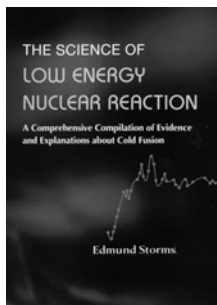
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