ICCF18:

SCIENTIFIC ADVANCEMENTS, INDUSTRIAL DEMONSTRATIONS, BIG TURNOUT, ENTHUSIASM

Marianne Macy

On July 21-27, the 18th International Conference on Condensed Matter Nuclear Science (historically known as the International Conference on Cold Fusion) took place on the campus of the University of Missouri in Columbia, with the emphasis on "Applying the Scientific Method To Understanding Anomalous Heat Effects: Opportunities and Challenges."

Advancements in the field resulted in one of the largest conference attendances in the history of the ICCF series, as well as a wider and more interdisciplinary range of programming than at previous conferences. Of the 215 attendees from 21 countries, 14% were students. Dr. David Nagel's report, which will publish on the *IE* website in mid-September and appear in #112, will cover the scientific and commercial advances. This report will focus on topics related to an expanding LENR field as presented at the conference, which encompassed such areas as education, venture capital, career opportunities and individual perspectives of researchers and observers.

SHORT COURSE ON LENR

On Sunday, July 21, a day-long LENR Introductory Short Course was offered. The "short course" is so described because it endeavors to cover the major areas of the field in one day. Viewed in that light, it is a short time to make such a heroic endeavor. Starting at 8:00 a.m. and going to 5:00 p.m., the short course is short of short and dense on information. The course is a comprehensive introduction to the field to quickly get newcomers up to speed on the major topics, evolution and current standing, though many of the attendees typically were long-time researchers in the field.

There is a generosity in this field that is remarkable; the effort made by major researchers to prepare the short course material is akin to having Elvis Presley, Mick Jagger, Luciano Pavarotti, John Lennon and the like offering to spend a Sunday talking about how they made music.

Nagel's summary of ICFF18 will include a synopsis of each of the short course presentations, the titles of which are presented here: Dr. David Nagel "Introduction and Major Questions"; Dr. Michael Melich "Ni-H Gas Loading and Heat Data"; Dr. Mahadeva Srinivasan "Transmutation Data and Issues"; Dr. Vittorio Violante "Materials Status and Challenges"; Dr. Michael McKubre "Palladium-Deuterium Electrochemical Loading and Heat Data"; Prof. Peter Hagelstein "Theoretical Status and Challenges"; Patent lawyer David French "Legal Aspects and Intellectual Property"; Nagel "Business Prospects and Applications of LENR."

WELCOME RECEPTION

Dr. Robert Duncan, Vice Chancellor for Research at the University of Missouri and General Chair of ICCF18, welcomed a large group of conference attendees at the hors d'oeuvre reception held Sunday evening, July 21. Columbia City Council member Michael Trapp encouraged the group to explore the beautiful city and campus. It was clear that Duncan and his wife Dr. Annette Sobel, who was Program Organizer, had a dedicated, diligent staff assisting with conference details, including: Beth Fisher, Barbara Breen, Heather Brown, Vicki Dennison, Natalie Feibish, Kate Stottle and Barbara Wills.

OPENING DAY HIGHLIGHTS

The ICCF18 scientific program opened at 7:45 a.m. on Monday, July 22. Numerous factors made this meeting significant. Having an LENR ("cold fusion") conference at a major university was important. The University of Missouri is also now endowed with a multimillion dollar center for research, the Sidney Kimmel Institute for Nuclear Renaissance (SKINR).

Duncan, who appeared in the CBS "60 Minutes" story on cold fusion, opened the meeting with the theme "Discovery is Disruptive and Unexpected." Always an inspiring speaker, Duncan ran through the history of known nuclear processes and spoke of work being done on "true tabletop nuclear fusion to achieve a true nuclear state." He asked, "Where is your scientific curiosity if you don't find this to be one of the most exciting advances of our time?" He noted that the many reports of excess heat in Ni-H systems would be discussed during the week. The results were yet to be replicated at SKINR, he added, but he felt they were just "not yet" successful and would continue to experiment. Duncan emphasized the need to follow the scientific method to establish physical mechanisms, including: always run careful controls, be hypothesis-driven ("what are we trying to disprove?") and standardize the protocol.

Keynote speaker Dr. James Truchard of National Instruments is a hard guy not to like, and indeed *Forbes* magazine counts him as one of "America's Favorite Bosses." He co-founded the company in 1976; it has annual revenues of

David Kidwell and James Truchard

Rob Duncan, Annette Sobel and Conrad Modica

$1.14 billion dollars, in 40 countries, serving 35,000 companies with their software being used in the Large Hadron Collider, Space X, Tesla Motor cars and Lego Mindstorms. They also provide diagnostic laboratory tools like LabView "to do for tests and measurements what the spreadsheet did for financial analysis." An innovative thinker, Truchard had established his company's interest in working with LENR researchers and companies doing industrial development in the field the previous year at NI Week 2012. The man known as "Dr. T" to his employees posed the question that might have been on the minds of attendees. "Why present at this conference?" In his talk "The Role of National Instruments in the Global Environment," he said, "I am hoping we'll come up with something here that does work." He explained how National Instruments got interested in the field: "Back in 1989 when the news broke about Fleischmann and Pons, it was an opportunity for a measurement company." National Instruments worked with the University of Utah, Stanford and Texas A&M, where early work was being done. They offered their software to "prove it exists or doesn't exist." They got takers by those who wanted to prove cold fusion did exist. "Ours is to measure, not to judge," Truchard said. "We need to be providing technology that enables the best possible measurements no matter what the phenomena is. If you want to advance science, you have to advance measurement."

Truchard, an engineer, clearly enjoyed the intellectual and creative challenges of his work. He spoke of National Instruments projects that ranged from infant brain scans to distance learning, the Costa Rican rain forest, and Olympic stadium safety to fusion research. They are now working with mobile devices as well. Truchard said, "We have a goal of helping society. We are building a brand and image for ourselves. We'll demonstrate how measurements make a big difference in this process and in applications. We want to be in the forefront of science and go to where no one has gone before with science and engineering."

A follow-up workshop after the conference offered LabView training to researchers for a dramatically reduced rate. Duncan noted that 19 enrolled in the course. Dr. T did not leave after his speech, preferring to stay for the morning's presentations. He was seen to engage in long conversations with researchers.

The second keynote speaker was Dr. David Kidwell from the Naval Research Laboratory, who Robert Duncan noted can be "far more self-critical of his own work than he is of anyone else's and all of us know how critical he is of our work." In "Applying The Scientific Method to Understanding Anomalous Heat Effects: Off the Chart" Kidwell discussed the many steps in the scientific method, but focused on an often-overlooked aspect: "In science, the prime directive is to prove yourself wrong. That is, logically only something can be falsified. You collect a lot of data to refute your hypothesis. Once you can't do that, then you grudgingly accept that the hypothesis is right. If the prime directive is to prove yourself wrong, every day you wake up and say, 'This is the day I am going to show myself wrong.' How do you live with yourself? Some people drink. Other people live for that one moment between proving yourself wrong and making a new discovery, a new theory, a new observation that no one else in the world has proven. You want to be first, but you want to be right."

Kidwell toured the audience through NRL's experimental results and their analysis of them with a Chart of Happiness, which included the states Elated, Neutral, Sad. He indicated various results that ranged from "off the chart elation" to closer to the "sad" state. A more detailed discussion of Kidwell's presentation, with commentary from researchers in the field, is forthcoming.

Dr. Edmund Storms was presented with the "Distinguished Scientist Award" before the morning break. See the story and interview with Storms on page 42.

Monday was the only day when the attendees came together for lunch. A luncheon at the beautiful Stotler Lounge in the Memorial Union featured a speech by Jed Rothwell titled, "Lessons from Cold Fusion Archives and from History." Rothwell is the co-founder and e-librarian of the lenr-canr.org impressive catalog of cold fusion papers. He indicated that the archive holds about 2,000 documents. He said, "What can we learn from all these papers? I have not read them all but I have read hundreds, and I think these are the most important lessons: Cold fusion is chaotic, and that is a good thing. The literature does prove the effect is real and it teaches how to replicate. I will point out specific papers that show how to replicate. This is a multidisciplinary subject. That means you better read the literature and con-

sult with experts, or your experiment will fail. Finally, the worst error you can make is an unexamined assumption."

Rothwell noted, "History shows that chaos, confusion and doubt are normal in emergent science. We should embrace chaos and celebrate intellectual ferment. . .Make no mistake: cold fusion *is* still emerging. Yes, it has been 24 years by the calendar, but compared to plasma fusion this research is two months old. It has gotten roughly $50 million since 1989, which is how much Uncle Sam spends on plasma fusion every two months."

Rothwell said, "I think the literature shows that cold fusion is more reproducible than the transistor was in the early 1950s. The tritium—and the heat correlated with helium—together are proof-positive that the effect is nuclear. Okay, we have no viable model, but two out of three ain't bad." Rothwell gave examples of papers that can teach one how to replicate (see http://lenr-canr.org/acrobat/RothwellJlessonsfro.pdf).

Rothwell's humorous but educational talk was a highlight of the day. Rothwell wrote after, "One member of the audience told me, 'We did not realize you knew so much.' It is not clear whether that is a complement or an insult, but I appreciate the sentiments."

WIDER RANGE

ICCF18 was a conference that evidenced a broader range of programming, audience and participation, because the Fleischmann-Pons Effect has been generally becoming accepted as legitimate in the past several years.

Ruby Carat and Eli Elliott, filmmakers and advocates from Cold Fusion Now, filmed the entire proceedings and provided daily reports on their site (www.coldfusionnow.org). Carat said, "During the conference, Cold Fusion Now had about 1,500 hits a day. I wouldn't say it was mainstream, but the cold fusion community around the world was certainly following the events." They plan to release as much footage of the conference lectures as possible.

Cold Fusion Now also conducted interviews with various scientists. Carat said, "We'll be using the one-on-one interviews for our documentary film expected to be in production over the next year-and-a-half. Interviews will resume next spring when we travel to several labs and talk with researchers in their element."

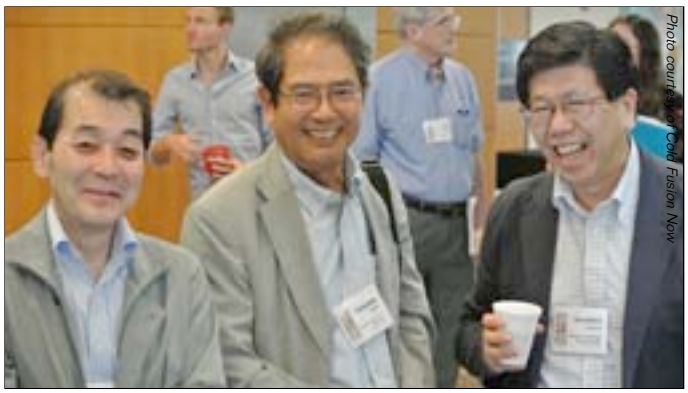
Documentary filmmaker Ken Fox (Crazy Like a Fox Films) was shooting interviews. He explained why he considered the LENR researchers at ICCF18 a fitting documentary film subject: "My perspective is that there are anomalies that can't be explained away by experimental error, that even though there is not yet a consensus on the theoretical underpinnings of these phenomena, there is something significant being uncovered by a small group of scientists that deserves a second look by the larger scientific community. Whether it's called cold fusion, low energy nuclear reactions, or anomalous heat effects, it holds the possibility of clean, widely available energy, and of opening a whole new branch within materials science that could lead to technologies that we haven't yet imagined." Fox plans to do more interviews at other locations and hopes to be able to screen his film at ICCF19, which is scheduled for March 2015 in Venice.

Defkalion Green Technologies provided a daylong demonstration of the operation of their R5 reactor from their Milan, Italy laboratory. At the opening of the Tuesday morning session John Hadjichristos, their Chief Scientist, described the laboratory set-up of their reactor and its flow calorimetry. During the afternoon break Hadjichristos answered questions that had been provided by email from the ICCF18 participants. The demonstration ended with Defkalion reporting that after several hours of operation the R5 reactor was producing heat with a power-out over power-in ratio of well above unity. The video of the laboratory and its operation was also made available in the poster area on a large screen monitor.

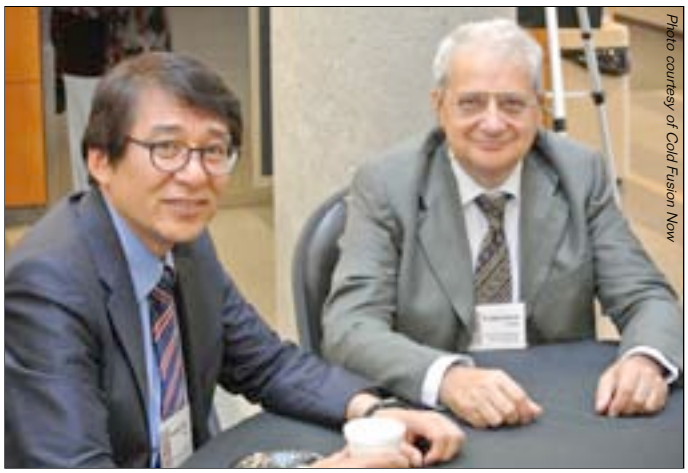
Dennis Letts also prepared and made available a presentation of the operation of his laser stimulated co-deposition cathodes in heavy water. The experiment was being run in a laboratory in Austin, Texas and was controllable remotely over the internet using Team Viewer. A large screen monitor was provided in the atrium poster area without sound, but was accompanied by a set of descriptive slides.

According to the organizer of these demonstrations it is expected that at future ICCFs, demonstrations broadcast to the conference center will use what was learned here, namely use witnesses and independent instrumentation technicians to provide validation of the operation of the experiment. The complexity and cost of bringing the increasingly complex experiments to an ICCF makes attractive the use of web broadcasts with witnesses.

Later in the week, former EPRI member Tom Passell made a joke about how he was seeing researchers and attendees younger than himself, as well as older. John Fisher, a theorist and long time researcher who was presenting a poster, waved



Akira Kitamura, Tatsumi Hoki and Yasuhiro Iwamura



Seung Bin Park and Francesco Celani

acknowledgement of his 93 years and said, "I'm glad to be here!"

But a distinct wave of younger representation of attendees was present in the form of venture capitalists as well as curious people from different disciplines from all over the world who are following LENR and felt it essential to be there. Michael Halem, from the financial world in NYC, had come, like a good number of others, to meet researchers. He was genuinely impressed and subsequently started fundraising efforts on a number of research initiatives. "For me, being in the conference photograph at the end of the week felt as if I was standing next to the early Silicon Valley entrepreneurs in the 1970s," he told me.

THE PEOPLE'S CHOICE

In keeping with the stream of new energy (pardon the expression) in the form of new people and efforts streaming into the field, the conference organizers scheduled two entrepreneurial sessions. The first was held the evening of July 22, "Entrepreneurial Efforts," led by moderator and venture capitalist Matt Trevithick.

To set the mood, a cartoon video was shown that was entitled, "Nikola Tesla Pitching Silicon Valley VCs." "Thanks for coming in, Nick! Is this a mobile play or a tech play? Energy is not as hot as it used to be! Maybe you could tie into a Kickstarter campaign!" It was just about the right note for the meeting of worlds taking place.

Trevithick spoke of working previously in venture capital for cold fusion technology and his perspective on such a meeting of worlds. Later in the week, I asked if he was deluged with researchers looking for venture capital funding. "No one came near me," he answered. "Not one!"

With a $50 gift card to the University of Missouri store as incentive award for the winner of the People's Choice, the "contestants" were give fifteen minutes to make their pitch.

Robert Godes, founder of Brillouin Energy, started the pitch process with a slide that declared his company's process "is a controlled electron capture reaction." He followed with individual validations such as that of Winthrop Williams, Director of UC Berkeley Electrical Engineering Lab (presented at the 2012 American Chemical Society cold fusion session). Thomas Claytor used the Brillouin Energy hypothesis as a basis for experiments that produced tritium from a deuterium gas system with electrically stimulated Pd alloy wire. Godes reported that their work is in Phase II, with two times power gain and measurements accurate to within 5%.

What's next for Brillouin? To improve SRI's development plan, talk with major consumer appliance companies and other major industrial companies, and to seek partnership with an established engineering firm. The company is raising up to $8 million. "We won't own the plants, we'll work with people who own them," Godes said. In a later conversation, Godes was thoughtful, circumspect and not overselling that they had a ready to roll technology, emphasizing that they'd had good results and have a good plan but were still deeply involved in research and development.

Next was one of the committed, brilliant, unsung heroes of the LENR world, Coolescence. Their funding forefather, Matt McConnell, starting by describing Coolescence as the "unluckiest cold fusion company in existence." Just at that moment, their projected slides plunged into darkness, which got a laugh.

In 2005, McConnell and Rick Cantwell decided that since the world needs a new source of energy—due to factors such as geopolitical instability's effect on oil and global warming—LENR had a unique, high potential to impact the problem with a small total investment worldwide. Coolescence is philanthropic in nature but, McConnell said, "I struggle to think now is the time to raise money."

Their 2005 business plan was simple—replicate published LENR experiments to find a repeatable experiment. Then, they would use this to understand the science, and from this understanding, see if it was possible to bring a product to market. With a marketable product, the next step would be to raise commercial/venture funding. All in all, a simple, great plan, or so they thought. The company is still trying to get past step A. After eight years, the story of Coolescence was that of the story of cold fusion: they still have to find an experiment with repeatable positive results. In some cases they have replicated results, but not to the extent that they can make conclusions.

Coolescence has spent $4 million so far, 67% on labor and equipment. They've done eleven major replications, with experiments running three to eighteen months, using glow discharge, gas loading, electrolytic work and collaborations with institutions and individuals. They are always interested in talking to people with good experimental techniques.

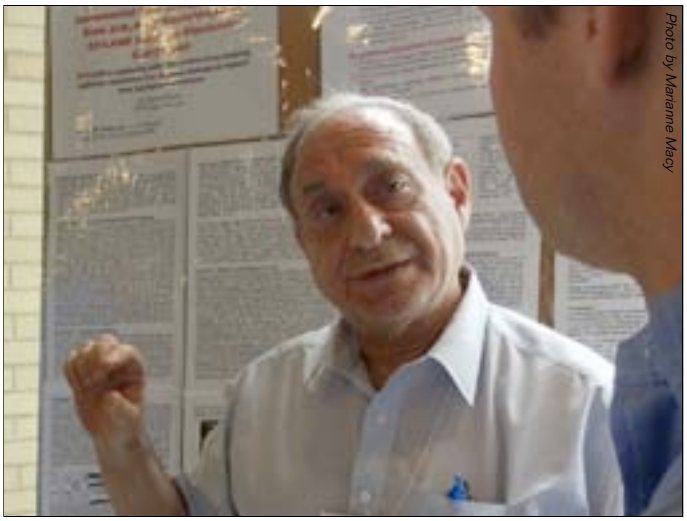
"Continued work is important," McConnell wound up. "We still think LENR is basic science, far too early for funding as a commercial venture. Better scientific understanding is required, through efforts like SKINR." His last note was sobering: "I've raised $20 million in VC and I wouldn't go to one that funded me in the past with anything I've seen today. That's my cloud of rain." But, it doesn't mean Coolescence will stop trying.

The next company up was JET Energy, with founder/head Mitchell Swartz, longtime LENR researcher and inventor. JET Energy has some of the more exciting claims in the field. The Nanor™, which they'd run demonstrations of at MIT, was reported to show significant energy density and power density. With an electrolysis loaded model, they reported energy gains that exceeded ten during the 2012 Open Demo at MIT—impressive claims that Peter Hagelstein of MIT supported. The company's struggles include trying to file for IP protection and having the Patent Office turn them down on utility despite the support of Senator Tarr.

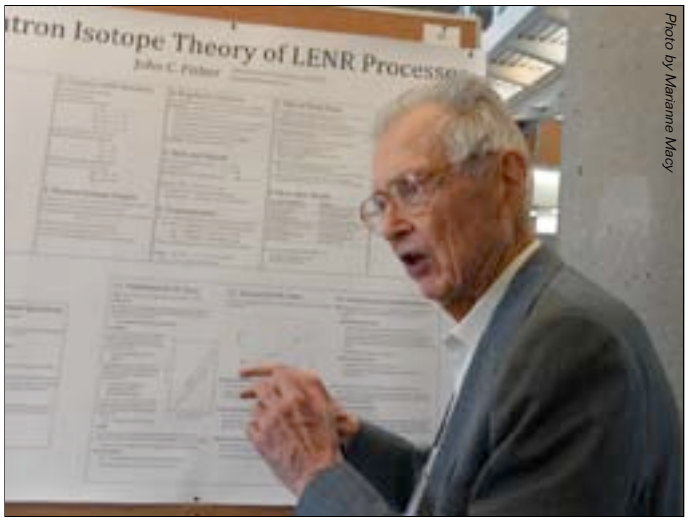
Swartz went rapidly through the slides and their methodology of using noise measurements to rule out false positives. "We use parallel and serial calorimetry," he said. He pointed out their technical milestones, among them *Popular Mechanics* reporting their cold fusion-driven Stirling engines with ohmic control and time integrations in 2004.

The Nanor™ is a dry device made of zirconium oxide and in it they "put palladium, like a chocolate chip cookie." Swartz spoke of their focus on producing a Nanor-type energy production platform, with goals for academic work and residential products.

The next contender, Nicholas Chauvin, is a young entrepreneur with a dream—to make LENR Cars. The company has been based in Lausanne, Switzerland, near CERN, since March 2012. The presentation showed their Board, which includes key advisor and mentor Daniel Borel, the co-founder of Logitech. Chauvin projects that an LENR car



Mitchell Swartz



John Fisher

could get 20,000 km between refuelings. They filed a patent application in 2012.

How does LENR Cars plan to proceed? They hope to set up collaborations with LENR generator makers, thermoelectric conversion systems and companies or investors interested in a mobile and scalable power source.

"Are we too early in the game?" he asked. "Yes, we are." But they are setting out to secure applications with IP. Their plans include: networking, leveraging funding, building an electric generator demo, engaging major key players, selling prototypes, selling IP licenses. And they are forming relationships. "We are speaking with Defkalion and Rossi, happy to cooperate with Brillouin," Chauvin said.

Max Fomitchev-Zamilov of Quantum Potential Corp. described that they have achieved means of micro-thermonuclear fusion in vibrating gas bubbles in liquid. Fomitchev-Zamilov established right off the bat he was a man who could handle the challenges of LENR financing with how he'd started his company. "I closed down my retirement account, and told my son he will pay for his own college," he announced. His company of seven employees runs out of the Penn State Innovation Park; they have raised $600,000 and have a state-of-the-art research facility.

Quantum Potential has built analytical models of bubble collapse, wrote molecular dynamics simulation software and built a prototype generator. Their bubble fusion experiment resulted in neutrons detected in three tests. Fomitchev-Zamilov said, "It was hot fusion, not cold, but a controversial area. Taleyarkhan's work was hard to reproduce. He withheld information from his papers. Let others reproduce your work and be open. This is science, not pseudo-science."

The last presenter for the People's Choice awards was Tyler Van Houwelingen of the Martin Fleischmann Memorial Project (MFMP), joined later by Bob Greenyer. The energy and enthusiasm of this group is infectious. Their presentation focused on their "Live Open Science" efforts that began at ICCF17. They have since replicated Francesco Celani's nickel-hydrogen device and are working with Tadahiko Mizuno. MFMP has cells operating in the EU and U.S. with "four teams on four continents poised to join a collaborative effort." They showed photos of a concentric calorimeter designed and built by Hunt Utilities Group (members of the MFMP). MFMP had their Celani replication hardware on display in the exhibit space throughout the conference.

They are forming a new non-profit called The New Fire Generation, to raise money for research efforts (see story on p. 8) and hope to partner with the Mozilla Foundation. Their website has video and updates of all of their work, including the Celani replication (www.quantumheat.org).

At the next morning's entrepreneurial panel, Trevithick announced the People's Choice Award as the Martin Fleischmann Memorial Project. Two-thirds of the 126 session attendees had voted MFMP first or second out of five projects, with 32% of the vote in their favor for first place.

ENTREPRENEURIAL PANEL

On Tuesday morning, the Entrepreneurship and Innovation Panel featured Matt Trevithick, Dr. Mark Johnson and Doug Moorehead.

Venture capitalist Trevithick (Venrock) related that one of his formulative experiences was when he found out he was related to Richard Trevithick, the inventor of the locomotive, a realization which may have presaged a career in venture capital for new technology.

"I went to MIT in 1988 as a freshman, and in the spring of my freshman year was the Fleischmann-Pons announcement," he related. At the same time, he was studying quantum mechanics under the brilliant Peter Hagelstein. A short time after graduation, he started and sold software companies. In 2002, he worked on Project Cobalt with Dennis Cravens, Dennis Letts, Michael McKubre and Peter Hagelstein to stimulate LENR-produced power using a laser. In December 2002, they thought they saw an excess heat phenomenon, which they presented at ICCF10. It was early in the development to form a company based on a hoped-for technology. For Matt, that ended experiments in cold fusion, but as a result of contacts he made working in this area he found himself "tapped on the shoulder by Venrock," a top VC firm that has invested $2.6 billion in 450 companies since 1969.

Accordingly, he projected a number of slides with messages of much inspiration for the LENR community: "Good news! Resources are ready! The smart money in New York, Washington and Silicon Valley is paying attention to LENR

and talent wants to 'Stop doing incremental things.'"

"I can vouch for that," Trevithick assured the audience. "With the hydrogen isotopes in metal systems, something unusual is going on." He projected a slide of someone sitting on a fence gazing at the sunset, signifying all those people in Washington, California and New York who would be wont to otherwise jump off the fence as far as LENR is concerned. "Due diligence is difficult," it read.

Dr. Mark Johnson is leader of an ARPA-E program targeting disruptive grid-level stationary energy storage technologies. He has headed up other programs for ARPA-E involving the convergence of power electronics, energy storage, renewable resource integration and information technology for electric power distribution. He'd also been a professor of Materials Science and Engineering and directed a program in tech entrepreneurship and commercialization at North Carolina State University. In short, he is the perfect Renaissance man for LENR. Johnson related meeting Trevithick at MIT, missed getting rich working on chips (computer chips one assumed), and worked in energy storage and rare earths.

Frank Gordon

Charles Beaudette

Johnson started with the bad news. "VC is dead in the energy sector," he proclaimed. "The idea you will have breakthrough and get on a plane to Silicon Valley is a fallacy. They're wondering if you can build a web app for it!"

He showed a chart illustrating "VC is not making money on clean tech. 'Angry Birds' is far more effective. The only one above water is Tesla. VC has to wait 180 days to sell stock. In energy there is an existing solution that has a cost benefit analysis, unlike how you can stuff people in an office and throw money and tell them to build an app in x-amount of time. You can't just throw money here. Get real or go home is the motto in VC."

So what works? He suggests "building a community early" and said, "Edison never had anyone else in his pictures, no infrastructure. J.P. Morgan took GE away from him. Shockley, no team. He started Silicon valley and everyone on his team hated him. Bob Noyce, on the other hand, you see him with a team around. Likewise Google in 1999, team."

Johnson recommended studying the DARPA Method, specifically the Heilmeyer Questions, particularly numbers 1-7.

Doug Moorehead of Earl Energy is a graduate of the U.S. Naval Academy, and was a SEAL team member. He went to MIT after his service and did a thesis on batteries in material sciences. Then, 9/11 occurred in his second year at MIT, so he re-enlisted and went to Iraq. After, he studied at Harvard Business School where he learned to "raise capital and build teams." An IPO in 2009 got him introduced to the LENR field. "The fundamental ability to do something disruptive lies within this field," he said.

However, he cautioned the audience, "I've never seen such a reluctance to share as I do in the LENR community." He acknowledged the "ocean of risk" but suggested that researchers think about how to capture risk so there would be a contingency recovery. He suggested, "Share what you are doing with the investment community. Make one big community bucket."

The speakers together formed a panel discussion at the table in front of the room. Mark Johnson began, "Cold fusion people are dedicated." He noted there are 48 projects at ARPA-E and $450 million dollars and the field needs to reach out to these funding organizations.

In the audience, Dr. Yeong Kim from Purdue asked of Johnson, "As a professor of a university I wrote three to six proposals [to ARPA-E]. Steve Koonin made an announcement saying 'Apply for grants.' Of the grants we wrote, are you involved?" Johnson said, "ARPA-E does not report to Undersecretaries of Science or Energy; Steve Koonin was Undersecretary for Science. They don't get together and come up with conclusions. You have to find individuals. They make comments and have 72 hours to give back to submitters."

Frank Gordon, retired from the SPAWAR Systems Center and now working in his own research company, asked, "People go to 7-11 and buy a lottery ticket. Chances of winning are low. Someone will win and it will change their life. I can't tell you who you should invest in. Are there investors that will invest in things as if they were buying a lottery ticket?" Trevithick responded firmly, "No! There is a point at which private investors will invest. If something is commercially useful and will fulfill its vision. People who have invested in LENR are largely philanthropic and altruistic. For now."

The panel broke up, and the audience dispersed and discussed the topic during a scheduled coffee break.

THE CAREERS WORKSHOP

At the end of the conference day on Tuesday, July 23, in the spirit of making the conference meaningful to the student population of the University of Missouri, a number of senior researchers and people involved with the conference formed a panel to talk about their careers and how things had unfolded for them, "Emerging Career Opportunities in CMNS." It was a thoughtful and generous hour, as well as interesting. "I didn't know a lot of those stories," said one witness who had worked in cold fusion since 1989.

Rob Duncan spoke first: "My background is that I'm a physicist and entrepreneur. My passion is making something of value for society. That is what turns me on." Asked about

what were high and low points of his career, he related that he was the PI on a NASA physics mission, responsible for hardware and design review. The project was cleared for flight, and was canceled for a mission to Mars in 2004. The shock of the project's cancellation resulted in Duncan needing to "fall back on being entrepreneurial."

Dr. Graham Hubler, now at the SKINR Center at University of Missouri, said that he got a degree in nuclear physics in 1972, a famous time for cutbacks in the nuclear industry and a flat line point in new government research. "I couldn't get a job." He applied for a postdoc position at NRL, going into material science, which he had not worked in previously. He became a branch head, pushing the science and technology forward. This kind of flexibility, he believed, has led to his going forward.

Dr. Michael McKubre of SRI introduced himself as a New Zealander who trained in the U.S. and New Zealand. "It's great to have aspirations," he said, "But don't expect a career will follow." McKubre went to Southampton in England where he was a postdoc with Martin Fleischmann. He planned to be an academic and see the world, but in England he found he hadn't seen the sun in six weeks when a friend called from SRI in "beautiful, sunny California." Thirty-five years later, he added, he'd worked to build up their electrochemistry group to being one of the largest groups in the U.S., with 16 researchers, six of which are New Zealanders. He counted his career highlight to be moving into cold fusion, where he was the director of an energy research center.

Dr. Mahadeva "Chino" Srinivasan of Chennai, India, got a degree in physics, working in textile engineering because there were hardly any opportunities until 1957, when the atomic energy agency was established in Bombay. Srinivasan was among the first batch of those in the training school which Homi Bhabha headed. "Eight thousand people turned up for 150 positions and I got one. I worked from 1957 to 1997 in BARC. Nuclear tech was unknown. I knew George Miley before cold fusion! One of my first projects was working on an experimental plutonium reactor, uranium-233 reactor. Then in 1989 came cold fusion. . ."

Venture capitalist Matthew Trevithick (Venrock) related that he got an MBA and did his first start-up a few years out of school. "The only way to earn a living was to be an entrepreneur." But he found his perspective changed when he learned that "being a boss was responsibility. The first crisis you have to deal with is that it involves not just your buddies and peers, but people depending upon you. You come out of it a changed person. You've been thrown into the deep end of the swimming pool." He was drawn to the world of future energy technology and LENR, and had worked with Peter Hagelstein of MIT and Mike McKubre of SRI. His worst experience had been a project four years earlier for which he'd raised money for LENR research and ended up in a position of "ambiguity, which was the worst place. If it was negative, I could let it go. . ."

Dr. Annette Sobel spoke next. "I spent twenty years in the reserves, and finished as a two star general in the Arizona National Guard as a physician and engineer." She worked at Sandia National Laboratory, managing programs, which involved, "Attack a problem and find funding!" A four-year stint at DARPA followed, with DOD funds covering research in the strategic tech area and energy sector. "I was an idealistic person. I worked in the military, at a national lab and now academia. I find funding for groups of people." One project was a Navy-funded electromagnetic rail gun. Her high point was meeting Rob Duncan, now her husband. At one point they worked on classified programs together. Her lowest career point, she declared, was working in a political appointee job in Homeland Security for the state of New Mexico. "My objectives are idealistic. So the political path was low." She has recovered and has come to love being in an academic setting.

Xavier Guay, a well-spoken young man who sported green hair, declared he was finding the stories they were telling interesting, as he was an undergrad and trying to figure out what to do.

Wenjie Wu introduced himself as an undergraduate at the University of Missouri in electrical engineering. He said, "Too much theoretical stuff and I don't like it. Later, I am looking to invent a system." Now he has the "ideal job for an international student," having joined SKINR, where he is able to apply knowledge in helping things get working and learn about equipment. He wants to pursue LENR work but said, "I plan to get a Ph.D. in physics, but that will be harder to find a job than if I was a straight electrical engineer. I have realistic concerns."

Hubler kindly advised that those choices "don't mean you can't work in the field." Hubler said, "I was a nuclear physicist who didn't know about materials but I learned it. Now I've worked on projects involving body armor, sensors for

MU students Emily Cizmas and Wenjie Wu with Peter Hagelstein

Tom Passell and Mike McKubre

John Dash and Jean-Paul Biberian

the Army, remote explosion detection and brain injury."

Nikita Alexandrov has his own company (Permanetix Corporation), and described himself as having a chemistry degree and working on aerospace materials but had a strong LENR interest, with goals of raising investments for companies attempting commercialization and patents in LENR. "My ideal situation would be a program manager in a multidisciplinary area due to my broad interests. Prior to hearing you I might have considered this career suicide." He thanked the panel for the inspiration.

"It depends upon how you do it," McKubre assured him. It [LENR work] hasn't affected SRI at all, and may have advanced it. It may be suicide for people required to publish. If your intended career is academic, perhaps I don't recommend. . .What we saw in the demonstration from Defkalion, should their company and others continue with a technology, work for physics or material science people will open up very fast."

Duncan urged, "Never forget all of modern aviation started in a bike shop in Dayton. Something that intrigues you, you will find a way to pursue it. My dissertation was quantum fluids. Could I get a job in industry? No. The point is, it was a wonderful training ground. It gave me mental agility. I am concerned with the attitude in academia of publish or perish." He spoke of the University of Missouri's successful student entrepreneurial group.

In the audience, Mateja Pitako, a young woman from Slovakia, declared she had a degree in policy but was a school teacher working with young children. She came to the conference because she wanted to do something for the environment such as creating links between "policy makers and you!"

Andrea Aparo, senior R&D advisor at AnsaldoEnergia in Italy, said that he believed students should keep in mind, "Four basic ingredients: Fun, passion, faith, magic. Be ready to make a lot of jumps. Have fun; you get fed up with being always serious!"

Chinese student Weiming Peng, a Ph.D. candidate at the University of Colorado, did his undergrad work in China. He said, "I was in undergraduate mechanical engineering and I love physics," he said. "I have been interested in cold fusion since 1989. Our pollution problem in China is serious. I talked to my advisor about it. Most professors saw cold fusion work as suicide but I didn't think so because I see something." He was delighted, he added, to be working with the American company Coolescence. He is currently working through problems of replication.

Hubler advised him: "Try to do material science around it. Electrolysis is hard. You are a remarkably strong young man to make all those decisions. You'd be the kind of guy I'd like in my group."

McKubre emphasized, "Career suicide is only slightly true. Those that can't do teach and those that can't teach become program managers. If you ask teachers they'll give you career suicide mantra around the publication issue. Most program managers have funded this area. If you can do, and succeed, this is an area that you can work in."

"What would destroy your career as you define it?" Duncan asked provocatively. "The skill set and base are of value. I liked the movie, 'The Best Exotic Marigold Hotel' and the theme that everything will work out in the end."

One student thoughtfully offered what became the workshop closing note: "My undergraduate physics professor helped me realize there is a lot of uncertainty of science in the world. That's how I got involved in LENR. I finished undergrad in May. As far as cold fusion I don't know much about it. I heard this conference was here. I didn't need any other reason to come!"

CONFERENCE WIND-UP

Participants on the whole reported some fatigue during and after the intensive week-long conference. Sessions began by 8:00 each morning and typically went into the evening. The conference featured 85 speakers, 40 posters and five technical panels. Five labs at the University of Missouri were toured (including both SKINR labs).

Dr. Pamela Mosier-Boss received the Preparata Medal at the banquet on July 25 (see story on p. 23). That evening, Dr. John Dash was presented with the Best Poster Award for "Power Output, Microstructure and Microchemical Analysis of Highly Porous Palladium Obtained by Spinodal Decomposition."

When the conference wrapped up on Friday, Sobel and Duncan reported statistics of participants. ICCF18 seems to have included more of a cross-section of population than past conferences.

With attention now focused on planning for ICCF19 in Venice, Italy, ICCF18 closed with a sense of excitement at the progress and commitment of researchers and supporters.

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FOR MORE ICCF18 COVERAGE

Dr. David Nagel's report on the scientific and commercial advances presented at ICCF18 will appear on our website in mid-September. The report will also be published in *IE* #112.

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