

ICALEPCS'97 closing remarks from
conference technical secretary In Soo Ko of
PAL, Pohang, Korea.



An accompanying industrial exhibition gave several advanced high technology industrial companies the opportunity to demonstrate their latest products. Among them were Hewlett-Packard, Motorola, Digital Equipment, Force Computers, Creative Electronic Systems (Switzerland), Vista Control Systems, Mitsubishi, Yokogawa, Hua Guang (China) and IMAG Corp. (China).

The Conference was preceded by a three-day training session, attended by about 100 people, on "Development Tool Kits for Control Systems" during which EPICS and Vsystem (Vista Control Systems Inc.) were introduced.

In Soo Ko from Korea's Pohang Accelerator Laboratory concluded the conference by highlighting its technical content whilst Shin Ichi Kurokawa of Japan's KEK closed the event on a poetical note, reflecting the community's enthusiasm by citing a poem of Cao Cao (A.D. 153 - 220), the king of Wei in the "three countries period":

Old horse, obliged to lie in a stable,
His will leaps over one thousand miles,

Brave man, although in the evening
of life,

Can not help being enthusiastic.

Credits

ICALEPCS'97 was organized by the Institute of High Energy Physics (IHEP) of the Chinese Academy of Sciences (CAS) and co-organized by the European Physical Society's (EPS) Interdivisional Group on Experimental Physics Control Systems (EPCS) and the Center for International Scientific Exchanges. It was chaired jointly by Zheng Zhipeng, Director of IHEP and Axel Daneels of CERN.

Local organization was in the hands of Jijiu Zhao and Shuhong Wang and their IHEP colleagues, who spared no effort to ensure a successful meeting. The conference was supported by China's National Committee for Nature Science, the Bureau of International Cooperation, the Chinese Academy of Sciences, the Beijing Legend Computer Group Corporation, EBG Company and Hewlett-Packard. Hewlett-Packard have supported the EPS-EPCS group since its foundation in 1985-1986.

ICALEPCS'99, will be held in fall 1999, hosted by Sincrotrone Trieste. Further information from: Daniele Bulfone, Trieste Synchrotron Radiation Facility ELETTRA, Accelerator Division, Controls Group, SS 14, Km 163.5 Basovizza 34012 Trieste Italy, Tel: +39 40 375.8579, E-mail bulfone@elettra.trieste.it Details will be made available via <http://www.elettra.trieste.it>

From In Soo Ko (PAL, Pohang, Korea) and Axel Daneels (CERN)

LeCroy on LeCroy

LeCroy has become a household name in physics instrumentation. This interview with LeCroy Corporation founder and Chairman Walter LeCroy was conducted on the CERN Courier's behalf by George Blamar, Director of the LeCroy Research Systems (LRS) Product Group. LeCroy today employs 600 plus people world-wide with sales in excess of \$140M a year.

Let's start with your early career.

In a brief flirtation with non-science, I entered Alabama as journalism major, but soon moved to Columbia as a physics major. After graduation, I initially took a job as an electrical engineer with ITT Labs, but soon went to Columbia to help commission a 2000-channel, 100 ns time-of-flight spectrometer for James Rainwater's thermal neutron experiments at the Nevis cyclotron. When this apparatus went to Nevis, I went with it to keep it running - which proved a challenging task. The Williams tube in particular, used to achieve the blazing 10 MHz storage rate, defied adjustment. I rigged a parity checker on it that rang a doorbell chime whenever it made an error, which proved so frequent that the technicians objected to the racket.

Who was at Nevis around 1960 when you were there?

Well, James Rainwater, as I mentioned, then Mel Schwartz, Jack Steinberger, Leon Lederman, Sam Ting and Carlo Rubbia. Also at Columbia though not at Nevis were T. D. Lee, C. S. Wu, Polykarp Kusch and Charles Townes. Others that come to mind include Warren Goodell, Alan Sachs and Sam Devons. Jerry Rosen and Lee Pondrom were postdocs, along with

Against a backdrop of his company's data acquisition and trigger equipment, research electronics instrumentation supplier Walter LeCroy with an early NIM module. "Physicists are our secret weapon", says LeCroy.

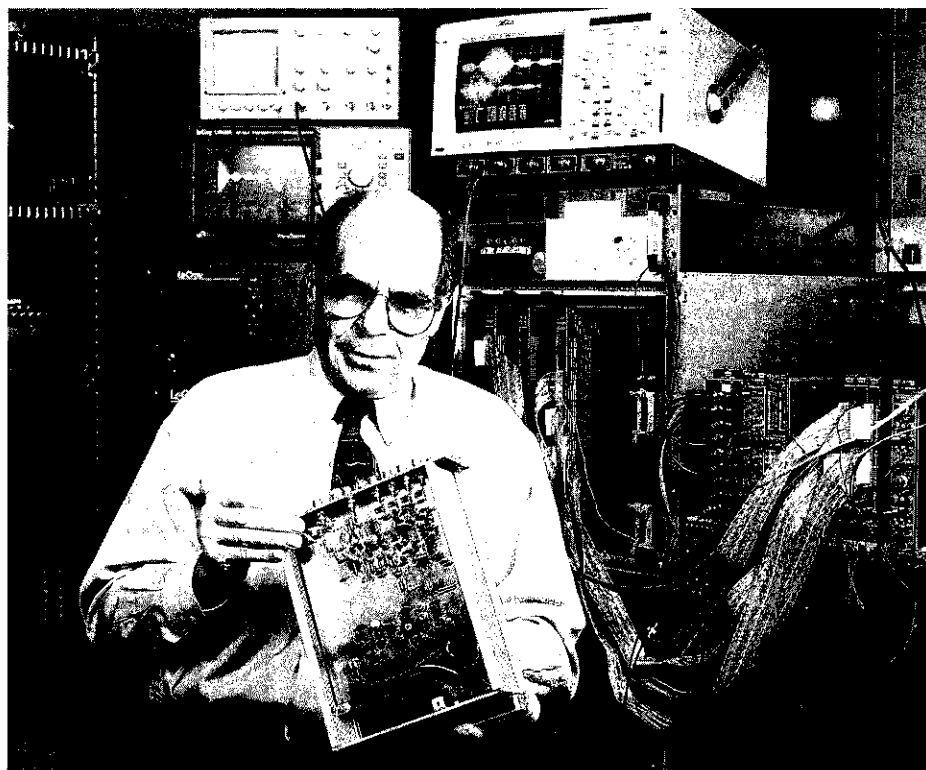
Aldo Michelini, Mimo Zavattini, Paolo Franzini and Juliet Lee. Rainwater was doing thermal neutron spectroscopy using time of flight on a mechanically chopped beam. Steinberger, Schwartz, Lederman and Ting were working at Brookhaven, mostly, using Nevis as a testing and staging area. The 380 MeV cyclotron at Nevis was already not too exciting a machine. Later I became chief electronics engineer at Nevis.

What kind of electronics were you making?

I began doing a series of small 10 MHz logic cards in plastic relay cases that plugged into vacuum tube sockets, and then a 100 MHz fast-logic series in modules bolted together out of aluminium rods and sheets. That was in the very early days of transistors and printed circuit technology. We painted our conductor runs with nail polish directly on the copper-clad boards and etched them with nitric acid scrounged from the chemistry lab. We soon graduated to tape on mylar, photoresist, and half-hour exposures in sunlight (longer if it was cloudy). The transistors were all germanium. Silicon transistors were there, but not fast enough yet and there were no ICs at all. My circuits were distinguished by being direct-coupled in contrast to the capacitor- or transformer-coupled designs prevalent then, and so were substantially free of rate effects, important for particle physics.

Why did you leave Nevis?

By 1963 I had been at Nevis for seven years. I had had a great opportunity to learn, and received a lot of encouragement from many people, including Leon Lederman, who succeeded James Rainwater as



director. I knew nothing about running a business, but was intrigued by the possibility of doing something useful, and a commercial enterprise seemed to be a good way to do it. After initial ideas for a transistor tester and a strip chart recorder for readout of digital data in graphical form, I received orders for fast logic modules based on an evolution of my Nevis designs.

Did you start out of a garage like Bill Hewlett and Dave Packard?

I started out in an old laundromat. The present New York facility was once a hospital, though the building has been extensively expanded and modernized. However, our thick film hybrid circuits are manufactured in the old maternity wards and the glass viewing windows are still there! Initially we concentrated on our 100 MHz logic modules, which soon included a rather experimental 6-bit

ADC, followed by a more polished 7-bit unit. These ADCs were housed one channel per NIM #2 module, and included a neon indicator light on the front panel for each bit. They were never very popular, but were the predecessors of the popular multi-channel CAMAC ADCs beginning with the Model 2248 in the mid-70s.

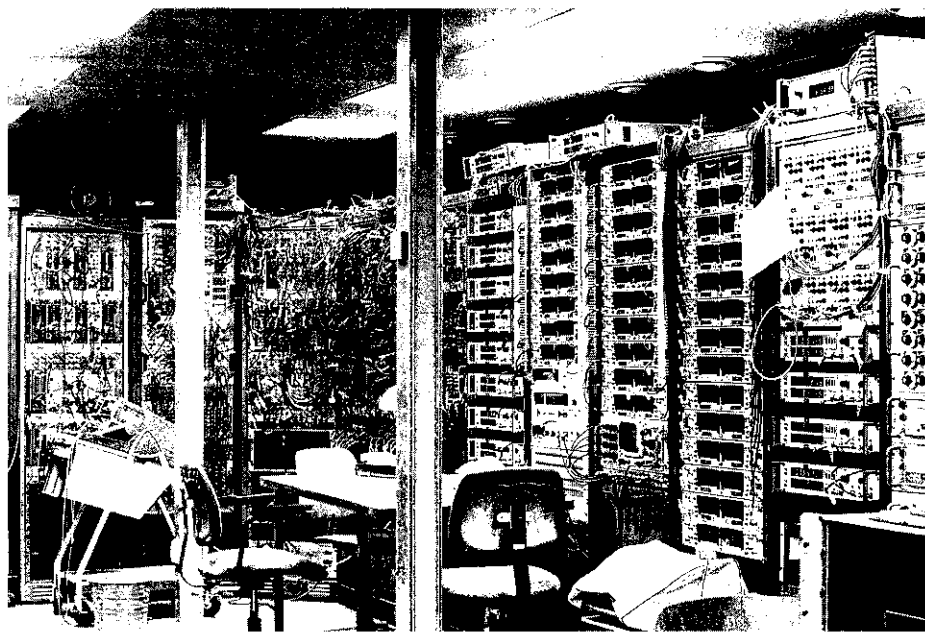
Who was your competition?

Our main competition was Chronetics and EG&G, who were doing several million dollars a year at that time. We were very small fry, always strapped for cash.

How did you sell?

At the very beginning, I was the main salesman. Then I got a phone call from a stranger who said he had heard we manufactured interesting scientific instruments, and asked if we were represented in Europe. We were not represented in New York,

An important early LeCroy success was supplying trigger and data acquisition electronics (behind the cabling, centre left) for Sam Ting's first experiment at DESY around 1967.



let alone Europe! In London I met a network of representatives lined up by the mystery caller, Dieter Zander, owner of a sizeable import-export chemicals and instrumentation business. So we began making sales in Europe before we had any sales network in the States! Dieter's helpfulness extended far beyond lining up reps. He became our guide, counsellor, and before long, banker. He did all of this on faith, step by step. Eventually, he was handling all our paperwork and administration in his New York offices. He advanced funds against orders, then when payment was received took a percentage, an arrangement known as "factoring" that is common in the garment trade. It kept us afloat for several years. We would never be able to repay Dieter, however, for his guidance and confidence that enabled us to survive those early years.

Who were your first major customers?

Lee Pondrom, at Wisconsin, placed a major order for logic modules which

set us on course. Other large early customers included the Penn-Princeton Accelerator (Tom Droege), DESY (Sam Ting), and Nevis itself. Our first important success was undoubtedly supplying the electronics for Sam Ting's first experiment at DESY around 1967. It was a landmark experiment mounted in record time, and we rapidly supplied innovative electronics, including the first ADCs used in high energy physics. Sam, who was at the beginning of his career, showed a lot of courage in going with an unknown upstart instead of an established vendor. Our business at CERN began in the mid-70s with the advent of our first CAMAC ADC, the well known Model 2248.

How did you get involved with NIM and CAMAC?

The US Bureau of Standards introduced NIM in about 1964-5. At that time, each manufacturer of modules, including us, had its own physical and electrical standard, each of course better than the others

and all incompatible. The laboratories wanted to standardize, and we made the change faster than some others. However the switch was painful for everyone - in proportion to our size we had to throw out just as much aluminium. CAMAC came later of course, with the pressure coming this time from Europe and particularly CERN. We put our ADCs into CAMAC for European customers, and this introduced CAMAC into the US. The wisdom of the time held that you couldn't put an ADC into a CAMAC module - all that digital stuff flapping around and the lack of shielding. The argument was persuasive, but incorrect, as we demonstrated. And then that led directly to FASTBUS and VME. Today we also build in the new VIPA - VME International Physics Association format.

How did you get established in Geneva?

CERN was potentially a huge customer. The first product that we successfully introduced was the 2248 ADC in the mid-70s. In response to CERN's buy-European policy, we needed to have a design and manufacturing facility in Europe. A pioneer project was the Mont Blanc tunnel neutrino physics experiment that needed custom, low-cost electronics for its streamer tubes. Today we have almost 200 people working less than 100m from the CERN perimeter fence!

Did LEP change the scale of operations at CERN?

Sure. For LEP experiments we supplied tens of thousands of channels of drift chamber readout - preamps, discriminators and TDCs, hadron calorimeter readout - preamps and ADCs, high voltage for almost every part of the detector, second level trigger including the

Physicist George Blamar, Director of the LeCroy Research Systems (LRS) Product Group.



FERA ADCs. This taught us to reach beyond present limits in speed, precision and cost - the new detector-mounted 17-bit dynamic range charge ADC was originally developed for both CLEO at Cornell and BELLE at KEK and the ground-breaking new 25 ps common-stop time-of-flight TDC came from studying the needs of BELLE.

Oscilloscopes make up the bulk of LeCroy's business today. Where did the idea come from?

Our experience with digitizers began with our early TDCs and integrating ADCs for particle physics. We saw very early the applicability of this technology to digital oscilloscopes, and in 1970 we introduced a very basic 1 Gs 8-bit digital oscilloscope, just a digitizer with a display and no input conditioning. This instrument, the WD2000, boasted a record length of 20(!) samples, and we sold just 20 of them before they succumbed to scan-converter competition that offered more samples. We resisted

the urge to make more competitive oscilloscopes and opted instead to put our limited resources on a new line of high energy physics products, and did not introduce another scope until the famous 9400 - an 'oscilloscope gap' of nearly 15 years.

Who designed the 9400 and the very popular, even today, 9450?

Geneva - the same group that started out on streamer tube electronics and then precision spectroscopy TDCs. This was in the early to mid-80s, just after we had done all that work for LEP and were ready for a new major project. Our newest scope, the 584, is up to 8 GS/s with 8 MS of memory. These are very powerful, general-purpose instruments with broad applicability.

How many physicists work at LeCroy and what do they do?

Physicists are our "secret weapon" We employ over 25, a few in marketing and sales but mostly leading project groups in engineering hardware and software. Physicists tend to assimilate new ideas quickly and are used to solving problems in innovative ways instead of just trying to upgrade existing techniques. A taste for the unconventional seems to be a part of their make-up, and we like that.

What is the role of the LeCroy Research Systems Group?

They continue to play a vigorous role supplying high density custom ADC and TDC components, NIM, CAMAC, FASTBUS, VME, and now VIPA modules to high energy, astro, nuclear, heavy ion, atomic and medical physics customers. Of late, we have been discussing applying our unique talents in manufacturing high density SMT printed circuit board assemblies for experiments

that could not get the quality from other vendors. With decades of FASTBUS, 9U VME and now VIPA instrument production, we have this experience. We also are planning a new line of multiple input, fast waveform digitizer modules this spring and expanding the ViSyN high voltage system product line for new detector systems.

In which direction do you see your company going?

Still doing physics instrumentation. We'll be doing scopes faster and with longer memories and more features to make them even better tools. We'll also be entering other market areas such as LAN diagnostics and telecommunications. The common link is the technology, which is still based on the high-speed, low-noise multi-channel techniques developed for particle physics.

The dark side of the Moon

Assignment: To look for traces of solar neutrinos

Position: Paraguana Peninsula, Eastern Venezuela

Date and time: 14.04 local time, 26 February

The appointment was very precise, because time, tide and total eclipses of the sun wait for no man.

But what does an eclipse have to do with neutrinos? The sun produces neutrinos in gigantic quantities - theory predicts 60 billion per sq cm per second at the earth's surface. The puzzle is that experimentalists only see a fraction of them.

The generally accepted interpretation is that the electron-type neutrinos generated in the sun oscillate, spontaneously changing