

FEATURE

Present, future and science fiction of particle physics

New Humboldt professor Brian Foster takes office at DESY

by Thomas Zoufal (DESY)

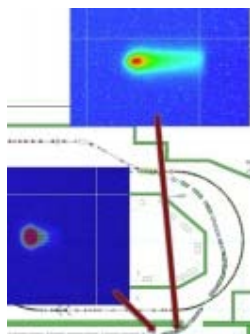


Brian Foster, recently awarded the Humboldt professorship by the Alexander von Humboldt Foundation, has begun work in Germany this week. He hopes to advance particle physics by exploring new methods of acceleration, analysing unique physics data and of course playing his violin.

AROUND THE WORLD

Checkout of ATF starts with test beam

by Rika Takahashi



On 26 May, a first test beam steered through the linac of the Accelerator Test Facility at KEK, Japan, with the same energy as before the March 2011 earthquake. Engineers are now working on the magnet alignment at the beam transportation line.

DIRECTOR'S CORNER

Congratulations to Michel Davier

by Barry Barish



Michel Davier, an important member of the International Linear Collider community, has been awarded the prestigious André Lagarrigue Prize in France. For the International Linear Collider, he chairs the special committee that has provided advice and guidance to the Research Director regarding the enabling R&D and detector design programmes for the ILC.

IMAGE OF THE WEEK



Kaoru Yokoya retires from KEK

Image: Nobuko Kobayashi

Kaoru Yokoya reflects on his life as an accelerator scientist at KEK during his retirement talk on 31 May. Yokoya retired from KEK on 31 March. He remains with the ILC as an Asia regional director.

IN THE NEWS

from **Nature**

27 May 2011

[Tevatron's legacy set to disappear](#)

Lack of long-term preservation plan threatens to leave key information inaccessible for future analysis.

from **Science Daily**

25 May 2011

[Electron Is Surprisingly Spherical, Say Scientists Following 10-Year Study](#)

Scientists at Imperial College London have made the most accurate measurement yet of the shape of the humble electron, finding that it is almost a perfect sphere, in a study published in the journal *Nature* on May 25.

CALENDAR

UPCOMING EVENTS

[18th FCAL collaboration workshop](#)

Predeal (Romania)

30 May- 01 June 2011

[Second Workshop on linac operation with long bunch trains](#)

DESY, Hamburg, Germany

06- 08 June 2011

[Technology and Instrumentation in Particle Physics 2011 \(TIPP 2011\)](#)

Chicago, IL

09- 14 June 2011

UPCOMING SCHOOLS

[USPAS sponsored by Stony Brook University](#)

Melville, New York

13- 24 June 2011

[View complete calendar](#)

PREPRINTS

ARXIV PREPRINTS

[1105.5513](#)

Pair production of charged top-pions in the $\gamma\gamma$ collisions at the ILC

[1105.5203](#)

TeV Scale Implications of Non Commutative Space time in Laboratory Frame with Polarized Beams

FEATURE

Present, future and science fiction of particle physics

New Humboldt professor Brian Foster takes office at DESY

Thomas Zoufal (DESY) | 2 June 2011

In June, Brian Foster will take up his work at DESY and University of Hamburg as a joint professor for experimental physics, with a focus on accelerators for very high energies. He is one of eight professors who won a Humboldt professorship this year, the most outstanding research prize in Germany, endowed with 5 million Euros for five years.



Brian Foster. Image: Alexander von Humboldt-Stiftung 2011 / David Ausserhofer

Foster will engage in several research fields, covering the present, the future and perhaps the science fiction of accelerator physics: The most concrete project is to analyse the data of HERA's deep inelastic scattering processes. Foster is still in love with DESY's electron-proton machine, which ceased operation in 2007. "I spent most of my career with HERA," says former ZEUS detector spokesperson Foster. "The HERA data are very crucial for the analysis at the LHC, so someone has to make sure that the final results come out. Young people are naturally eager to analyse the Large Hadron Collider data but people like me can contribute to analysis in this way. I don't have to worry about my career progression anymore."

Also well-defined is a programme whose main goal is the optimisation of the accelerating gradient of ILC cavities, exploring several promising

directions, for instance surface treatment and thin films. "We are facing a substantial programme of R&D. If we can improve the gradient to 45 megaelectronvolts per metre, perhaps 50, this would make superconducting technology very competitive with the Compact Linear Collider (CLIC) Study technique in terms of maximum gradient."

Foster's third field sounds a little more like science fiction: using the wakefields of a plasma to accelerate particles. Foster and his colleagues plan to use the electron beam of FLASH – a free-electron laser at DESY, using the same superconducting TESLA technology which should be used to realise the ILC – to check if it can be further accelerated by a plasma and is still usable for physics. "This programme is obviously nebulous at the moment, but here at DESY we have facilities that can make a unique contribution so it makes sense that we start such a programme here."

Finally Foster has ambitious plans to inform the general public about his exciting scientific research. "I devote a lot of time to outreach," says Foster, "and am enthusiastic about using the violin, and Einstein's love of it, to reach new audiences." He was buzzing with ideas, including commissioning new music to illustrate quarks and leptons and looking forward to the challenge of presenting his ideas in German as well as English.

But before planning the future and science fiction of particle physics, Brian Foster faces some very mundane problems. Starting officially in June, he still has duties to complete in Oxford until July, has to find a home in Hamburg and of course must begin to hire a team of people for his projects. For that, Foster will not only search in Hamburg, but also hopes to attract people from abroad. "I will work hard to enhance the strong ties between Oxford and DESY as well as building on current collaborations and

starting new ones with colleagues inside and outside Germany.”

*This story will also appear in the 9 June issue of **DESY inForm**.*

DESY | GERMANY | HUMBOLDT PROFESSORSHIP | UNIVERSITY OF HAMBURG

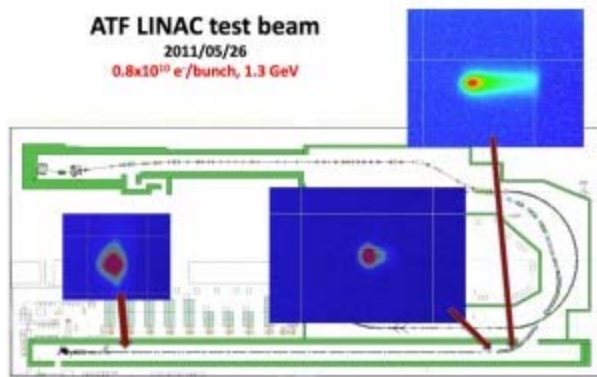
Copyright © 2011 ILC GDE

Printed from <http://newsline.linearcollider.org>

AROUND THE WORLD

Checkout of ATF starts with test beam

Rika Takahashi | 2 June 2011



On the evening of 26 May 2011, KEK scientists and engineers confirmed that a test beam successfully steered through the linac during the commissioning test of the Accelerator Test Facility (ATF).

“It went relatively smoothly, reached the end of linac in a half-hour or so,” said Nobuhiro Terunuma of KEK, Japan, the new spokesperson for the ATF international collaboration.

Following the successful injector commissioning test conducted a day earlier, “we had a beam to the entrance of the beam transportation line,” said Terunuma. The beam energy was roughly 1.3 gigaelectronvolts (GeV), the same as before the March 2011 earthquake.

ATF is a unique test facility for producing and controlling the ultra-low emittance beams that are required for linear colliders. For the ILC, the thinner the beam – or lower the emittance – the more particle collisions occur in the detectors. To produce electron beams that will have a similar quality as those of the ILC, the ATF damping ring squeezes the beam down to make it extremely thin – to the nanometre level.

“But we are not measuring the emittance yet,” said Terunuma. “Our priority is to proceed with hardware checks and to see if we can inject the beam to the ring.”

Another priority is beam alignment.

“Now we are working on aligning magnets, one by one, at the beam transportation line. Most of magnets are still waiting for the checkout,” said Sakae Araki, a KEK engineer in charge of magnet alignment. There is an array of magnets at the beam transportation line, and engineers are making precise alignments on them to prepare for the continued checkout using a test beam through the damping ring.

Most of the work on the beamline equipment is carried out during daytime, followed by test beam operations in the evening. “We hope to see a beam in the damping ring soon,” Terunuma said.

[ATF](#) | [EARTHQUAKE](#) | [KEK](#) | [TEST BEAM](#)

Copyright © 2011 ILC GDE

Printed from <http://newsline.linearcollider.org>

DIRECTOR'S CORNER

Congratulations to Michel Davier

Barry Barish | 2 June 2011



Michel Davier speaks after being awarded the André Lagarrigue Prize

I am especially pleased today to pay tribute to Michel Davier, a long-time colleague, who has recently been awarded the André Lagarrigue Prize for 2010. Although Michel and I have not been direct collaborators, our research careers have paralleled each other to a large extent. Consequently, I am very familiar with his many important contributions to physics and teaching and I have the utmost respect and admiration for his abilities and contributions to science. I had the special pleasure of being one of the invited speakers at the celebration of his receiving this award on 26 April.

The André Lagarrigue prize, instituted by the Linear Accelerator Laboratory (LAL) at Orsay under the aegis of the French Physical Society, is awarded “to front-line researchers who have had responsibility for machine and detector construction and derived

maximum scientific benefit from such projects, performed in a French laboratory or in close collaboration with French groups.”

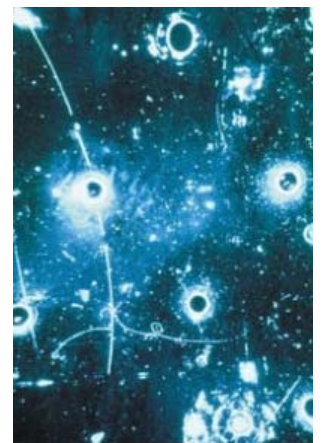
Michel Davier has made many seminal contributions to particle physics. I first knew him as a young rising star at SLAC, where he worked with David Leith and was soon promoted onto the SLAC faculty. However, when given the opportunity, he decided to return to France. He has had a brilliant career in France, where he was the French-Italian Virgo project director at LAL from 1985 to 1994, during the period when LAL built the LEP Injector Linac for CERN and the linear accelerator for the CLIO free-electron laser facility in Orsay. He has made an incredibly broad impact on physics, from his work on electron-positron collider physics, tau physics, B physics, g-2, to teaching and other areas of physics like gravitational waves.

Interestingly, I also knew and very much respected André Lagarrigue, who was instrumental in the discovery of the weak neutral current at CERN, a discovery crucial to establishing the Standard Model of particle physics and where my work at Fermilab provided complementary evidence. Although neutral currents were a prediction of electroweak symmetry breaking, stringent limits on strangeness changing neutral currents already existed from K decay experiments. The search for non-strangeness changing neutral currents required searching with much more difficult neutrino reactions. Using the large Gargamelle heavy liquid bubble chamber, Lagarrigue and colleagues observed several events of the rare leptonic processes $\bar{\nu}_\mu + e^- \rightarrow \bar{\nu}_\mu + e^-$ where the single electron emerges from the collision in the far forward direction relative to the beam.

My first strong overlap with Michel Davier was in tau physics. Marty Perl of SLAC had discovered the tau lepton in 1975. Once the tau was established as a heavy lepton, it became clear that the physics of the tau lepton could provide a rich laboratory to study the weak decays, because the tau is so heavy it had many hadronic decay modes. Following this motivation, my colleagues and I from



*André Lagarrigue.
Image: CERN*



The first observed neutral current event by André Lagarrigue and collaborators in the Gargamelle bubble chamber at CERN

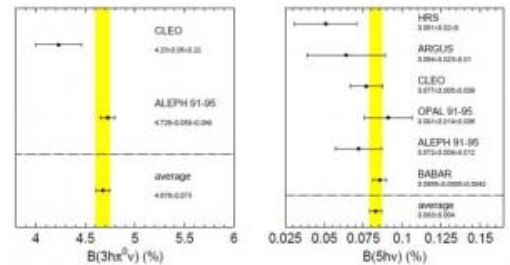
Caltech developed a very productive programme to study tau physics using the CLEO detector at Cornell. Michel also became interested in tau physics. For him, it was a chance to take advantage of the opportunities that would be possible with the Aleph detector on LEP at CERN. In anticipation of that programme, Michel organised the first international workshop on tau physics in Paris and invited me to give the summary talk (a daunting task).



Photo from the first International Workshop on Tau Physics held in Paris in 1990 and organised by Michel Davier

Although I moved on to work in other areas of particle physics following our CLEO tau efforts, I closely followed Michel's huge impact on the field over the next decade. I think it is fair to say that much of what we have learned about tau leptons has come through the work of Michel and his collaborators. They truly turned this field into a precision science and subsequently were able to make an enormous impact on our knowledge of the physics of tau leptons.

The other area of overlap between Michel's career and my own is in gravitational waves, where I have a long-term commitment to LIGO, the US long baseline interferometric detectors, and where Michel became involved in the French-Italian project, VIRGO. Michel became interested in burst sources, like the collapse of stars or supernovae, and more recently in gamma ray bursts. He has made significant contributions to understanding detectability, including simultaneous use of several interferometers spaced around the world. As usual, Michel has picked a subject of fundamental interest, as in this case: the collapse of a star first emits gravitational waves during the actual gravitational collapse and later there are signals from neutrinos and then

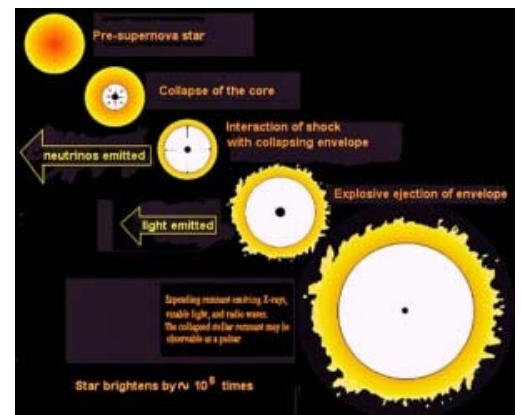


Precision measurements of tau decays into multi-hadronic decay modes on ALEPH and BaBar

hours later, light signals. So, we expect detection of gravitational wave signals will provide information on the fundamental processes involved.

Finally, we have been very fortunate to have Michel Davier leading the special committee formed by Sakue Yamada called the International Detector Advisory Group (IDAG) to advise him on the development of the detector programme for the ILC. The IDAG reviewed the Letters of Intent that were submitted by detector design groups during 2009, and recommended groups for validation. This process has been very useful in guiding the work of the detector as they evolved the detector concepts towards designs that are realistically buildable and have performance capabilities to address the physics agenda of the ILC. Since validating two ILC detectors, IDAG now monitors the progress of the validated groups under Michel Davier's leadership of a group of experienced experimentalists, phenomenologists and theorists.

Michel Davier is a superb scientist, who is very deserving of being selected for the Lagarrigue Prize. I am very happy I was able to participate in the celebration of his award, and I congratulate him one more time.



The sequence of stages for the gravitational collapse of stars (e.g. supernovae). Note that gravitational waves are emitted before neutrinos and light.

[CNRS/LAL](#) | [GARGAMELLE](#) | [LAGARRIGUE PRIZE](#) | [TAU](#) | [VIRGO](#)

Copyright © 2011 ILC GDE

Printed from <http://newsline.linearcollider.org>