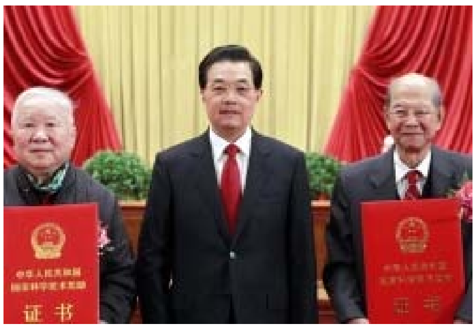
ilc newsline

 23 FEBRUARY 2012

AROUND THE WORLD

Jialin Xie wins China's top science award

by Min Zhang and Qian Pan



Jialin Xie, a 92-year-old specialist in particle accelerators, was awarded the State Top Scientific and Technological Award by President Jintao Hu at a ceremony held in the Great Hall of the People in Beijing on 14 February. Xie is best known for helping China build its first high-energy electron linear accelerator in 1964 and for contributing to the research and design of the Beijing Electron Positron Collider in the 1980s.

FEATURE

From Fermilab Today: ILCSC and ICFA meetings

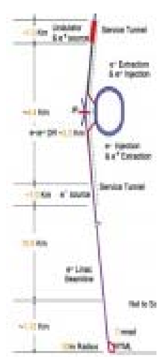
Meetings for the International Linear Collider Steering Committee and the International Committee for Future Accelerators recently took place in Oxford, England. One of the principal issues discussed at both meetings was a new organisation for the worldwide linear collider effort.

DIRECTOR'S CORNER

How long is the ILC linear accelerator?

This week's issue features a Director's Corner by Ewan Paterson, member of the Global Design Effort Executive Committee

by Ewan Paterson



This simple question does not have a simple answer. The ILC linear accelerator length issue was recently discussed during a Baseline Technical Review at KEK, as there are many technical choices that can affect it.

IMAGE OF THE WEEK

GDE Executive Committee visits Jefferson Lab

Images: Jefferson Lab

Charles Reece, deputy director of Jefferson Lab's Institute for Superconducting Radiofrequency Science and Technology, leads GDE Executive Committee members on a tour of the new facilities that will be available upon completion of the Technology and Engineering Development Facility, a $72 million structure that will keep the lab in the forefront of SRF developments.

John Hogan, Jefferson Lab SRF Cryomodule Production Leader, shows GDE Executive Committee members the sixth C100 cryomodule (of ten) being produced at Jefferson Lab as part of the lab's 12 GeV CEBAF Upgrade Project. This cryomodule is at the cold-mass assembly stage and Hogan is discussing the integrated design of the components as they relate to overall cryomodule performance.

Members of the GDE Executive Committee pause during a tour of Jefferson Lab's Institute for Superconducting Radiofrequency Science and Technology for a group photo between two C100 cryomodules being built for Jefferson Lab's 12 GeV Upgrade.

IN THE NEWS

from ***Le Monde***
23 February 2012
Le neutrino, la vitesse de la lumière et le GPS défectueux
“Dès lors que les expériences peuvent reprendre, en quelques jours, les physiciens auront la réponse définitive sur les effets liés à ces branchements et à l'horloge de synchronisation”, indique Stavros Katsanevas. Si les neutrinos “ralentissent” et se remettent alors dans le rang de la physique, il restera à Opera le titre de “meilleure mesure de la vitesse des neutrinos”. Pas si mal. Mais loin du Nobel.

from ***Science***
22 February 2012
BREAKING NEWS: Error Undoes Faster-Than-Light Neutrino Results
It appears that the faster-than-light neutrino results, announced last September by the OPERA collaboration in Italy, was due to a mistake after all. A bad connection between a GPS unit and a computer may be to blame.

from ***CERN***
20 February 2012
Geneva conference to bring benefits of basic research to medicine
A new kind of conference will be launched next week in Geneva, uniting physics, biology and medicine for better healthcare.

from ***InterAction Collaboration***
15 February 2012
AAAS Meeting Presents Particle Physics' Past, Present, and Future
In the second session focused on particle physics at the AAAS Annual Meeting, the leaders of Japanese, American, European and Canadian particle physics laboratories will discuss how particle physicists surmount cross-border and cross-cultural challenges to achieve their scientific goals. They will also look ahead to the new form of global partnership that will be needed to build the world's next big particle physics facility.

from ***China Daily***
15 February 2012
Physicist, architect take honors
In his decades-long research career, Xie has made outstanding breakthroughs in accelerator physics, accelerator technology and free electron lasers.

CALENDAR

UPCOMING EVENTS

CALICE collaboration meeting
Shinshu University, Matsumoto, Japan
05-07 March 2012

ILC Mechanical & Electrical Review and CFS Baseline Technical Review
CERN
21-23 March 2012

UPCOMING SCHOOLS

Physics and Technology of Particle Accelerators (JUAS 2012)
Geneva, Switzerland
09 January-16 March 2012

Excellence in Detectors and Instrumentation Technologies (EDIT 2012)
Fermilab, Batavia, IL, USA
13-24 February 2012

USPAS sponsored by Michigan State University
Grand Rapids, Michigan, US
18-29 March 2012

View complete calendar

BLOGLINE

21 February 2012
Dilbert
"I've found the Higgs boson…"

PREPRINTS

ARXIV PREPRINTS

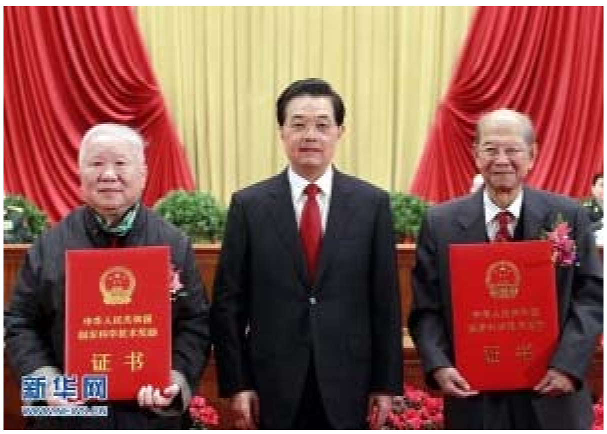
1202.4608
NLO automated tools for QCD and beyond

1202.3341
Top Mass Measurement at CLIC at 500 GeV

AROUND THE WORLD

Jialin Xie wins China's top science award

Min Zhang and Qian Pan | 23 February 2012



Architect Liangyong Wu (left) and physicist Jialin Xie (right) were awarded the State Top Scientific and Technological Award by President Jintao Hu (middle) in 2012. Image: www.news.cn

Jialin Xie, professor at the Institute of High Energy Physics (IHEP) and Academician of the Chinese Academy of Sciences (CAS), was awarded the State Top Scientific and Technological Award and a bonus of five million yuan by President Jintao Hu at a ceremony held in the Great Hall of the People in Beijing on 14 February.

China has given its annual award to elite scientists and researchers for twelve years. Till now 20 laureates have been honoured for their contributions to China's science and technology progress in diverse fields including mathematics, agriculture, physics, geology, computer science, aerospace science and medicine.

Professor Xie was born in Harbin, Heilongjiang province in August 1920. He graduated from Yanjing University in 1943 and moved to the United States for further study. At Caltech, Xie obtained his M.S. degree in physics in 1948, and in 1951 he received his PhD from Stanford University. From 1951 to 1955, he worked at the microwave and high-energy physics laboratory at Stanford University. Then he was in charge of building an accelerator at Michael Reese Hospital in Chicago, which was the highest-energy (45 MeV) medical accelerator in the world at that time.

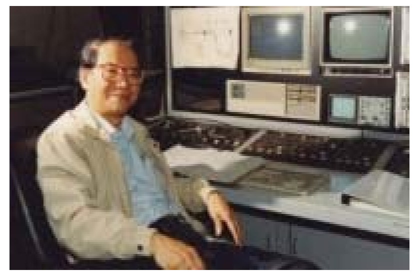
In the 1950s, Xie worked on the console of a 45-MeV medical electron linear accelerator. Image: IHEP

In 1955, Xie was determined to return to China despite the offer to become a permanent US citizen. "My knowledge was crucial for China, which was an underdeveloped country at that time," Xie said. "I came back because China needed young people to contribute what they learned for the country's development and I was eager to do my part." Athough he faced many difficulties during that time, including a lack of proper equipment and up-to-date information, and even continuous exposure in a dangerous environment putting his life in danger at times, Xie determined to go on with his research. "These difficulties were nothing for someone who wished to achieve something important," he said. Following successful prefabrication research on various components of an electron linear accelerator, such as an electron gun, accelerating tube, high-power pulse modulator, microwave system and high-power klystron, he built a 30-MeV electron linac in 1964, the first one ever built in China. The successful construction of China's first high-energy electron linear particle accelerator led to Xie being awarded the Scientific and Technological Achievement Prize at the National Science and Technology Conference in 1978.

From 1981 to 1986, Xie led the design, pre-research and construction of the Beijing Electron Positron Collider (BEPC) and was appointed project director. He made important decisions on the requirements of BEPC subsystems and made key decisions as scientific manager. In October 1988, with the collisions of electrons and positrons, BEPC declared the construction a success. It was regarded as a good example of the realization of the reform and open-door policy of Chinese government and international collaboration of science and technology. Its luminosity was four times that of SLAC's SPEAR, and the precise measurement of the tau mass carried out at BEPC aroused world attention. In 1990, Xie was awarded a Supreme Prize for National Science and Technology Progress.

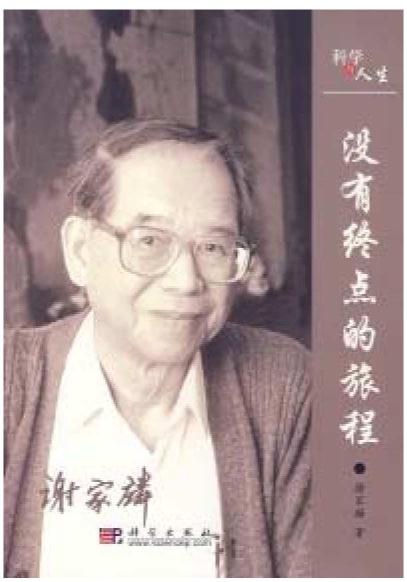
In 1984, Xie (middle) reported on the design of BEPC to Comrade Deng Xiaoping (left), who was then the chair of the State Central Military Commission. Image: IHEP

On learning about the establishment of free-electron lasers around the world – the latest development in the field of science and technology – Xie proposed the development of the Beijing Free Electron Laser and then worked out a concrete scheme. Using funds provided in 1987 under the State 863 High Tech Program, he succeeded in building China's first infrared free-electron laser, which produced spontaneous emission in May 1993; the lasing reached saturation at the end of 1993. Following those built in the US and western Europe, this was the first infrared free-electron laser built in Asia. In 1994, he was awarded by CAS the Supreme Prize for Science and Technology Progress.



In 1993, Xie sits in front of the Beijing free-electron laser device console. Image: IHEP

Xie attached great importance and concern to the accelerator development strategy in China. He repeatedly made important recommendations on the long-term development planning and guidance of accelerator developments, playing a major role in that area. He also held a positive view of the ILC and promoted the first CCAST ILC Accelerator Workshop held in Beijing 2007.



Xie's autobiography, A Journey That Will Never End*. Image: Science Press*

Besides contributing research work, Xie has nurtured a great number of accelerator-specialised experts. "Professor Xie is a great teacher, a well cultivated gentleman, both in Chinese and western terms, and a lifelong friend," said Jie Gao, professor at IHEP and one of Xie's students.

Xie often warned young scientists to learn with their own hands and brain. "Equipment is the material basis for innovative research. Although much of today's equipment has become an industrial product, it is only limited to the standard equipment. The equipment needed for truly creative scientific experiments still needs the hands-on development of the experimenter himself," he said.

At present, Professor Xie still goes to the IHEP laboratory every Monday, where he communicates with young scientists. He is still active in the frontier of accelerator research and continues to contribute to sustainable development in high-energy and accelerator research. He summed up his 60-year-long scientific career in his autobiography, named *A Journey That Will Never End*.

Another version of this article first appeared on ***IHEP website***

AWARD | BEPC | CAS | CHINA | IHEP | STATE TOP SCIENTIFIC AND TECHNOLOGICAL AWARD

Director's Corner

ILCSC and ICFA meetings

Physicists discussed the future of the field at the ILCSC meeting in England. *Photo: Barry Barish*

Last week, the meetings for the International Linear Collider Steering Committee and the International Committee for Future Accelerators took place in Oxford, England. This was my first meeting as chair of ICFA, succeeding KEK Director Atsuto Suzuki. One of the principal issues discussed at both meetings was a new organization for the worldwide linear collider effort. For some time now, the world's two large linear collider efforts – the ILC Global Design Effort and CLIC, the Compact Linear Collider - have been working on common issues applicable to both colliders. As we move into the next phase in the evolution of linear colliders it is important to bring the ILC and CLIC efforts under unified leadership.

The proposal approved by ICFA is to appoint one director that will be the overall leader for the linear collider effort. The LC Director will represent this effort to the worldwide science community and the funding agencies. Reporting to this LC Director will be three associate directors: one for the ILC; one for CLIC; and one for physics and detectors for both ILC and CLIC. While the new organization takes shape over the next year, ICFA approved a statement that continues the mandate of the ILC Global Design Effort to represent the plans for ILC R&D to the funding agencies.

Depending on the evolution and timing of discoveries at the LHC, the LC organization will evolve towards a single proposal for the appropriate linear collider. Eventually, to move any linear collider forward, a country or region must step up to host the machine and invest roughly half the needed capital.

The search for the first LC Director is now beginning. The Director will report to the Linear Collider Board, which will be composed of five members from each world region and a chair selected by ICFA. Because the Board is not yet in place, ICFA has appointed a six-member nominating committee to conduct the search:

Europe: Joachim Mnich (DESY) and Manfred Krammer (new ECFA Chair)

Americas: Pier Oddone (Fermilab) and William Trischuk (University of Toronto)

Asia: Sachio Komamiya (U of Tokyo) and Jie Gao (IHEP/Beijing)

If you are interested in being considered for the position of LC director or would like to nominate a colleague, please contact one of the committee members.

ilc newsline

DIRECTOR'S CORNER

How long is the ILC linear accelerator?

This week's issue features a Director's Corner by Ewan Paterson, member of the Global Design Effort Executive Committee

Ewan Paterson | 23 February 2012

How is the length of the linear accelerator determined?

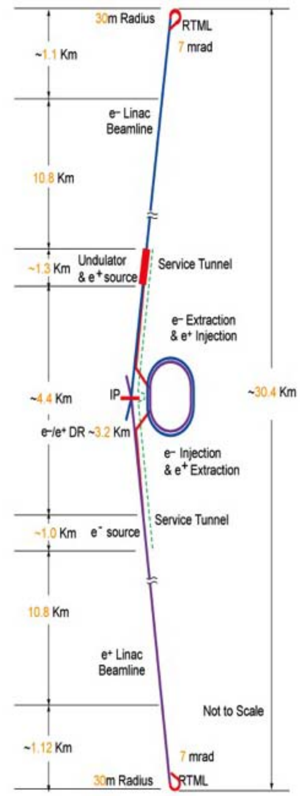
How long is the ILC linear accelerator? This simple question does not have a simple answer.

In the first place, the electron linear accelerator, or linac, is longer than the positron linac because it's the electron beam's responsibility to produce the positrons, so part of the electron linac's length is dedicated to that task. The electron beam passes through an undulator, a device that causes the beam to wiggle left and right like a snake, producing an intense beam of gamma rays. These rays strike a target and, after capture, selection and acceleration, produce a beam of positrons. The positrons are then injected into the damping ring. In producing the gamma ray beam the electrons lose gigaelectronvolts (GeV) of energy, which requires on the order of 100 metres of additional accelerator to replace. In addition, the undulator, target and capture systems occupy several hundred metres more tunnel length in line with the linac.

Another impact of this positron production system affects the length of the other linac, the positron linac, which is located opposite the electron linac on the other side of the interaction region, and its tunnel. After the electron beam has gone through the undulator system, it bypasses the positron capture systems and goes through the final focus system to the interaction point. Here it collides with the positron beam, which was produced by the previous cycle of electrons one fifth of a second earlier and which has gone around the damping ring a million times before being extracted, transported to the beginning of the positron linac and accelerated through to the interaction region. The electron and positron bunches must arrive at the interaction point at the same time with picosecond accuracy. That means that the difference in the distance travelled by the electron and positron bunches starting at the positron target and terminating at the interaction region must be exactly equal to N (an integer) times the circumference of the damping ring to millimetre accuracy. This cannot be achieved without careful layout of the geometry of several systems and tunnels and with some degree of adjustability after construction. This path length adjustment can be done with path length-changing chicanes or with manipulation of the beams in the damping rings during the interpulse period. It is very desirable to minimise the size and complexity of these post-construction adjustments, and because the length of the positron linac (or more correctly, the length of the tunnel containing it and the ring to linac system) is a major component of this path length, we have constraints on its length.

In the recent [Baseline Technical Review at KEK](), we discussed the linac length issue at great length as there are many technical choices that can affect it. In addition there is a natural desire to have some safety factor, or some extra length of tunnel and accelerator, say a few hundred metres, to guarantee the linac can reach full design energy, roughly 500 GeV, under conservative performance assumptions. As one can conclude from the above, it is not difficult to add length to the electron linac at the extra cost of the tunnel and facilities. However, on the positron linac side things are much more complex because of the timing issue and its path length corrections. An agreement on a design length was reached pending a final check on the lengths of all the components and systems.

So, to the question, How long are the ILC linear accelerators?, we give this answer: they will be just long enough, roughly 11 kilometres each.



ILC layout. Not to scale

BASELINE DESIGN | LINAC