ilc newsline

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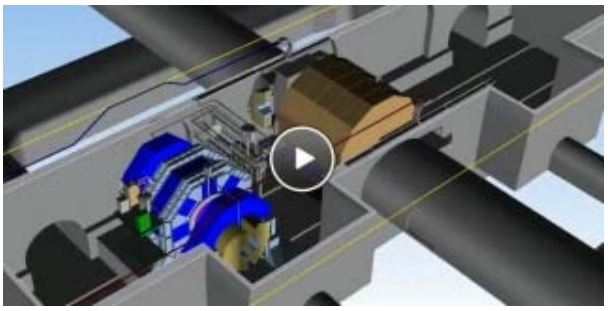
VIDEO OF THE WEEK



The great ILC flythrough: a trailer

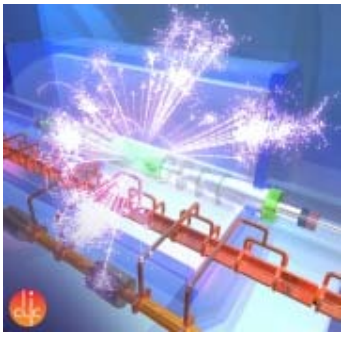
Video: DESY

Coming soon to YouTube channels near you: a complete video tour of the ILC, based on all available CAD data. Road signs have been added for orientation, and a voiceover will explain what you see, and why it looks the way it does.

Stay tuned!

FEATURE

From CERN Bulletin: CLIC's three-step plan



CERN's newsletter, the CERN Bulletn, reports on progress from CLIC: In early October, the CLIC collaboration published its final *Conceptual Design Report*. Accompanying it was a strategic summary document that describes a whole new approach to the project: developing the linear e+e− collider in three energy stages. Though CLIC's future still depends on signs from the LHC, its new staged approach to high-energy electron-positron physics for the post-LHC era is nothing short of convincing.

DIRECTOR'S CORNER

ATF autumn run started: aiming for the beam size required for the ILC

by Toshiaki Tauchi

KEK's Accelerator Test facility (ATF) is up again after its summer shutdown. After several improvements to beams size monitors, multi-ole magnets and the organisation structure, the international team is looking forward to squeezing the beam size further and further towards the 37 nanometres required for the ILC.

SLIDESHOW

Impressions from LCWS12

Images: Margie Jackmack and Victor Reece

Linear Collider Workshops have broken records in the past - not only in number of parallel sessions held, but also in visitor numbers for particle slams, for example. Wednesday saw another such record: 1200 people attended Steven Weinberg's lecture at the University of Texas in Arlington, which was the public event for the LCWS12 workshop. The venue had never held so many people before.

IN THE NEWS

from ***The Shorthorn***
24 October 2012
Steven Weinberg discusses Higgs Boson particle advancements
About 1,500 people from all over the world gathered in Texas Hall to listen to Nobel Laureate Steven Weinberg's lecture Wednesday.
The lecture titled "The Standard Model, Higgs Boson: Who Cares?" was part of the annual International Workshop on Future Linear Colliders. This is the first time the conference is being held in Texas.

from ***The Shorthorn***
24 October 2012
Nobel Prize winner Steven Weinberg to lecture on Higgs Boson particle
UTA plays host to Texas' first International Workshop on Future Linear Colliders.

from ***NBCNews***
17 October 2012
Astronomers take first 3-D look at giant strand of dark matter
Filaments are difficult to observe, but Hubble Telescope helps probe elusive cosmic web

CALENDAR

UPCOMING EVENTS

2012 International Workshop on Future Linear Colliders (LCWS12)
University of Texas at Arlington, Texas, USA
22- 26 October 2012

Special Linear Collider Event at the 2012 IEEE NSS/MIC
Disney Hotel, Anaheim, California
29- 30 October 2012

2012 IEEE Nuclear Science Symposium and Medical Imaging Conference
Disney Hotel, Anaheim, California
29 October- 03 November 2012

TESLA Technology Collaboration (TTC) Meeting
Thomas Jefferson National Accelerator Facility
05- 08 November 2012

Accelerators for a Higgs Factory: Linear vs. Circular (HF2012)
Fermilab
14- 16 November 2012

UPCOMING SCHOOLS

The first Asia-Europe-Pacific School of High-Energy Physics (AEPSHEP2012)
Fukuoka, Japan
14- 27 October 2012

CERN Accelerator School: Introduction to Accelerator Physics

University of Granada, Granada, Spain
28 October- 09 November 2012

View complete calendar

ANNOUNCEMENTS

Media advisory: experts on future particle accelerators answer questions in a conference call

This week, more than 200 scientists from all over the world are meeting for the International Workshop on Future Linear Colliders at The University of Texas at Arlington. Three top members of the scientific group planning these projects will be available for a conference call with reporters at 8 a.m. CDT on Friday, October 26. Please RSVP to Traci Peterson, media relations officer at UT Arlington, at 817-272-9208 or tpeterso@uta.edu. A number and call-in code will be sent on Thursday.
Read media advisory

PREPRINTS

ARXIV PREPRINTS

1210.4553
Non-standard Charged Current Interactions: beta decays versus the LHC

VIDEO OF THE WEEK

The great ILC flythrough: a trailer

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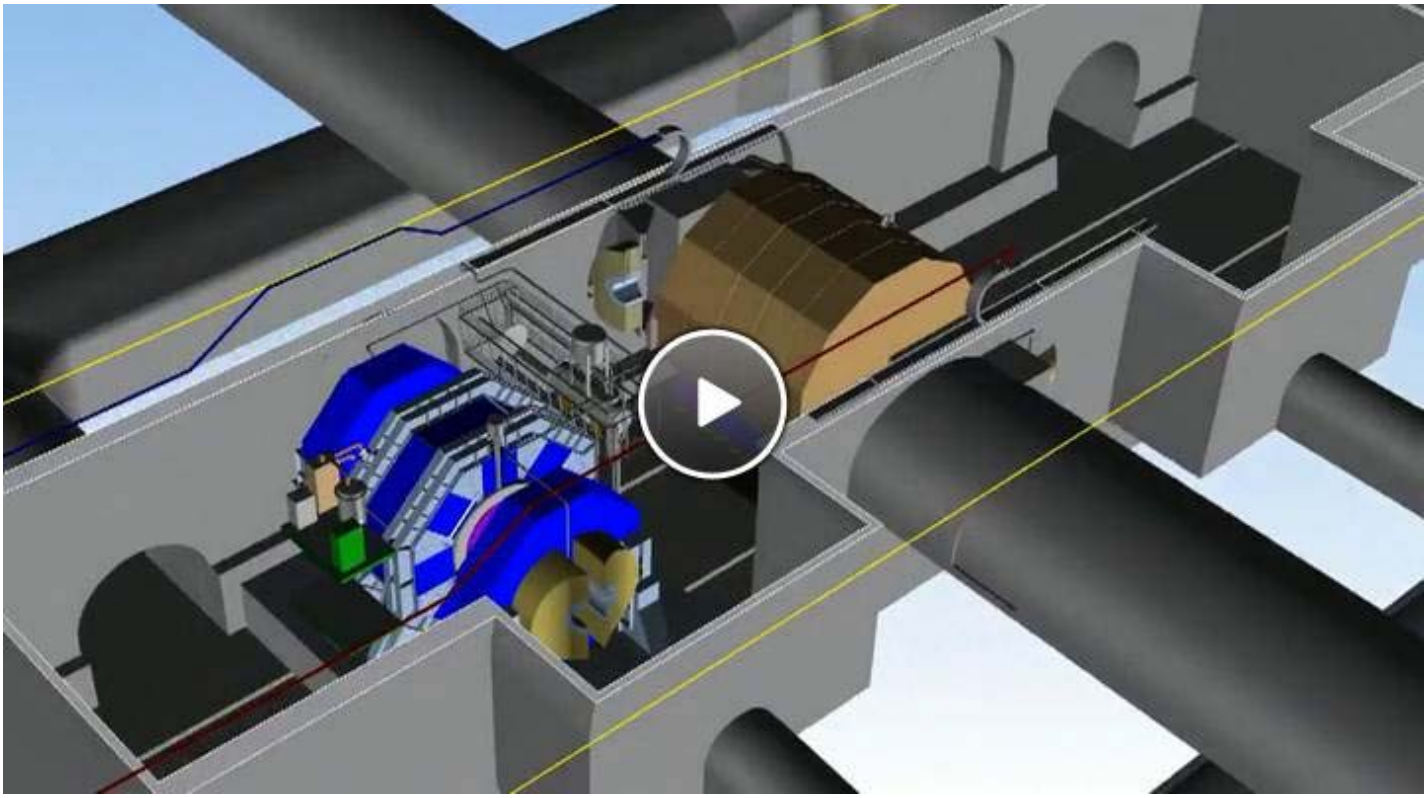
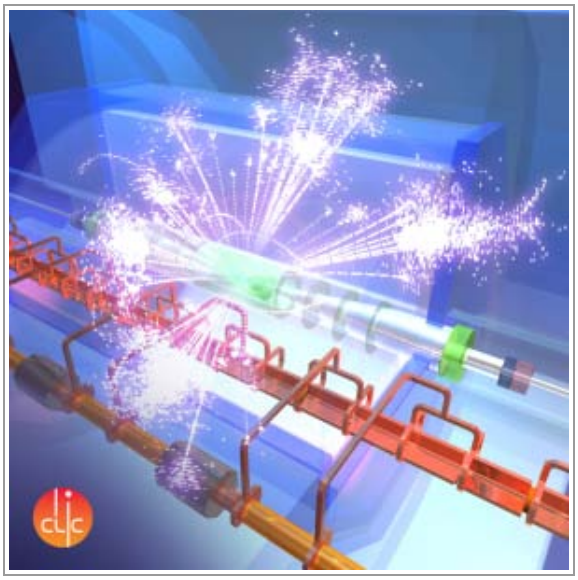


3D MODEL | CAD

CLIC's three-step plan

In early October, the Compact Linear Collider (CLIC) collaboration published its final Conceptual Design Report. Accompanying it was a strategic summary document that describes a whole new approach to the project: developing the linear e^+e^- collider in three energy stages. Though CLIC's future still depends on signs from the LHC, its new staged approach to high-energy electron-positron physics for the post-LHC era is nothing short of convincing.



Instead of asking for a 48-kilometre-long commitment right off the bat, the CLIC collaboration is now presenting an accelerator that can be constructed in stages. For example, it could begin as an 11-kilometre 500 GeV accelerator that could later be extended to a 27-kilometre 1.5 TeV machine. Finally, after a decade or so of data taking, it could be taken up to the full 48-kilometre 3 TeV facility (see image 2). "Not only is the approach technically and financially practical, it also offers a very convincing physics programme," explains Lucie Linssen, who is leading CERN's Linear Collider Detector project. "Each stage of the machine could be optimized to probe different physics issues: at the initial 500 GeV stage, CLIC would be optimised for Higgs physics and top physics; when it is brought up to higher energies it could then look for signs of rarer Higgs decays, dark matter, supersymmetry and other new physics (see image 3)."

The report also confirms CLIC technology to be sufficiently flexible and robust to withstand the engineering challenges of this staged approach. Thus, data-taking during the first energy stage and second-stage construction and tunnelling could occur simultaneously, to a large degree. Current schedules – laid out in the report by the same team that scheduled the LHC – would see the 500 GeV stage completed in time for when the LHC programme comes to an end around 2030.

But of course, a possible decision to give the CLIC project the green light is still a few years away. The future of physics is dependent on signs from the LHC, which in addition to recent successes retains a great potential for new physics at higher energies. "The physics argument for a high energy linear collider is not strong enough yet," says Lucie. "While certain interesting Higgs processes – such as the Higgs self-coupling – would require these high energies, there have not been sufficient hints of physics beyond the Standard Model from the LHC to justify the final energy needed."

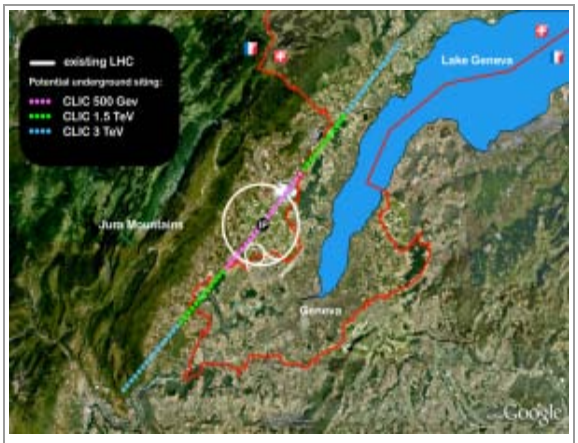


Image 2: Possible CLIC location, showing the three energy stages.

However, should the LHC see signs of new physics, the CLIC accelerator could be the optimal project on the drawing board capable of reaching the energy levels needed. "We still hope and believe

that the LHC will see more indications of physics beyond the Standard Model," concludes Lucie. "Once the LHC has run at full energy for a few years, we should be in a position to decide how CLIC might fit into the global physics programme."

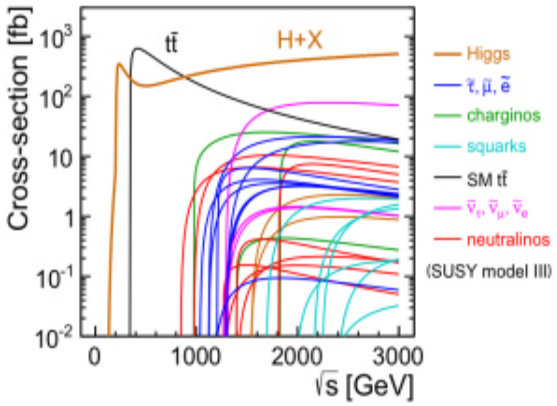


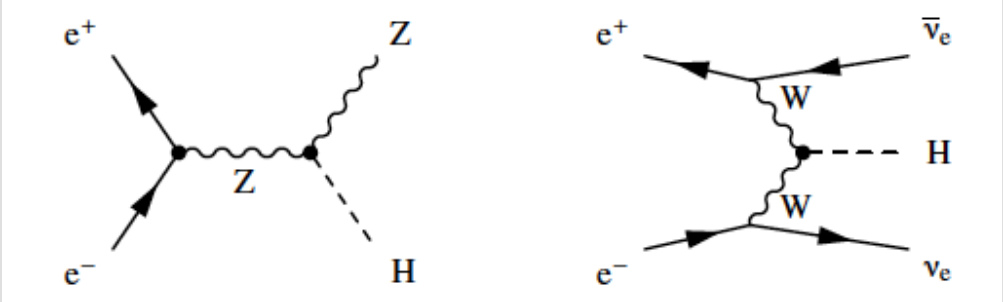
Image 3: Interaction cross-sections for an exemplar SUSY model, SM Higgs boson (with mass 125 GeV) and SM top physics as a function of e^+e^- centre-of-mass energy.

Electron-positron physics: a powerful investigative tool

The advantage of an electron-positron collider is simple: precision. By colliding well-understood base particles, physicists will gain access to decays that are difficult to see at the LHC.

One example is ZH production, also known as the "Higgs-strahlung". At CLIC, the properties of the colliding electrons and positrons are known with high precision, and the resulting Z particle can be measured with matching precision. Thus, physicists would be able to deduce the Higgs mass and its coupling to other particles in a model independent way. And if an unknown particle were to enter into the equation – say, a candidate for dark matter – it would be easily and accurately spotted.

Another example is the one of the most produced Higgs decays: a Higgs into b-bbar. In practice, this gives just two jets in the detector; so even though this decay is produced frequently at the LHC, background events make it almost impossible for experiments to record it. This decay would be a lot easier to see at CLIC, as there is significantly less background and no trigger selection is needed for reading the detectors out.



In e^+e^- collisions, the Higgs is primarily produced essentially through these two processes. The Higgs-strahlung (left) is the dominant process up to ~500 GeV, though its cross section decreases with centre-of-mass energy increases. The WW-fusion process (right) dominates at higher energies, as its cross section increases with centre-of-mass energy. Very rare Higgs decays also profit at higher centre-of-mass energies, as there is an additional increase in luminosity.

by Katarina Anthony

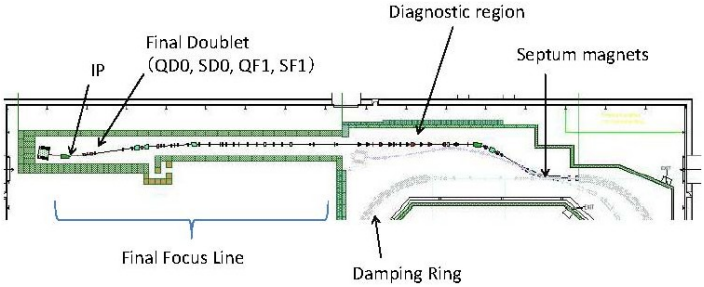
ilc newsline

DIRECTOR'S CORNER

ATF autumn run started: aiming for the beam size required for the ILC

Toshiaki Tauchi | 25 October 2012

From the evening of Monday, 15 October, the autumn beam operation at KEK's Accelerator Test Facility (ATF) has been back in business after two months of shutdown in summer. In this operation period, we will have two ATF2 dedicated runs: a two-week run in November, and a four-week run from the end of November to December, to make sure we can meet the performance goal of squeezing down the size of colliding beams to the ILC requirement. ATF2 is a final-focus test facility at ATF to verify local chromaticity correction and assure stable nanometre-beam operation, aiming to achieve 37 nanometres of vertical beam size for the same chromaticity as required for the ILC.



The layout of the Accelerator Test Facility.

In my column today, I would like to mention some of the important improvements made during the shutdown. One of them is an improvement of the beam size monitor called Shintake monitor. The Shintake monitor is a beam size monitor (BSM) set at ATF2's interaction point that uses laser interference fringes as target. These are being developed by the University of Tokyo. It is a valuable beam-tuning tool, and is the only device capable of measuring a beam size of less than 100 nanometres.

In the previous operation period, we have measured a beam size of 150 nanometres. But some people think that it actually could have been smaller than that. There was a possibility that the BSM did not perform at the designed resolution. One of the possible causes was laser path misalignment. For the autumn operation, the team have adjusted the lens set-up to improve the balance of the BSM focal point. The team has also made numerous improvements such as matching the path length of upper and lower lasers, and changing the handling concept for laser crossing angle control. Those improvements will greatly contribute to reduce the modulation uncertainty.

A magnet from SLAC now used at ATF2.

Another possible cause that might have intervened in the measurement of the small beam is multi-pole error at higher orders, unwanted effects in magnetic fields at the final focus beam line. To squeeze the beam into a very small size, we use various multi-pole magnets, such as quadrupole, sextupole and dipole. For the autumn ATF run, we have increased the numbers of skew sextupole magnets from one to four for the correctors. Also, we are planning to replace the final H-focusing quadrupole magnet with much fewer higher-multi-pole components, which are being shipped from SLAC. This replacement magnet was used for the PEP II experiment, which has a larger aperture. We expect that this replacement will facilitate the beam tuning at the design optics. ATF has almost same design optics as the ILC, so demonstration of the bean tuning at ATF is quite important for us.

In addition to the technological improvements, the operation framework for ATF

was reconstructed by our scientists. A new position, the ATF2 tuning coordinator, was created to clarify the decision-making process on beam operation. For the autumn run, Kiyoshi Kubo of KEK takes this role. He will communicate with two beam-tuning experts, Glen White of SLAC, and Toshiyuki Okugi of KEK, accommodating the individual leaderships and ATF2's responsibility.

Many improvements have been made from the last run, and we are aiming to realise a beam size less of than 70 nanometres. This is our first target beam size, and we are expecting to squeeze down further. Stay tuned for news from ATF2!

ATF2 | BEAM MONITOR | BEAM SIZE | MAGNET

SLIDESHOW

Impressions from LCWS12

Images: Margie Jackmack and Victor Reece | 25 October 2012

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The workshop itself is an important (and near-final) step along the way to the publication of the *Technical Design Report* and *Detailed Baseline Design* report for the detectors next June, and the changeover from Global Design Effort to new linear collider organisation, headed by Lyn Evans, in February 2013. Accelerator technologies of both the ILC and CLIC were discussed and news presented, the detector community also showed latest test beam results, module process and much more. See all talks and tomorrow's closing plenary here.

[Show as slideshow]







LCWS12