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ID: 1176 ATF2 Commissioning

Speaker Andrei Seryi (SLAC, Menlo Park, California)

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Abstract ATF2 is a final-focus test beam line that attempts to focus the low-emittance beam from the ATF damping ring to a beam size of about 37 nm, and at the same time to demonstrate nm beam stability, using numerous advanced beam diagnostics and feedback tools. The construction is well advanced and beam commissioning of ATF2 has started in the second half of 2008. ATF2 is constructed and commissioned by ATF international collaborations with strong US, Asian and European participation.

Funding Agency

Type of Presentation Invited Oral

Main Classification Lepton Accelerators

Sub Classification A03 - Linear Colliders

ID: 2756 Beam Impact Studies for ILC Collimators

Presenter George Ellwood (STFC/RAL, Chilton, Didcot, Oxon)

Authors George Ellwood (STFC/RAL, Chilton, Didcot, Oxon)

Abstract Spoilers in the ILC Beam Delivery System are required to survive without failure a minimum of 1-2 direct impacts of 250 GeV-500 GeV bunch of electrons or positrons, in addition to maintaining low geometric and resistive wall wake fields. The likelihood of spoiler survival was determined using finite element models of thermal and mechanical properties of the spoilers, with realistic patterns of energy deposition as input. The second phase of an experiment to calibrate the finite element models using electron beam data will be performed in the ATF2 extraction line, by subjecting a small sample of Ti-6Al-4V to bunches of electrons. The displacement of the surface will be measured with a Velocity Interferometer System of Any Reflector (VISAR). This paper shows the project plan as well as results of the simulations and expected readout from the VISAR.

Funding Agency

Type of Presentation Poster

Main Classification Accelerator Technology - Subsystems

Sub Classification T19 - Collimation and Targetry

ID: 2855 Linear Collider Final Doublet Considerations: ATF2 vibration measurements

Presenter Benoit Bolzon (IN2P3-LAPP, Annecy-le-Vieux)

Authors Benoit Bolzon, Nicolas Geffroy, Andrea Jeremie (IN2P3-LAPP, Annecy-le-Vieux)

Abstract Future linear collider projects like ILC and CLIC will have beam sizes of a few nm. Vibration sources like ground motion can hamper the beam collisions. Relative jitter tolerance between the final focus magnets and the Interaction point (IP) is a fraction of the beam size. The ATF2 project proposes a test facility with a projected beam of 37nm. To measure the beam size with only 2% of error, vertical relative jitter tolerance (above 0.1Hz) between the final doublet magnets (FD) and the IP (with a Shintake beam Size Monitor: BSM) is of the order of 7nm while ground motion is of about 150nm. Thanks to determined adequate instrumentations, investigations were done to design supports for FD. Since ground motion measurements showed that this one is coherent up to 4m, more than the distance between FD and BSM, we chose a stiff support for FD fixed to the ground on its entire surface. Thus, FD and BSM should move in a coherent way. Vibration measurements show that relative motion between FD and BSM is only of 4.8nm and that flowing water in FD does not add any significant jitter. The FD support has been consequently validated on site at ATF2 to be within the vibration specifications.

Funding Agency Work supported by the Agence Nationale de la Recherche of the French Ministry of Research (Programme Blanc, Project ATF2-IN2P3-KEK, contract ANR-06-BLAN-0027).

Type of Presentation Poster

Main Classification Accelerator Technology - Subsystems

Sub Classification T28 - Subsystems, Technology and Components, Other

ID: 2838 Linear collider test facility: ATF2 Final Doublet Active stabilization pertinence

Presenter Benoit Bolzon (IN2P3-LAPP, Annecy-le-Vieux)

Authors Benoit Bolzon, Andrea Jeremie (IN2P3-LAPP, Annecy-le-Vieux), Daniel Schulte, Rogelio Tomas (CERN, Geneva), Philip Bambade (KEK, Ibaraki; LAL, Orsay), Yves Renier (LAL, Orsay), Andrei Seryi (SLAC, Menlo Park, California)

Abstract CLIC is one of the current projects of linear colliders. Achieving a vertical beam size of 1 nm at the Interaction Point (IP) with several nanometers of fast ground motion imposes an active stabilization of final doublet magnets (FD) at a tenth of nm above 4Hz. ATF2 is a test facility for linear colliders whose first aim is to have a vertical beam size of 37nm. Relative motion tolerance between FD and the IP is of 7nm above 0.1Hz. Because ground motion is coherent between these two elements, they were fixed to the floor so that they move in a coherent way. Investigations are going on to have in 2011 a useful active stabilization for ATF2 in order to use it as a CLIC prototype. Parameters of a 2D ground motion generator were fitted on measurements to reproduce spatial and temporal spectra, so it can be used for ATF2 simulations. Thus, we evaluated the ideal response function that an active stabilization FD system would need to have to improve on the present ATF2 system. Because ground motion coherence is lost with upstream magnets, we simulated the integrated vibrations at the IP to evaluate the usefulness of their stabilization. These results were validated with measurements.

Funding Agency Work supported by the Agence Nationale de la Recherche of the French Ministry of Research (Programme Blanc, Project ATF2-IN2P3-KEK, contract ANR-06-BLAN-0027).

Type of Presentation Poster

Main Classification Accelerator Technology - Subsystems

Sub Classification T28 - Subsystems, Technology and Components, Other

ID: 2221 Beam waist manipulations at the ATF2 interaction point

Presenter Sha Bai (New Affiliation Request Pending, Beijing)

Authors Sha Bai, Xiongwei Zhu (New Affiliation Request Pending, Beijing), Yoshio Kamiya (ICEPP, Tokyo), Jie Gao (IHEP Beijing, Beijing), Toshiyuki Okugi (KEK, Ibaraki), Philip Bambade (LAL, Orsay; KEK, Ibaraki), Douglas McCormick, Mark Woodley (SLAC, Menlo Park, California), Masahiro Orouku, Takashi Yamanaka (University of Tokyo, Tokyo)

Abstract The ATF2 project is the final focus system prototype for ILC and CLIC linear collider projects, with a purpose to reach a 37nm vertical beam size at the interaction point. We report on techniques developed based on simulation studies to adjust the horizontal and

vertical beam waists independently in the presence of errors, at two different IP locations where the beam size can be measured with different accuracies. During initial commissioning, we will start with larger than nominal β-functions at the IP, to reduce the effects from higher-order optical aberrations and thereby simplify the optical corrections needed. The first measurements in such intermediate β-configurations are reported.

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Type of Presentation Poster

Main Classification Accelerator Technology - Subsystems

Sub Classification T28 - Subsystems, Technology and Components, Other

ID: 2580 Orbit reconstruction, correction, stabilization and monitoring in the ATF2 Extraction line

Presenter Yves Renier (LAL, Orsay)

Authors Yves Renier, Philip Bambade (LAL, Orsay), Javier Resta-Lopez (JAI, Oxford), Kiyoshi Kubo (KEK, Ibaraki), Glen White (SLAC, Menlo Park, California), Anthony Scarfe (UMAN, Manchester)

Abstract The orbit in the ATF2 extraction line has to be accurately controlled to allow orbit and optics corrections to work well downstream. The Final Focus section contains points with large beta function values which amplify incoming beam jitter, and few correctors since the steering is performed using quadrupole movers, and so good orbit stability is required. It is also essential because some magnets are non-linear and can introduce position-dependent coupling of the motion between the two transverse planes. To check the long-term evolution, the orbit is monitored and reconstructed, allowing comparisons with simulations to identify sources of variations.

Funding Agency CNRS/IN2P3 ANR

Type of Presentation Poster

Main Classification Beam Dynamics and Electromagnetic Fields

Sub Classification D01 - Beam Optics - Lattices, Correction Schemes, Transport

ID: 2535 Coupling correction in ATF2 extraction line

Presenter Cecile Rimbault (LAL, Orsay)

Authors Cecile Rimbault, Philip Bambade (LAL, Orsay), Shigeru Kuroda (KEK, Ibaraki), Glen White, Mark Woodley (SLAC, Menlo Park, California)

Abstract The purpose of ATF2 is to deliver a beam with stable very small spotsizes as required for future linear colliders such as ILC or CLIC. To achieve that, precise controls of aberrations such as dispersion and coupling are necessary. Initially, coupling correction upstream of the final focus line of the ATF2 will be performed with only two skew quadrupoles (SQ) in the extraction line (EXT). We thus first examine the feasability of coupling correction in the EXT with those two SQ, considering several possible coupling error sources. The correction is first based on an algorithm of minimisation of vertical emittance with successive skew scans, implemented in the Flight Simulator code*. We will then investigate new methods to measure and extract the first order four coupling parameters of the beam matrix in order to perform a more direct and accurate coupling correction.

Footnotes *G. White et al., "A flight simulator for ATF2...", TUPP016 EPAC08

Funding Agency CNRS-IN2P3, ANR

Type of Presentation Poster

Main Classification Beam Dynamics and Electromagnetic Fields

Sub Classification D01 - Beam Optics - Lattices, Correction Schemes, Transport

ID: 2380 Plans and Progress towards Tuning the ATF2 Final Focus System to Obtain a 35nm IP Waist

Presenter Glen White (SLAC, Menlo Park, California)

Authors Glen White (SLAC, Menlo Park, California), Rogelio Tomas (CERN, Geneva), Kiyoshi Kubo, Shigeru Kuroda (KEK, Ibaraki), Yves Renier (LAL, Orsay), James Jones (STFC/DL/ASTeC, Daresbury, Warrington, Cheshire), Anthony Scarfe (UMAN, Manchester)

Abstract Using a new extraction line currently being commissioned, the ATF2 experiment plans to test a novel compact final focus optics design using a local chromaticity correction scheme, such as could be used in future linear colliders*. Using a 1.3 GeV beam of ~30nm

normalised vertical emittance extracted from the ATF damping ring, the primary goal is to achieve a vertical IP waist of 35nm. We discuss our planned strategy, implementation details and early experimental results for tuning the ATF2 beam to meet the primary goal. These optics require uniquely tight tolerances on some magnet strengths and positions, we discuss efforts to re-match the optics to meet these requirements using high-precision measurements of key magnet elements. We simulated in detail the tuning procedure using several algorithms and different code implementations for comparison from initial orbit establishment to final IP spot-size tuning. Through a Monte Carlo study of 100's of simulation seeds we find we can achieve a spot-size within 10% of the design optics value in at least 90% of cases. We also ran a simulation to study the long-term performance with the use of beam-based feedbacks.

Footnotes * "ATF2 Proposal", ATF2 Collaboration (Boris Ivanovich Grishanov et al.)., KEK-REPORT-2005-2, Aug 23, 2005.

Funding Agency Work supported in part by Department of Energy Contract DE-AC02-76SF00515

Type of Presentation Poster

Main Classification Beam Dynamics and Electromagnetic Fields

Sub Classification D01 - Beam Optics - Lattices, Correction Schemes, Transport

ID: 2958 Interfacing of Third-party Accelerator Code with the Lucretia Flight Simulator

Presenter Stephen Molloy (SLAC, Menlo Park, California)

Authors Stephen Molloy, Mauro Torino Francesco Pivi, Glen White (SLAC, Menlo Park, California), Yves Renier (LAL, Orsay)

Abstract The Flight Simulator is a tool used for international collaboration in the writing and deployment of online beam dynamics algorithms. Written as an add-on to the Lucretia tracking software, it allows simulation of a beamline in a control system environment identical to that in the control room. This allows the testing and development of monitoring and correction tools by an international collaboration by making the control system transparent to the user. The native beamline representation are those adopted by Lucretia, so, in order to allow third party software, to interface with this system, it was necessary to develop functionality to convert the lattice to a universal representation. Accelerator Markup Language (AML), and its associated Universal Accelerator Parser (UAP), were used for this purpose. This paper describes the use of the UAP to convert the internal beamline representation to AML, and the testing of this conversion routine using the lattice description of the ATF2 final focus experiment at KEK, Japan. Also described are the inclusion of PLACET and SAD based algorithms using appropriate converters, and tests of these on the ATF2 extraction line.

Funding Agency

Type of Presentation Poster

Main Classification Controls and Operations

Sub Classification T04 - Control Systems

ID: 2962 A Flight Simulator based Beam Based Alignment package for ATF2

Presenter Stephen Molloy (SLAC, Menlo Park, California)

Authors Stephen Molloy, Glen White, Mark Woodley (SLAC, Menlo Park, California)

Abstract The Flight Simulator is a Matlab middleware layer which uses the Lucretia beam tracking engine and a lower level EPICS control system to allow the development of beam control and monitoring algorithms in a simulation environment that appears identical to the that of the control room. The goal of ATF2 is to test a novel compact final final focus optics design intended for use in future linear colliders. The newly designed extraction line and final focus system will be used to produce a 37nm vertical waist from the extracted beam. Alignment of the magnetic elements is of vital importance for this goal and it is expected that beam-based alignment (BBA) techniques will be necessary to achieve the necessary tolerances. This paper describes a package for the beam-based alignment of quadrupole and sextupole magnets in the ATF2 damping ring, extraction line, and final focus system. It brings together several common techniques for the alignment of magnetic elements, and has been implemented as a GUI-based tool that may be used on its own, or integrated with other routines. The design of this package is described, and simulation and beam results are shown.

Funding Agency

Type of Presentation Poster
Main Classification Controls and Operations
Sub Classification T04 - Control Systems

ID: 3612 A proposal of a single coupler cavity beam position monitor

Presenter Stewart Takashi Boogert (Royal Holloway, University of London, Surrey)
Authors Alexey Lyapin (UCL, London), Stewart Takashi Boogert (Royal Holloway, University of London, Surrey)
Abstract Cavity beam position monitors (CBPM) made a significant progress in the last 10 years with an entire nano-beamline relying on them being currently commissioned at ATF2 (KEK). The major improvement was the introduction of the mode selective coupling allowing for efficient rejection of unwanted monopole modes. We propose another step towards creating a simple and cost effective CBPM - a cavity using just one coupler (instead of 2 or even 4) to couple out both polarisations of the dipole mode. The x and y signals are then split in the mixing stage of the electronics, so that only one expensive high-frequency electronics front-end is used for both x and y. A very good separation of the x and y signals can be achieved with a reasonable performance mixer assembly. In this paper we present the concept and provide some simulation results proving this processing scheme.
Funding Agency
Type of Presentation Poster
Main Classification Instrumentation
Sub Classification T03 - Beam Diagnostics and Instrumentation

ID: 2390 Beam orbit tilt monitor studies at ATF2

Presenter Daisuke Okamoto (New Affiliation Request Pending, Sendai)
Authors Daisuke Okamoto (New Affiliation Request Pending, Sendai), Yosuke Honda (KEK, Ibaraki), Tomoyuki Sanuki (Tohoku University, Sendai)
Abstract We have designed a beam orbit tilt monitor for stabilizing a beam orbit in ATF2. Once we can measure a beam orbit tilt angle with high precision at one point, we can relate this data with the beam position profile at the focal point. This monitor is composed of a single rectangular cavity and waveguides to extract the signal. This monitor can measure the beam orbit tilt with a single cavity. We extract the signal of one basic resonance mode from the cavity. This electric field mode is perpendicular to the nominal beam axis, and is excited by beam tilt. The magnitude of extracted signal gives us the beam tilt data. According to our simulation, the expected sensitivity is about 80 nrad. in the vertical direction and 300 nrad. in the horizontal direction.
Funding Agency
Type of Presentation Poster
Main Classification Instrumentation
Sub Classification T03 - Beam Diagnostics and Instrumentation

ID: 2462 Development of the C-band BPM system for ATF2

Presenter Stewart Takashi Boogert (Royal Holloway, University of London, Surrey)
Authors Alexey Lyapin (UCL, London), Yosuke Honda, Toshiaki Tauchi, Nobuhiro Terunuma (KEK, Ibaraki), Jung Yun Huang, Woon Ha Hwang, Seung Hwan Kim, Sung-Ju Park, Yong Jung Park (PAL, Pohang, Kyungbuk), Stewart Takashi Boogert (Royal Holloway, University of London, Surrey), Justin May, Douglas McCormick, Stephen Molloy, Janice Nelson, Tonee Smith, Glen White (SLAC, Menlo Park, California)
Abstract The ATF2 international collaboration is intending to demonstrate nanometre beam sizes required for the future Linear Colliders. An essential part of the beam diagnostics needed to achieve that goal is the high resolution cavity beam position monitors (BPMs). In this paper we report on the C-band system consisting of 32 BPMs spread over the whole length of the new ATF2 extraction beamline. We discuss the design of the BPMs and electronics, main features of the DAQ system, and the first operational experience with these BPMs.
Funding Agency
Type of Presentation Poster

Main Classification Instrumentation
Sub Classification T03 - Beam Diagnostics and Instrumentation

ID: 2625 Status of the first commissioning of the Shintake monitor for ATF2

Presenter Yoshio Kamiya (ICEPP, Tokyo)

Authors Yoshio Kamiya (ICEPP, Tokyo), Yosuke Honda, Tatsuya Kume, Toshiaki Tauchi, Nobuhiro Terunuma (KEK, Ibaraki), Sachio Komamiya, Masahiro Orouku, Taikan Suehara, Takashi Yamanaka (University of Tokyo, Tokyo)

Abstract Commissioning of the ATF/ATF2 project will start in the winter of 2008 to 2009, with the aim of studying beam optics, diagnostic instrumentations, and tuning processes for around 35 nm beam size. The project is the realistic scaled down model of the ILC final focus system, and also, studies in the project offered important findings for future accelerator physics. In this presentation, we will present about the status of the first commissioning of the Shintake monitor for ATF2. The monitor is located at the virtual interaction point of the ATF2 (the focus point) to measure beam size. A measurable ranges as a design are from 6 micron down to 20 nm in vertical and down to several microns in horizontal. That wide range allows us to used the detector from the beginning of the beam tuning process. The monitor scheme was originally proposed by T. Shintake and verified using around 60 nm beam at FFTB project. We upgraded the detector system for ATF2 of smaller beam size and implemented a laser wire scheme for horizontal beam size measurement. These additional capabilities are also presented.

Funding Agency
Type of Presentation Poster
Main Classification Instrumentation
Sub Classification T03 - Beam Diagnostics and Instrumentation

ID: 2472 Development of the S-band BPM system for ATF2

Presenter Stewart Takashi Boogert (Royal Holloway, University of London, Surrey)

Authors Alexey Lyapin, Bino Maiheu, Matthew Wing (UCL, London), Seunghwan Shin (Fermilab, Batavia, Illinois), Yosuke Honda, Toshiaki Tauchi, Nobuhiro Terunuma (KEK, Ibaraki), Ae-young Heo, Eun-San Kim, Hyoung-Suk Kim (Kyungpook National University, Daegu), Robert Charles Douglas Ainsworth, Stewart Takashi Boogert, Gary Boorman (Royal Holloway, University of London, Surrey), Douglas McCormick, Stephen Molloy, Janice Nelson, Glen White (SLAC, Menlo Park, California), David Ward (University of Cambridge, Cambridge)

Abstract The ATF2 international collaboration is intending to demonstrate nanometre beam sizes required for the future Linear Colliders. An essential part of the beam diagnostics needed to achieve this goal is the high resolution cavity beam position monitors (BPMs). In this paper we report on the S-band system installed in the final focus region of the new ATF2 extraction beamline. It only includes 4 BPMs, but they are mounted on the most critical final focus magnets squeezing the beam down to 35 nm. We discuss both the design and the first operational experience with the system.

Funding Agency
Type of Presentation Poster
Main Classification Instrumentation
Sub Classification T03 - Beam Diagnostics and Instrumentation

ID: 2255 Design and Performance of Intra-train Feedback Systems at ATF2

Presenter Javier Resta-Lopez (JAI, Oxford)

Authors Javier Resta-Lopez, Philip Burrows (JAI, Oxford)

Abstract The major goals of the final focus test beam line facility ATF2 are to provide electron beams with a few tens nanometer beam sizes and beam stability control at the nanometer level. In order to achieve such a level of stability beam based feedback systems are necessary at different timescales to correct static and dynamic effects. In particular, we present the design of intra-train feedback systems to correct the impact of fast jitter sources. We study a bunch-to-bunch feedback system to be installed at the extraction line to combat the ring extraction transverse jitters. In addition, we design a bunch-to-bunch

feedback system at the interaction point for correction of position jitter due to the fast vibration of the magnets in the final focus. Optimum feedback software algorithms are discussed and simulation results are presented.

Funding Agency

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T05 - Beam Feedback Systems

ID: 3859 Nanometer resolution beam position monitor for the ATF2 interaction point region

Presenter Ae-young Heo (Kyungpook National University, Daegu)

Authors Ae-young Heo, Eun-San Kim, Hyoung-Suk Kim (Kyungpook National University, Daegu), Dongchul Son (CHEP, Daegu), Seunghwan Shin (Fermilab, Batavia, Illinois), Yosuke Honda, Toshiaki Tauchi, Nobuhiro Terunuma (KEK, Ibaraki), Seung Hwan Kim, Yong Jung Park (PAL, Pohang, Kyungbuk)

Abstract The ATF2 international collaboration is intending to demonstrate nanometer beam sizes required for the future Linear Colliders. The position of the electron beam focused down at the end of the ATF2 extraction line to a size as small as 35 nm has to be measured with nanometer resolution. For that purpose a special Interaction Point(IP) beam position monitor (BPM) was designed. In this paper we report on the features of the BPM and electronics design providing the required resolution. We also consider the results obtained with BPM triplet which was installed in the ATF beamline and the first data from ATF2 commissioning runs.

Funding Agency

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T17 - Alignment and Survey

ID: 2554 Nanometer Order of Stabilization for Precision Beam Size Monitor (Shintake monitor)

Presenter Tatsuya Kume (KEK, Ibaraki)

Authors Tatsuya Kume, Yosuke Honda, Toshiaki Tauchi, Nobuhiro Terunuma (KEK, Ibaraki), Yoshio Kamiya (ICEPP, Tokyo), Benoit Bolzon, Nicolas Geffroy, Andrea Jeremie (IN2P3-LAPP, Annecy-le-Vieux), Sachio Komamiya, Masahiro Orouku, Taikan Suehara, Takashi Yamanaka (University of Tokyo, Tokyo)

Abstract The ATF2, accelerator test facility has been developed confirming techniques for obtaining super low emittance beam for future particle accelerators. Here, the converged beam size is designed to be 37 nm, and a precision beam size monitor using interference fringes as a reference called Shintake monitor is used for measuring it. In order to measure the beam size with resolution of better than 10%, relative position between the beam and the interference fringes should be stabilized within few nanometers. Highly rigid tables and mounts for the Shintake monitor and final focusing magnets are adopted with highly rigid floor to ensure relative position stability. Then, the Shintake monitor can be stabilized against the beam, since the beam fluctuates coherently with the final focusing magnets. On the other hand the interference fringes are stabilized against the Shintake monitor with precise phase control system. As a result, relative position between the beam and the interference fringes is stabilized based on rigidity of tables, mounts, and floor between them. We will present our conception for stabilization and results of vibration measurements for the Shintake monitor.

Funding Agency

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T17 - Alignment and Survey

ID: 3406 Interferometric IP Position Monitoring system for ATF2

Presenter David Urner (OXFORDphysics, Oxford, Oxon)

Authors David Urner, Paul Andrew Coe (OXFORDphysics, Oxford, Oxon), Armin Reichold, Matthew Stuard Warden (JAI, Oxford)

Abstract The MONALISA group is developing a nanometre precision, interferometric system to continuously monitor relative position and orientation of crucial accelerator components. The most challenging role at a future linear collider will be monitoring the final focus quadrupoles. A combination of fixed frequency and frequency scanning interferometry (FSI) provides nanometre precision, real time readout every few milliseconds. We present a demonstration measurement system that we intend to install at ATF2 to measure the relative motion of QD0 and the shintake monitor and we will report on measurement results achieved in the laboratory.

Funding Agency

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T17 - Alignment and Survey

ID: 2631 ATF2 ultra-low IP betas proposal

Presenter Rogelio Tomas (CERN, Geneva)

Authors Rogelio Tomas, Frank Zimmermann (CERN, Geneva), Shigeru Kuroda, Toshiaki Tauchi, Junji Urakawa (KEK, Ibaraki), Philip Bambade (LAL, Orsay), Sha Bai (New Affiliation Request Pending, Beijing), Andrei Seryi, Glen White (SLAC, Menlo Park, California)

Abstract The CLIC Final Focus System has considerably larger chromaticity than those of ILC and its scaled test machine ATF2. We propose to reduce the IP betas of ATF2 to reach a CLIC-like chromaticity. This would also allow to study the FFS tuning difficulty as function of the IP beam spot size. Both the ILC and CLIC projects will largely benefit from the ATF2 experience at these ultra-low IP betas.

Funding Agency

Type of Presentation Poster

Main Classification Lepton Accelerators

Sub Classification A03 - Linear Colliders

ID: 2384 Study of the Effect of the Non-linear Magnetic Fields in the Extraction Region of the ATF Extraction Line on the Emittance Growth

Presenter Maria del Carmen Alabau (LAL, Orsay)

Authors Maria del Carmen Alabau, Philip Bambade, Guy Le Meur, Francois Touze (LAL, Orsay), Angeles Faus-Golfe (IFIC, Valencia), Shigeru Kuroda (KEK, Ibaraki), Mark Woodley (SLAC, Menlo Park, California)

Abstract Since several years, the vertical beam emittance measured in the Extraction Line (EXT) of the Accelerator Test Facility (ATF) at KEK, has been significantly larger than that measured in the damping ring (DR) itself. The EXT line that transports the beam to the ATF2 Final Focus beam line has been rebuilt, but the extraction itself remains in most part unchanged, with the extracted beam transported off-axis horizontally in two of the quadrupoles, beyond the linear region for one of them. A few other nearby magnets have also modelled or measured non-linearity. In case of a residual vertical beam displacement, this can result in increased vertical emittance through coupling between the two transverse planes. Tracking studies as well as measurements have been carried out to study this effect and the induced sensitivity of beam optical parameters to the trajectory at injection, in view of deriving tolerances for reproducible and stable operation.

Funding Agency

Type of Presentation Poster

Main Classification Lepton Accelerators

Sub Classification A03 - Linear Colliders

ID: 2042 ATF2 Spot Size Tuning Using the Rotation Matrix Method

Presenter Anthony Scarfe (UMAN, Manchester)

Authors Anthony Scarfe, Robert Appleby (UMAN, Manchester), Deepa Angal-Kalinin, James Jones (STFC/DL/ASTeC, Daresbury, Warrington, Cheshire)

Abstract The Accelerator Test Facility (ATF2) at KEK aims to experimentally verify the local chromaticity correction scheme to achieve a vertical beam size of 37nm. The facility is a scaled down version of the final focus design proposed for the future linear colliders. In order to achieve this goal, high precision tuning methods are being developed. One of the methods proposed for ATF2 is a novel method known as the 'rotation matrix' method. Details of the development and testing of this method, including orthogonality optimisation and simulation methods, are presented.

Funding Agency

Type of Presentation Poster

Main Classification Lepton Accelerators

Sub Classification A03 - Linear Colliders

ID: 2157 Permanent magnet Final Focus Doublet R&D for ILC at ATF2

Presenter Yoshihisa Iwashita (Kyoto ICR, Uji, Kyoto)

Authors Yoshihisa Iwashita, Takanori Sugimoto (Kyoto ICR, Uji, Kyoto), Mika Masuzawa, Toshiaki Tauchi, Kaoru Yokoya (KEK, Ibaraki)

Abstract Although the base line technology of the Final Focus Doublet for ILC is superconducting magnet, which is supposed to be conventional, the slender structure may be suffered from its vibration. The permanent magnets, however, do not have any vibration source in it at the steady state. The five-ring-singlet configuration, proposed by R. L. Gluckstern adds 100% strength adjustability to permanent magnet quadrupole (PMQ) lens. A prototype of this lens is fabricated and under evaluation. It was originally designed for ILC that also has the extra hole for the outgoing beam. In order to realize the beam test at ATF2, the inner bore is enlarged from D20mm to D50mm to clear the background photons from Shintake-Monitor. The magnet is described.

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Type of Presentation Poster

Main Classification Lepton Accelerators

Sub Classification A03 - Linear Colliders

ID: 2278 Superconducting Magnets for a Final Focus Upgrade of ATF2

Presenter Brett Parker (BNL, Upton, Long Island, New York)

Authors Brett Parker, Michael Anerella, John Escallier, Ping He, Animesh Kumar Jain, Andrew Marone (BNL, Upton, Long Island, New York), Claude Hauviller (CERN, Geneva), Benoit Bolzon, Andrea Jeremie (IN2P3-LAPP, Annecy-le-Vieux), Toshiaki Tauchi, Kiyosumi Tsuchiya, Junji Urakawa (KEK, Ibaraki), David Urner (OXFORDphysics, Oxford, Oxon), Andrei Seryi (SLAC, Menlo Park, California)

Abstract The Accelerator Test Facility (ATF2) at KEK is a scaled down version of the final focus design proposed for the future linear colliders (LC) and aims to experimentally verify the final focus (FF) technology needed to obtain very small, stable beam spots at a LC interaction point. Initially the ATF2 FF is made using conventional (warm) quadrupole and sextupole magnets; however, we propose to upgrade the FF by replacing some of the conventional magnets with new superconducting magnets constructed with the same technology as those of the International Linear Collider baseline FF magnets*. With the superconducting magnet upgrade we can look to achieve smaller interaction point beta-functions and to study superconducting magnet vibration stability in an accelerator environment. Therefore for the ATF2 R&D magnet we endeavor to incorporate cryostat design features that facilitate monitoring of the cold mass movement via interferometric techniques. The design status of the ATF2 superconducting upgrade magnets is reported in this paper.

Footnotes *International Linear Collider Reference Design Report, ILC-REPORT-2007-001, August 2007.

Funding Agency Work supported by the U.S. Department of Energy under Contract No. DE-AC02-98CH10886.

Type of Presentation Poster

Main Classification Magnets

Sub Classification T10 - Superconducting Magnets

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SPMS Author: Matthew Arena — Fermi National Accelerator Laboratory

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ID: 2208 MICRON SIZE LASER-WIRE SYSTEM AT THE ATF EXTRACTION LINE, RECENT RESULTS AND ATF-II UPGRADE.

Presenter Alexander S. Aryshev (JAI, Egham, Surrey)

Authors Alexander S. Aryshev, Pavel Karataev (JAI, Egham, Surrey), Hitoshi Hayano, Kiyoshi Kubo, Nobuhiro Terunuma, Junji Urakawa (KEK, Ibaraki), Laura Corner, Nicolas Delerue, Brian Foster, Fred Gannaway, David Francis Howell, Laurence James Nevay, Myriam Newman, Rohan Senanayake, Roman Walczak (OXFORDphysics, Oxford, Oxon), Grahame A. Blair, Stewart Takashi Boogert, Gary Boorman, Alessio Bosco, Lawrence Deacon (Royal Holloway, University of London, Surrey)

Abstract The KEK Accelerator Test Facility (ATF) extraction line laser-wire system has been upgraded, enabling the measurement of micron scale transverse size electron beams. The most recent measurements using the upgraded system are presented, including the major hardware upgrades to the laser transport, the laser beam diagnostics line, and the mechanical control systems.

Funding Agency STFC LC-ABD Collaboration, Royal Society, Daiwa Foundation, Commission of European Communities under the 6th Framework Programme Structuring the European Research Area, contract number RIDS-011899

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T03 - Beam Diagnostics and Instrumentation

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ID: 2267 Beam test results with the FONT4 ILC prototype intra-train beam feedback system

Presenter Philip Burrows (JAI, Oxford)

Authors Philip Burrows, Robert Apsimon, Christine Isabel Clarke, Ben Constance, Hamid Dabiri Khah, Anthony Francis Hartin, Colin Perry, Javier Resta-Lopez, Christina Swinson (JAI, Oxford), Glenn Brian Christian (ATOMKI, Debrecen), Alexander Kalinin (STFC/DL/ASTeC, Daresbury, Warrington, Cheshire)

Abstract We present the results of beam tests of the FONT4 ILC prototype intra-train beam feedback system. The system comprises a stripline BPM, a fast analogue BPM signal processor, a custom FPGA-based digital feedback board, a high-power fast-response drive amplifier, and a stripline kicker. The hardware was deployed at the Accelerator Test Facility at KEK. Trains comprising three electron bunches were extracted from the ATF damping ring, with bunch spacing c. 150ns. The feedback loop was closed by measuring the position of bunch 1 and correcting bunches 2 and 3. We report the performance of the feedback, including gain studies, the correction dynamic range, latency measurement, and quality of the beam position correction. The system achieved micron-level bunch stabilisation with a latency of c. 140ns.

Funding Agency

Type of Presentation Poster

Main Classification Lepton Accelerators

Sub Classification A03 - Linear Colliders

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ID: 2274 Development of a Fast Micron-Resolution Beam Position Monitor Signal Processor for Linear Collider Beam-Based Feedback Systems

Presenter Philip Burrows (JAI, Oxford)

Authors Philip Burrows, Robert Apsimon, Christine Isabel Clarke, Ben Constance, Hamid Dabiri Khah, Anthony Francis Hartin, Colin Perry, Javier Resta-Lopez, Christina Swinson (JAI, Oxford), Glenn Brian Christian (ATOMKI, Debrecen), Alexander Kalinin (STFC/DL/ASTeC, Daresbury, Warrington, Cheshire)

Abstract We present the design of prototype fast beam position monitor (BPM) signal processors for use in inter-bunch beam-based feedbacks for linear colliders and electron linacs. We describe the FONT4 intra-train beam-based digital position feedback system prototype deployed at the Accelerator test facility (ATF) extraction line at KEK, Japan. The system incorporates a fast analogue beam position monitor front-end signal processor, a digital feedback board, and a fast kicker-driver amplifier. The total feedback system latency is less than 150ns, of which less than 10ns is used for the BPM processor. We report preliminary results of beam tests using electron bunches separated by c. 150ns. Position resolution of order 1 micron is obtained.

Funding Agency

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T05 - Beam Feedback Systems

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SPMS Author: Matthew Arena — Fermi National Accelerator Laboratory

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ID: 3130 Beam test of the strip-line kicker at KEK-ATF

Presenter Takashi Naito (KEK, Ibaraki)

Authors Takashi Naito, Sakae Araki, Hitoshi Hayano, Kiyoshi Kubo, Shigeru Kuroda, Toshiyuki Okugi, Nobuhiro Terunuma, Junji Urakawa (KEK, Ibaraki)

Abstract The kicker of the damping ring for the International linear collider(ILC) requires fast rise/fall times(3 or 6ns) and high repetition rate(3 MHz). A multiple strip-line kicker system is developing to realize the specification[1]. We present results of the beam test at KEK-ATF by the strip-line kicker[2]. The multi-bunch beam, which has 5.6ns bunch spacing in the damping ring, is extracted with 308ns duration. Two units of the strip-line electrodes are used to extract the beam. The scheme of the beam extraction is same as the kicker of the ILC. A bump orbit and an auxiliary septum magnet are used with the kicker to clear the geometrical restriction. [1] T. Naito et. al. “Development of the Strip-line Kicker System for ILC Damping Ring”, Proc. of PAC07, pp2772-2274 [2] T. Naito et. al. ”Design of the Beam Extraction by Using Strip-line Kicker at KEK-ATF”, Proc. of EPAC08, pp601-603

Funding Agency

Type of Presentation Poster

Main Classification Accelerator Technology - Subsystems

Sub Classification T12 - Beam Injection/Extraction and Transport

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ID: 2621 Measurement of non-linear resonances in the ATF DR

Presenter	Rogelio Tomas (CERN, Geneva)
Authors	Rogelio Tomas (CERN, Geneva), Kiyoshi Kubo, Shigeru Kuroda, Takashi Naito, Toshiyuki Okugi (KEK, Ibaraki)
Abstract	Recently sextupolar resonances were measured in the ATF Damping Ring. In particular one skew sextupolar resonance was found to be too large. After the re-alignment of the ATFDR we expect this resonance to be smaller. We present the new measurements of the sextupolar resonances of the ATF DR.
Funding Agency	
Type of Presentation	Poster
Main Classification	Beam Dynamics and Electromagnetic Fields
Sub Classification	D02 - Non-Linear Dynamics - Resonances, Tracking, Higher Order

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SPMS Author: Matthew Arena — Fermi National Accelerator Laboratory

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ID: 2133 Possible limitations in coupling correction using orbit response matrix analysis

Presenter Kosmas Grigoriou Panagiotidis (Cockcroft Institute, Warrington, Cheshire; Liverpool University, Liverpool)

Authors Kosmas Grigoriou Panagiotidis (Cockcroft Institute, Warrington, Cheshire; Liverpool University, Liverpool), Andrzej Wolski (Liverpool University, Liverpool; Cockcroft Institute, Warrington, Cheshire)

Abstract The specified vertical emittance for the ILC damping rings is 2 pm. A major objective for the Accelerator Test Facility (ATF) at KEK is to demonstrate reliable operation in this low emittance regime. LOCO is a tool for identifying optics errors in storage rings, based on fitting a lattice model to the measured closed orbit response matrix. This technique can be used to determine corrections to minimise vertical dispersion and betatron coupling, and hence reduce the vertical emittance. So far, efforts to apply LOCO to the ATF to achieve 2 pm vertical emittance have met with limited success. This paper presents the results of simulations aiming to identify possible limitations in the technique. We consider the effects of varying parameters controlling the fit of the lattice model to the measured data, and investigate possible degeneracies (e.g. between skew quadrupole strengths and tilts of the corrector magnets) that may limit the quality of the correction achievable using this technique.

Funding Agency

Type of Presentation Poster

Main Classification Beam Dynamics and Electromagnetic Fields

Sub Classification D01 - Beam Optics - Lattices, Correction Schemes, Transport

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ID: 3005 A Study of Lens Effects on Laser-wire Data

Presenter Myriam Newman (JAI, Oxford; OXFORDphysics, Oxford, Oxon)

Authors Myriam Newman, Laura Corner, Nicolas Delerue, David Francis Howell, Laurence James Nevay, Roman Walczak (JAI, Oxford; OXFORDphysics, Oxford, Oxon), Alexander S. Aryshev, Pavel Karataev (JAI, Egham, Surrey), Stewart Takashi Boogert, Lawrence Deacon (JAI, Egham, Surrey; Royal Holloway, University of London, Surrey), Grahame A. Blair (JAI, Oxford; Royal Holloway, University of London, Surrey)

Abstract Achieving high luminosity at future colliders will require beam diagnostic tools designed to handle the challenges of submicron beams at high energies. A prototype laser-wire system was tested at the KEK Accelerator Test Facility in Tsukuba, Japan. Data was taken in two phases to allow for modifications and upgrades to the laser and optical components to improve the focus and scanning of the laser-wire. A separate lens characterization study was performed on both the singlet plano-convex lens and the custom designed spherically corrected lens which were used with the laser-wire at the KEK ATF. The lenses were mounted in kinematic mounts on an optical stage with robotic actuators to allow them to be tilted and decentred. A knife edge scanning device was used to measure the focused spot size and the beam quality parameter. This system is analogous to the scanning system used at KEK. Additionally, these measurements were simulated using Zemax, an optical design software. Results from these studies and corresponding Zemax simulations demonstrate an understanding of the lens effects, such as spherical aberrations, and their contributions to the laser-wire system performance.

Funding Agency Work supported by the STFC LC-ABD collaboration and the Commission of the European Communities under the 6th Framework Programme Structuring the European Research Area, contract RIDS-011899

Type of Presentation Poster

Main Classification Instrumentation

Sub Classification T03 - Beam Diagnostics and Instrumentation

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