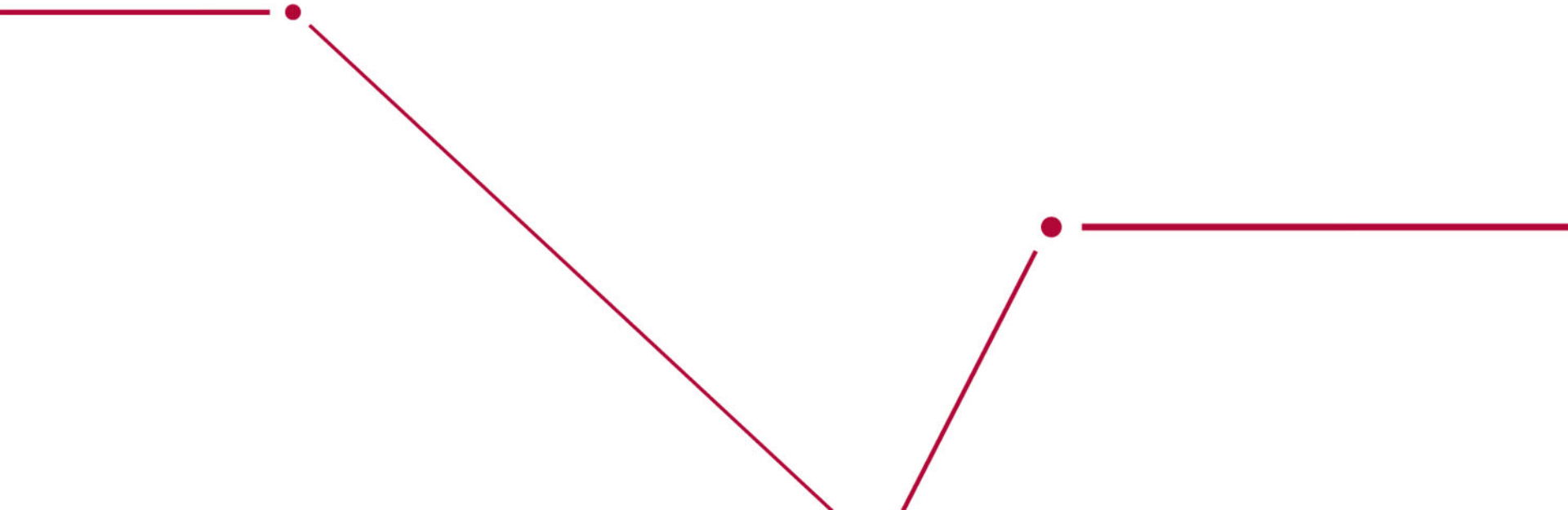


Gamma-Gamma and ILC

Coherence in particle and photon beams: Past, Present, and Future Symposium, (a.k.a. Kwang-Je Symposium)

Tor Raubenheimer

March 15, 2019



LCLS XFEL Concept: 27 Years Ago

C. Pellegrini, A 4 to 0.1 nm FEL Based on the SLAC Linac,
Workshop on Fourth Generation Light Sources, February, 1992

LCLS Study Group

SHORT WAVELENGTH FELs at SLAC - STUDY GROUP

SOURCE

Karl Bane
Jeff Corbett
Max Cornacchia
Klaus Halbach (LBL)
Albert Hofmann
Kwang-je Kim (LBL)
Phil Morton
Heinz-Dieter Nuhn
Claudio Pellegrini (UCLA)
Tor Raubenheimer
John Seeman
Roman Tatchyn
Herman Winick

SCIENTIFIC CASE

Art Bienenstock
Keith Hodgson
Janos Kirz (SUNY-Stony Brook)
Piero Pianetta
Steve Rothman (UCSF)
Brian Stephenson (IBM)



Lawrence Berkeley Laboratory

UNIVERSITY OF CALIFORNIA

Accelerator & Fusion Research Division

Presented at the Particle Accelerator Conference 1995, Dallas, TX,
May 1-5, 1995, and to be published in the Proceedings

Gamma Ray Sources Based on Resonant Backscattering of Laser Beams with Relativistic Heavy Ion Beams

E.G. Bessonov and K.-J. Kim

April 1995

RECEIVED

JUL 13 1995

OSTI

Next Linear Collider Contributions (1995 – 2004)

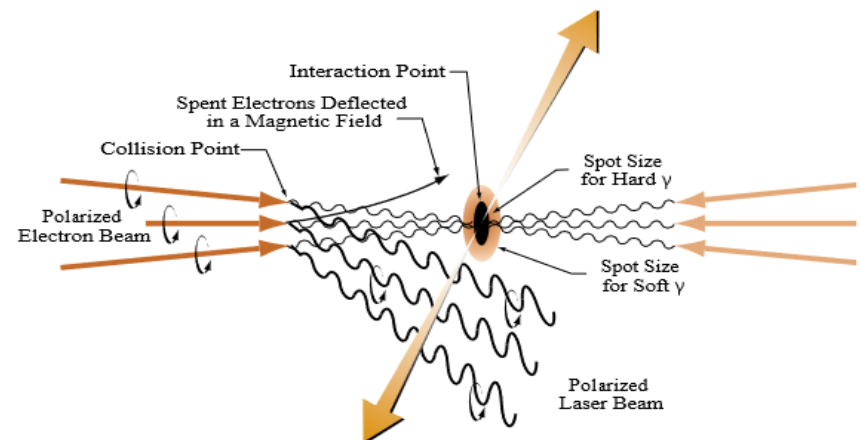
γ - γ Interaction region and beam dynamics

SLAC

GAMMA-GAMMA COLLIDERS

by KWANG-JE KIM & ANDREW SESSLER

*Photon beams can
be made so energetic
and so intense that when
brought into collision with each other
they can produce copious amounts
of elementary particles.*



Solid State Laser or an FEL as a γ - γ driver?

SLAC

CONF-9608133--7

ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORA



ELSEVIER

Nuclear Instruments and Methods in Physics Research A 375 (1996) 523-525

NUCLEAR
INSTRUMENTS
& METHODS
IN PHYSICS
RESEARCH
Section A

An FEL scheme for generating high-power optical beams for
gamma-gamma colliders based on chirped pulse amplification
techniques[☆]

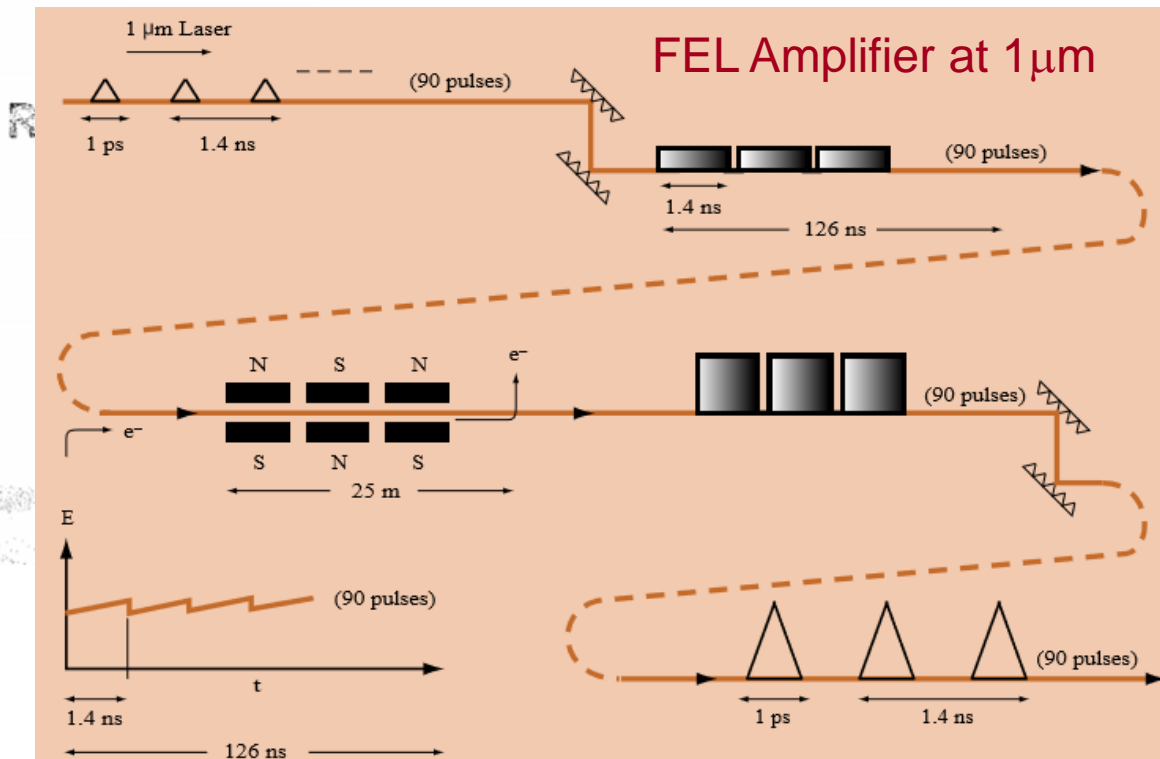
K.-J. Kim*, M. Xie, A.M. Sessler

Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA

Gamma-Gamma Collider Based on Compton Back-Scattering

K.-J. Kim
Accelerator and Fusion
Research Division

August 1996
Presented at the
18th International Free
Electron Laser Conference,
Rome, Italy,
August 26-31, 1996,



Appendix B of NLC Zeroth-Order Design Report

60+ pages of 9-point font

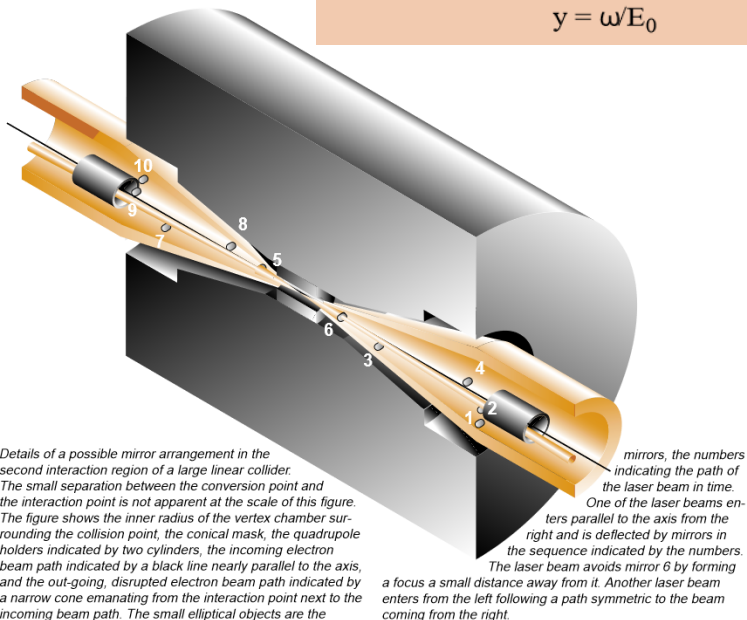
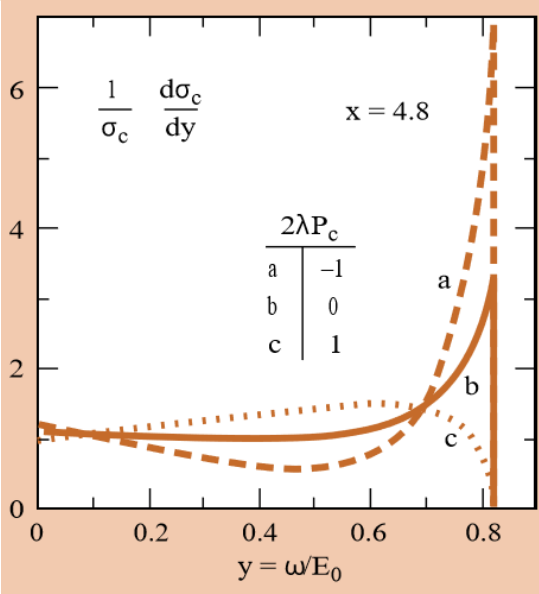


B

A Second Interaction Region For Gamma-Gamma, Gamma-Electron and Electron-Electron Collisions

Contents

B.1	Introduction	937
B.2	Physics Opportunities at $\gamma\gamma$ Collider: The Higgs Sector and Other New Physics	938
B.2.1	The Higgs $\gamma\gamma$ Partial Width	938
B.2.2	Higgs CP Eigenvalue	939
B.2.3	Higgs Boson Search	940
B.2.4	Strongly Interacting Electroweak Sector	940
B.2.5	Supersymmetry	941
B.2.6	Compositeness	941
B.3	Major Parameters	941
B.3.1	Basic Scheme	941
B.3.2	Laser Parameters	942
B.3.3	Electron Beam Parameters	942
B.4	CP Issues	943
B.4.1	Optimization of the Laser Parameters	943
B.4.2	Low-Energy Electrons Due to High-Order Multiple Scattering	947
B.4.3	Compton Conversion Efficiency	948
B.5	IP Issues	950
B.5.1	Optimization of Spectral Luminosity	950
B.5.2	Polarization	951
B.5.3	Collision of the Spent Electron Beam	951
B.5.4	Disruption of Low Energy Electrons	951
B.6	Luminosity Calculations	952
B.6.1	Simulation Code Development	952
B.6.2	Simulation of the CP	953
B.6.3	Telnov's Simulation Results for $\gamma\gamma$, γe^- and e^-e^- Luminosities	953
B.7	Backgrounds and Other Detector Considerations	962
B.7.1	Introduction	962
B.7.2	Physics Requirements	962
B.7.3	Backgrounds	963
B.7.4	Detector Considerations	963
B.7.5	Initial Simulations	964
B.7.6	Conclusions	965



Snowmass 2001: The future of particle physics

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- overview
- @snowmass
- schedule
- bulletin
- practical info
- people/groups
- NPSS technology
- education outreach
- media
- young physicists

T5: Working Group on Beam Dynamics

Working Group Convenors: M. Blaskiewicz (BNL), K.-J. Kim (Argonne), S. Y. Lee (Indiana)

Perform a survey of our present understanding of the beam dynamics problems facing the high energy accelerators and colliders, linear or circular, which are currently in operation, currently under construction, or envisioned as a possibility of the future. The specific beam dynamics areas to be covered are:

- Collective effects
- Beam lifetime
- Nonlinear effects
- Beam-Beam interaction
- Beam polarization
- Beam cooling

Snowmass 2001 – The Future of Particle Physics

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Where is Kwang-Je?

Physics 575: Accelerator Physics and Technologies for Linear Colliders (Winter 2002)

SLAC



Physics 575: ACCELERATOR PHYSICS AND TECHNOLOGIES FOR LINEAR COLLIDERS

Instructor: Kwang-Je Kim (kwangje@aps.anl.gov)

Lecture Room: [KPTC 103 \(click here for maps and directions\)](#),

Physics Department, The University of Chicago

Time: Tuesdays and Thursdays 1:30-3:00 p.m.

Review and Exercise Sessions: Thursdays 3:00-3:50 p.m.

Grading for the registered students will be based on homeworks listed in the web page.

[Course Announcement](#)

The high-energy physics community is in general agreement that a linear collider (LC) will be the most important high-energy physics accelerator project after the Large Hadron Collider (LHC) for comprehensive exploration of fundamental interactions on the TeV scale. The requirements of a linear collider are very challenging: high-current electron beams must be accelerated to several hundred GeV, focused to a few-nanometer spot, and collided with similarly prepared opposing positron beams. Thanks to the intense international effort on accelerator physics studies and hardware development during the past decade, it now appears that linear colliders meeting these requirements can be built.

This course will provide an introduction to the accelerator physics and technology topics required to construct a linear collider. It is intended for graduate students as well as advanced undergraduate students with a good background in classical mechanics and E&M. Prior knowledge of accelerator physics is not necessary. The course will begin with a basic introduction to accelerator physics and then progress into more detailed discussions of important subtopics by guest lecturers who are leaders in the respective areas. Attendance by scientists from Chicago-area institutions interested in the future development of high-energy accelerators is also encouraged.

LECTURERS

S. Holmes (FNAL)

Attend the [LC Workshop](#)

KJK

KJK

T. Raubenheimer (SLAC)

J. Rosenzweig (UCLA)

L. Emery (ANL)

J. Wang (SLAC)

L. Lilje (DESY)

F. Zimmermann (CERN)

V. Shiltsev (FNAL)

W. Gai (ANL)

Goal of hosting a Linear Collider (ca. 2004)

Physicists at the Argonne Tandem-Linear Accelerating System are working with Helen Edwards to construct a chemical processing lab at Argonne for the superconducting RF cavities. Physicists at the Argonne Wakefield Accelerator are developing a facility to test the performance of the high-gradient RF structures built at Fermilab.

"Argonne's future is closely tied with Fermilab's since we are within a half-hour's driving distance," Kim said. "We would like to work together to strengthen the prospects of hosting a Linear Collider at Fermilab."



Kwang-Je Kim - Photo courtesy Argonne

RF superconductivity workshop (ca. 2004) – ??

SLAC

ANL-05/10

Proceedings of the Workshop on Pushing the Limits of RF Superconductivity

Kwang-Je Kim and Catherine Eyberger, Editors

Advanced Photon Source
Argonne National Laboratory

Studies Pertaining to a Small Damping Ring for the International Linear Collider

Louis Emery, Kwang-Je Kim
Argonne National Accelerator Laboratory, Argonne, IL 60439

Joe Rogers
Cornell University, Ithaca, NY 14853

Shekhar Mishra, David Neuffer, K.Y. Ng, Jean-François Ostiguy, Nikolay Solyak, Aimin
Xiao
Fermi National Accelerator Laboratory, Batavia, IL 60510

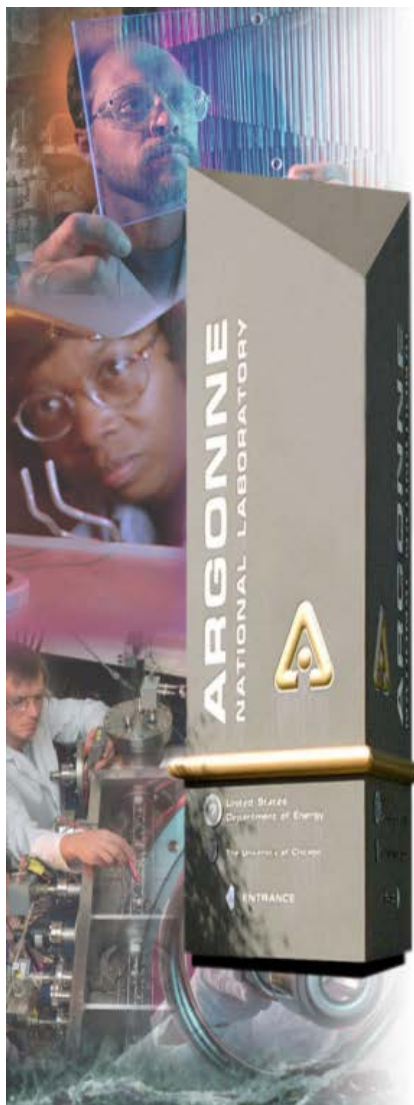
George D. Gollin¹, Guy Bresler, Keri Dixon, Thomas R. Junk, Jeremy B. Williams
Dept. of Physics, University of Illinois at Urbana-Champaign, Urbana, IL 61801

September 28, 2004

FERMILAB-TM-2272-AD-TD

Managing the Americas ILC Damping Ring Effort

SLAC



Damping Ring Design Overview

Kwang-Je Kim

*2005 International Linear Collider Workshop
Stanford Linear Accelerator Center, Stanford, CA*

March 18-22, 2005

Argonne National Laboratory



A U.S. Department of Energy
Office of Science Laboratory
Operated by The University of Chicago



Snowmass 2005 – Beginning of the ILC GDE

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Where is Kwang-Je?

Unfortunately management has it's drawbacks

SLAC



Damping Ring R&D

Kwang-Je Kim
Argonne Accelerator Institute
Argonne National Laboratory

ILC Americas Regional Team Review
April 4-6, 2006
Fermi National Accelerator Laboratory

Damping Rings are too easy → Lets study Positrons

SLAC



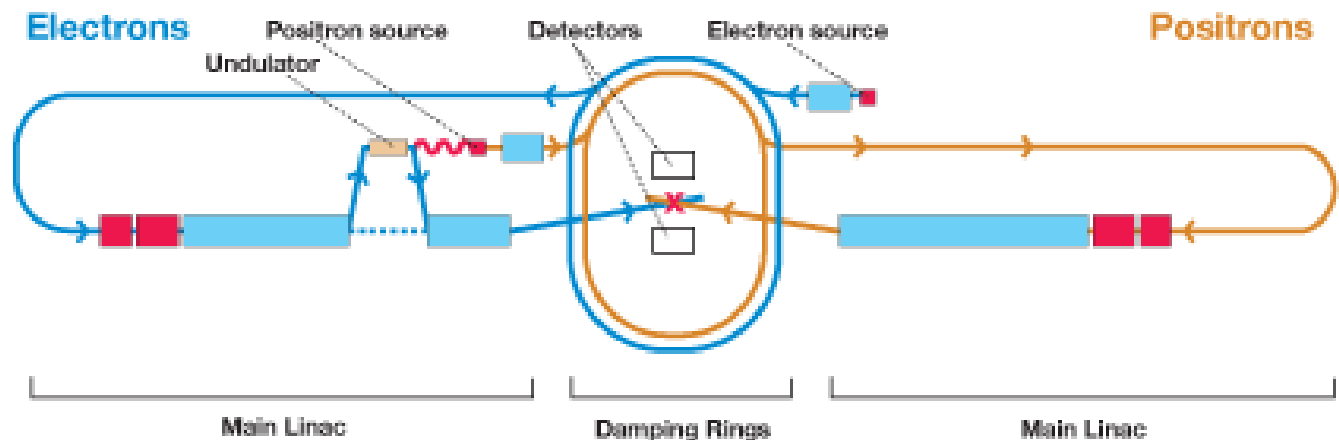
Update on ILC Production and Capturing Studies

Wei Gai, Wanming Liu and Kwang-Je Kim

ILC e^+ Collaboration Meeting

IHEP Beijing

Jan 31 – Feb 2, 2007



UChicago
Argonne, LLC

A U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC

2007 ILC GDE Meeting in Beijing

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Found Kwang-Je!



2007 ILC GDE Meeting, Beijing

Thanks for 27 great years of working together!

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