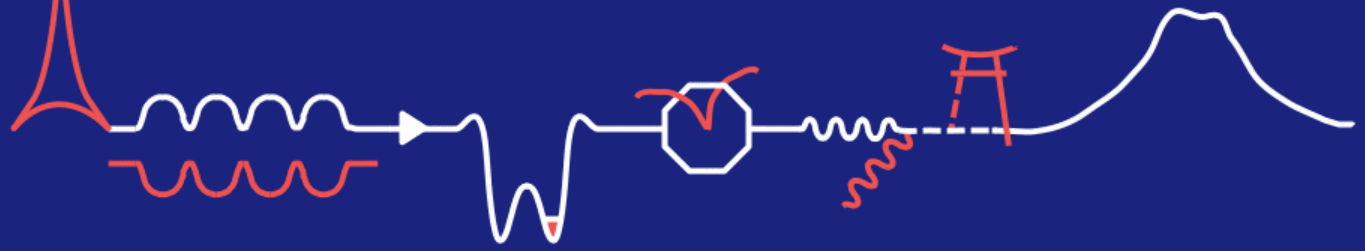
Source WG Summary

- Masao KURIKI
- Spencer Gessner
- Joe Grames
- Yoshinori Enomoto
- Gudrid Moortgat-pick

LCWS2024 International Workshop on Future Linear Colliders



Statistics

18 contributions

Electron 1

Undulator Positron 4

E-Driven Positron 13

~25 participants regularly including online participants

Title	Speaker	Affiliation
CEPC positron source	Li Xioping	IHEP
Update on Ce+BAF Positron Activities	Andriy Ushakov	Jefferson Lab.
SuperKEKB positron beam tuning using AI/ML	Y. Enomoto	KEK
Postron source for STCF	Ailin Zhang	IHEP
The Compact Positron Source	Spencer Gessner	SLAC
CFD simulations of high power positron converter targets	Silviu Covrig Dusa	Jefferson Lab.
Spin-polarized electron sources for future linear colliders	Jared Maxson	Cornell U.
Positron Capture beam loading simulations with RF-track	Nafiseh Mesbah	CERN
Present status and plan on E-driven positron source for ILC	Yoshinori Enomoto	KEK
ILC electron-driven positron source Design by black-box optimization	Shunpei Kuroguchi	Hiroshima U.
Rotating target for E-Driven ILC positron source	Yu Morikawa	KEK
Capture cavity design	Masafumi Fukuda	KEK
FCC positron source	Iryna Chaikovska	IN2P3/ILCLab.
Update of the CLIC positron source	Yongke Zhao	CERN
HALHF positron source	Gudrid Moortgat-Pick	U. of Hamburg
Hydrodynamic Simulations of an Argon-filled Tapered Plasma Lens for Optical Matching at the ILC Source	Manuel Formela	U. of Hamburg
Prototyping Pulsed Solenoid and Rotating Wheel for the undzlator-based source	Grigory Yakopov	DESY
Update on plasma stability measurements of the prototype plasma lens for positron matching	Niclas Hamann	U. of Hamburg

Update on the FCC-ee Positron Source

Iryna Chaikovska
Laboratoire de Physique des 2 Infinis Irène Joliot-Curie (IJCLab)
CNRS, Université Paris-Saclay

on behalf of the CHART/FCC-ee Injector design collaboration (WP3)

Optimisation of the CLIC positron source

Y. Zhao, S. Doebert, A. Latina, CERN

he University of Tokyo, Japan

Positron source for CEPC

ping Li, Cai Meng, Jingru Zhang, Zhe Duan, Jindong Liu, J

中国科学院高能物理研究所
Institute of High Energy Physics
Chinese Academy of Sciences

CEPC 环形正负电子
Circular Electron Po

Present status and plan on E-driven positron source for ILC

Y. Enomoto
On behalf of KEK iCASA positron group

s work was supported by【MEXT Development of key element technologies to improve the performance of future accele
ogram】Japan Grant Number JPMXP1423812204.

The positron source of STCF in China

中国科学技术大学
University of Science and Technology of China
STCF

Ailin Zhang, Xin Xu, Guoxi
Pei,Qing Luo，Haiping Peng

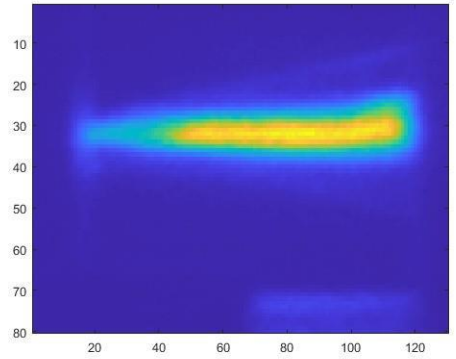
9th July
The 2024 International Workshop on Future Linear Colliders

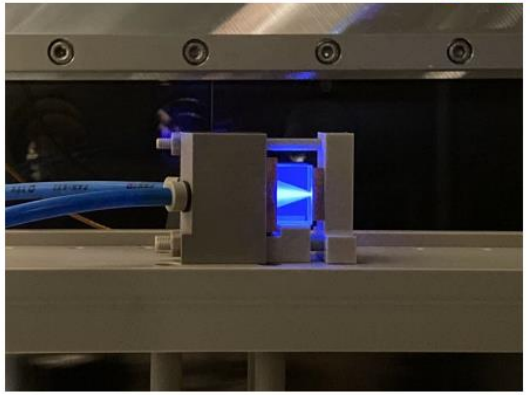
Bundesministerium für Bildung und Forschung

DESY.

UHH

Update on plasma stability measurements of the r





K. Ludwig[2], J. Osterhoff[3], G. Moortgat-Pick[1,2]

2: DESY Hamburg, 3: Berkeley Lab

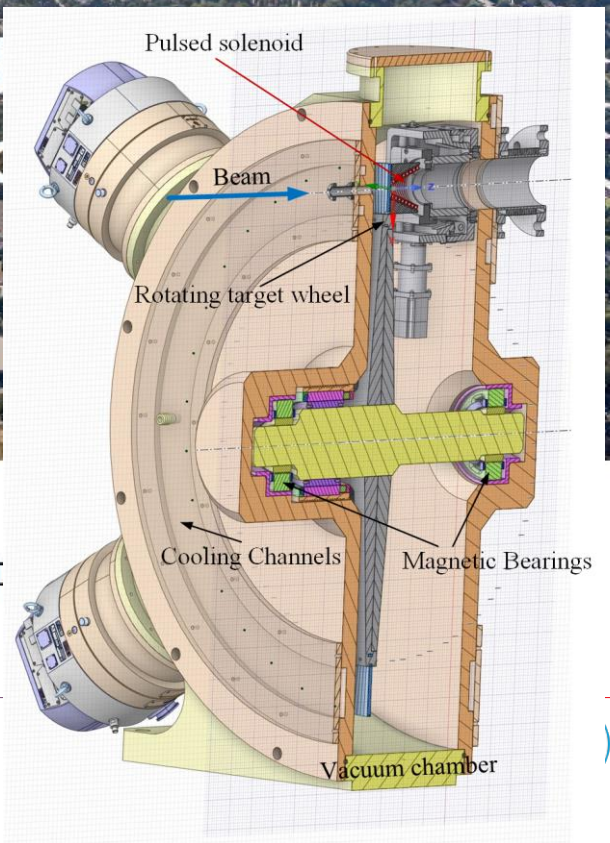
amann@desy.de

Mechanical desig the pulsed solenc positron sources

Possible methods for manufacture

G.Moortgat-Pick, P.Sievers, S.Riemann, S.D

Tokyo

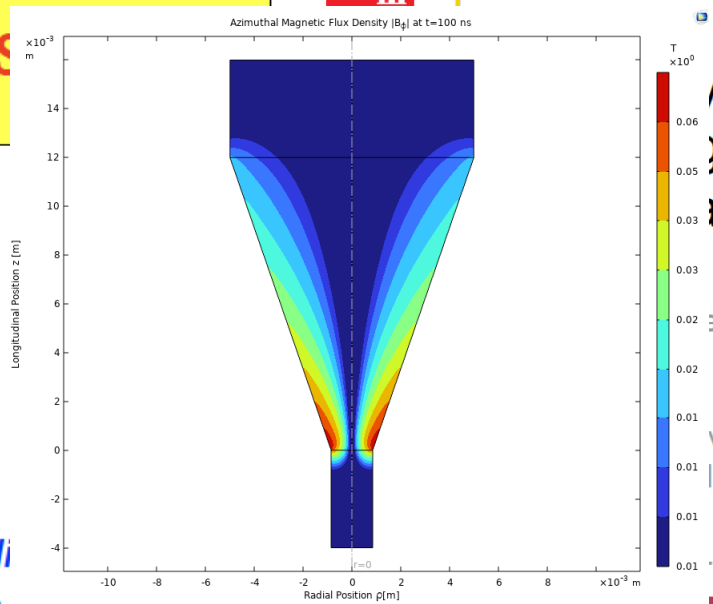


UHH

Federal Ministry of Education and Research

Prototypes and R&D Undulator e+ S

- **Overview**
- **Ongoing ITN work:**
  - Undulator field simulation
  - Target Material Analyses
  - Activities towards rotating wheel engineering design
  - Prototype Pulsed Solenoid *(see Grigory's talk)*
  - Plasma Lens prototype and simulations *(see Manuel & Ni*
- **First steps towards undulator e+ source for HALHF**



ydrodynamic Simulations gon-filled Tapered Plasma Lens l Matching at the ILC e⁺ Source

es[2], G. Boyle[3], G. Moortgat-Pick[1], N. Hamann[1], G. Loisch[2]
M. Thévenet[2], J. Osterhoff[4]

versity of Hamburg, Hamburg, Germany
lektronen Synchrotron DESY, Hamburg, Germany
[3]James Cook University
awrence Berkeley National Laborator

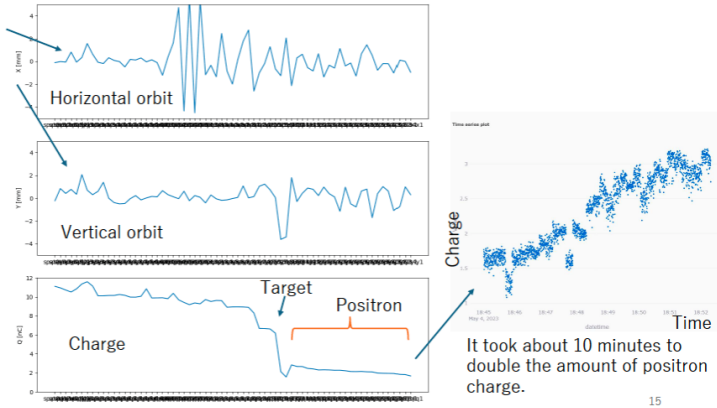
SuperKEKB positron beam tuning using ML

Takuya Natsui

Example 1

Searching for parameters that will increase positron production by shaking the orbit in the upstream. (Changing magnet current and RF phase.

BPM data in linac while auto tuning.

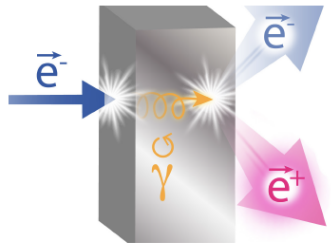


It took about 10 minutes to double the amount of positron charge.

15

Update on Ce⁺BAF Positron Activities

- Concept of Ce⁺BAF injector
- Current Ce⁺BAF projects/proposals
- Simulations of positron capture and acceleration



Andriy Ushakov (*Jefferson Lab*)
on behalf of the Ce⁺BAF Working Group

International Workshop on Future Linear Colliders (LCWS2024), July 8-11, 2024, University of Tokyo, Japan

Work supported by the U.S. Department of Energy Office of Nuclear Physics under contract DE-AC05-06OR23177 and Office of High Energy Physics US-Japan Science & Technology Cooperative Program

Jefferson Lab

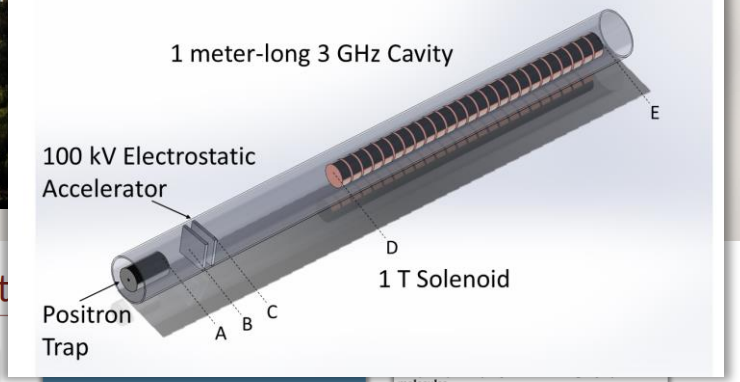
U.S. DEPARTMENT OF ENERGY | Office of Science | JSA

Plans for the Compact Positron Source at SLAC

Spencer Gessner, Rafi Hessami, Aaron Lindenberg, Chris Adolphsen, Joel Englar

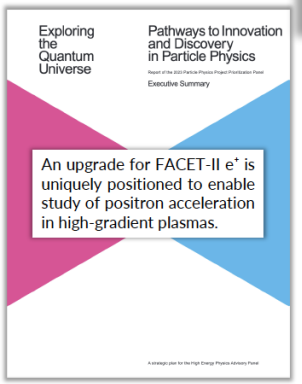
LCWS2024, Tokyo
July 10, 2024

SLAC NATIONAL ACCELERATOR LABORATORY

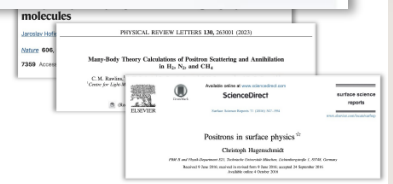


Motivation: Mult

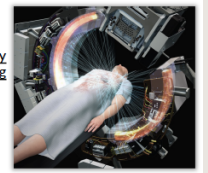
Accelerator R&D



Laboratory Astrophysics



Stanford Medicine first to try out novel tumor-targeting radiation therapy machine



Novel Treatment Modalities

SLAC is *uniquely positioned* to deliver positron beams available nowhere else in the world for high-impact research.

SLAC

4

Beam Loading Studies in Positron Source of Capture Linac in Compact Linear Collider (CLIC)

Nafiseh Mesbah (Nafiseh.Mesbah@cern.ch)

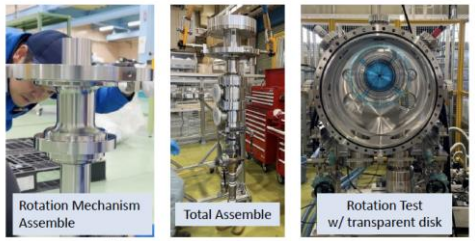
Steffen Doebert[1], Mohsen Dayyani[1,2]
Andrea Latina[1], Yongke Zhao[1], Javier Olivares[1]

1 European Organization for Nuclear Research (CERN), Geneva, Switzerland.
2 Institute for Research in Fundamental Sciences (IPM), School of Particles and Accelerators, Tehran, Iran.

LCWS2024 International Workshop on Future Linear Colliders
8–11 Jul 2024
Tokyo, Japan

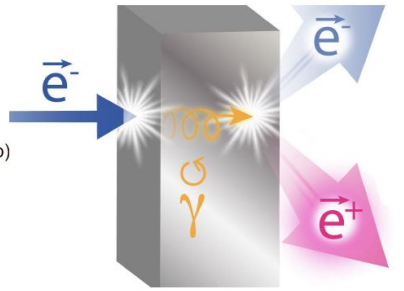
Development of ILC e-driven positron target

○Yu Morikawa(KEK)



CFD Simulations of High-Power Positron Targets

- Design with CFD
- High-power e⁺ target designs with CFD
- Summary



Silviu Covrig Dusa (on behalf of the Ce⁺BAF Group)
Jefferson Lab, USA

International Workshop on Future Linear Colliders
LCWS2024
The University of Tokyo, Japan
8-11 July 2024

Jefferson Lab

U.S. DEPARTMENT OF ENERGY | Office of Science | JSA

LCWS2024

2024-07-10

Design of the ILC electron-driven positron source and utilization of black-box optimization

Shunpei Kuroguchi, Masao Kuriki, Tohru Takahashi, Zachary Liptak, Hiroki Tajino,
Junji Urakawa, Yoshinori Enomoto, Tunehiko Omori, Masafumi Fukuda, Yu Morikawa, Kaoru Yokoya
(Hiroshima Univ. & KEK)

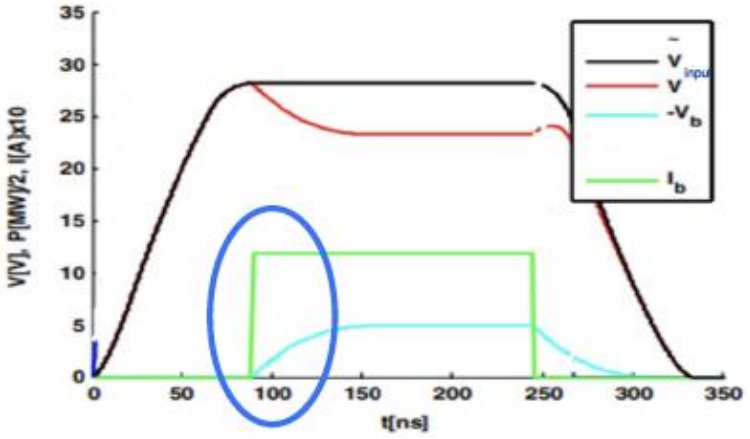
APS cavity design for ILC E-driven positron capture linac

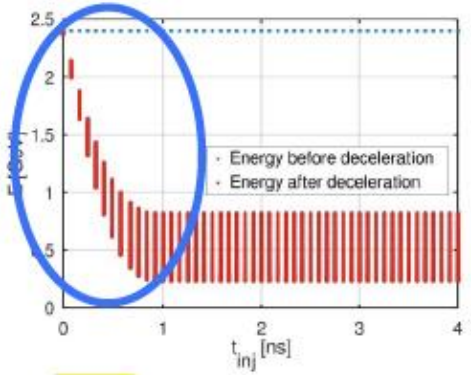
KEK M. Fukuda

- From Poynting: Equation in terms of Gradient:

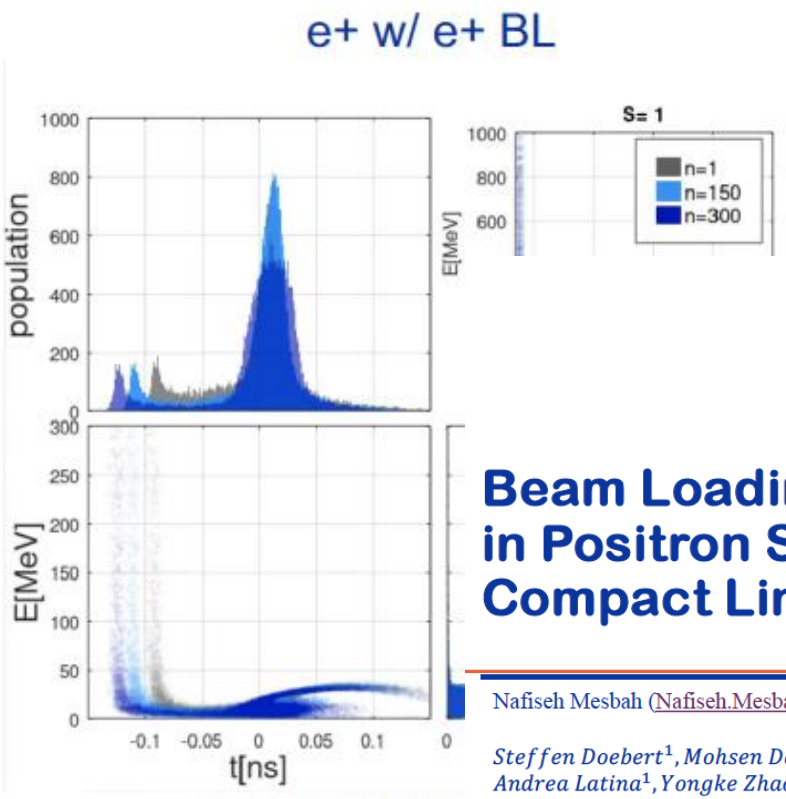
$$-\frac{\partial G_{\text{eff}}}{\partial t} = v_g \frac{\partial G_{\text{eff}}}{\partial z} + \left(-\frac{v_g Q}{r_{\text{eff}}} \frac{\partial (r_{\text{eff}}/Q)}{\partial z} + \frac{\omega}{Q} + \frac{\partial v_g}{\partial z} \right) \frac{G_{\text{eff}}}{2} + \underbrace{\frac{\omega r_{\text{eff}} \bar{I}}{2Q}}_{\text{Beam Loading term!}}$$

DOI: 10.1103/PhysRevSTAB.14.052001





DOI: 10.1103/PhysRevSTAB.14.052001



longitudinal phas
first, middle anc

Beam Loading Studies in Positron Source of Capture Linac in Compact Linear Collider (CLIC)

Nafiseh Mesbah (Nafiseh.Mesbah@cern.ch)

Steffen Doebert[1], Mohsen Dayyani[1,2]
Andrea Latina[1], Yongke Zhao[1], Javier Olivares[1]

1 European Organization for Nuclear Research (CERN), Geneva, Switzerland.
2 Institute for Research in Fundamental Sciences (IPM), School of Particles and Accelerators, Tehran, Iran.

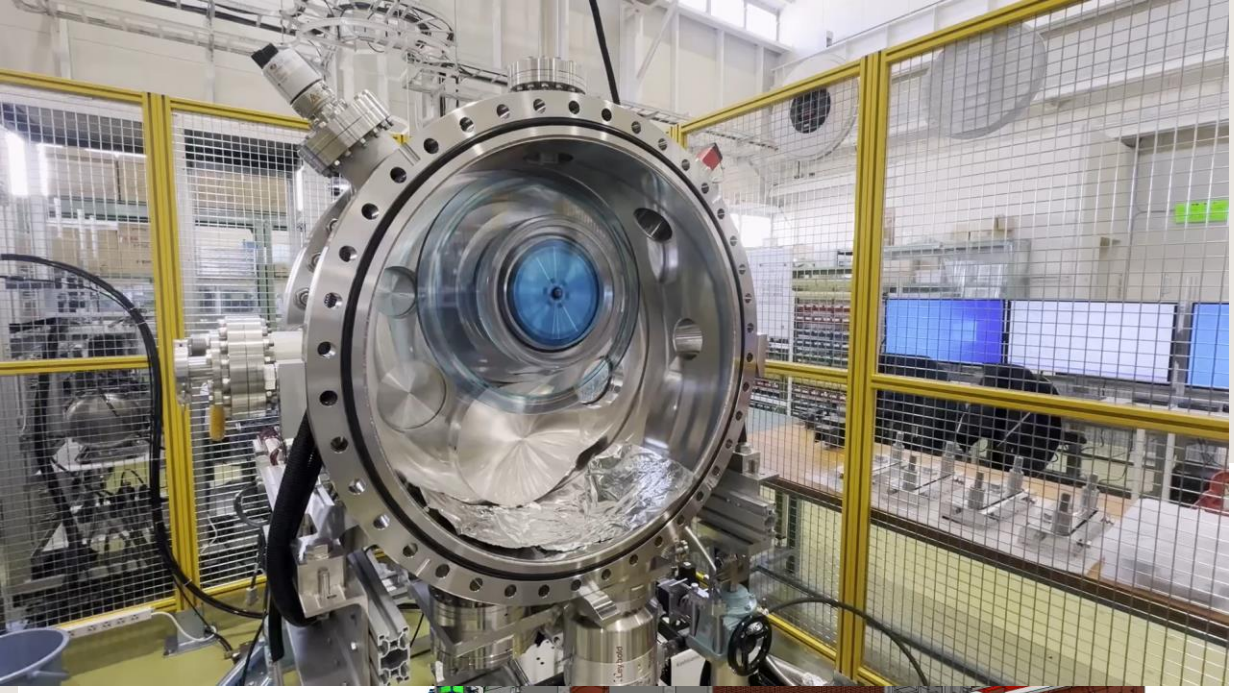
CERN

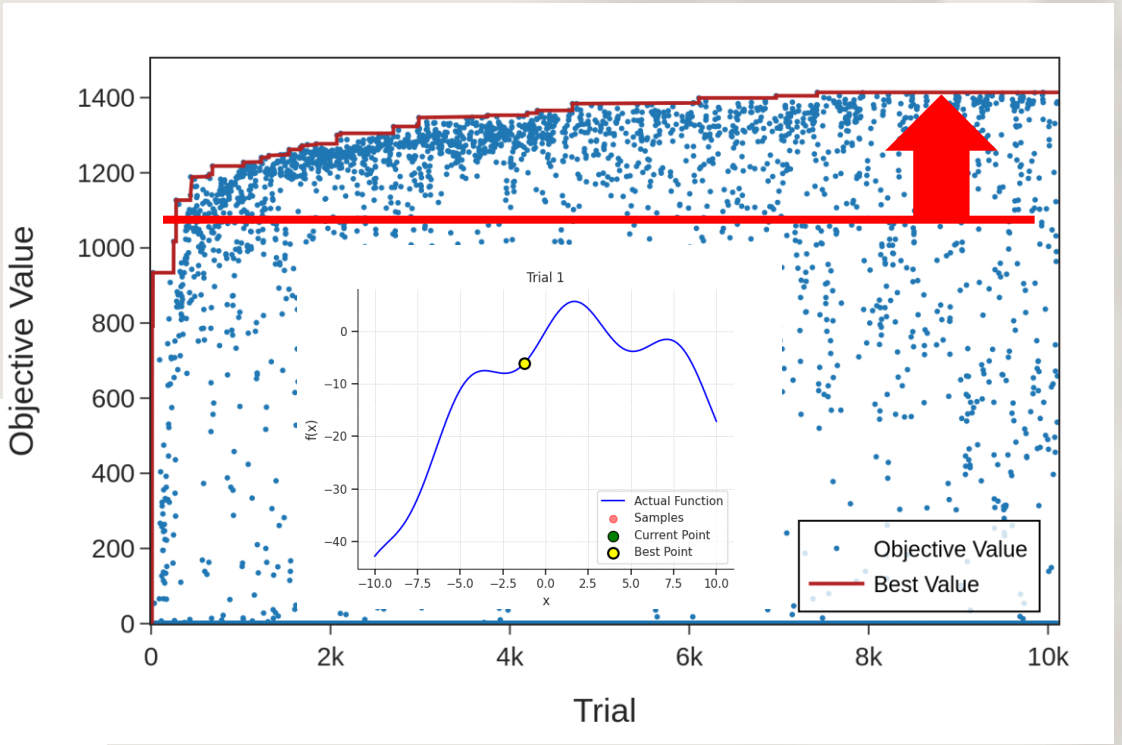
clic

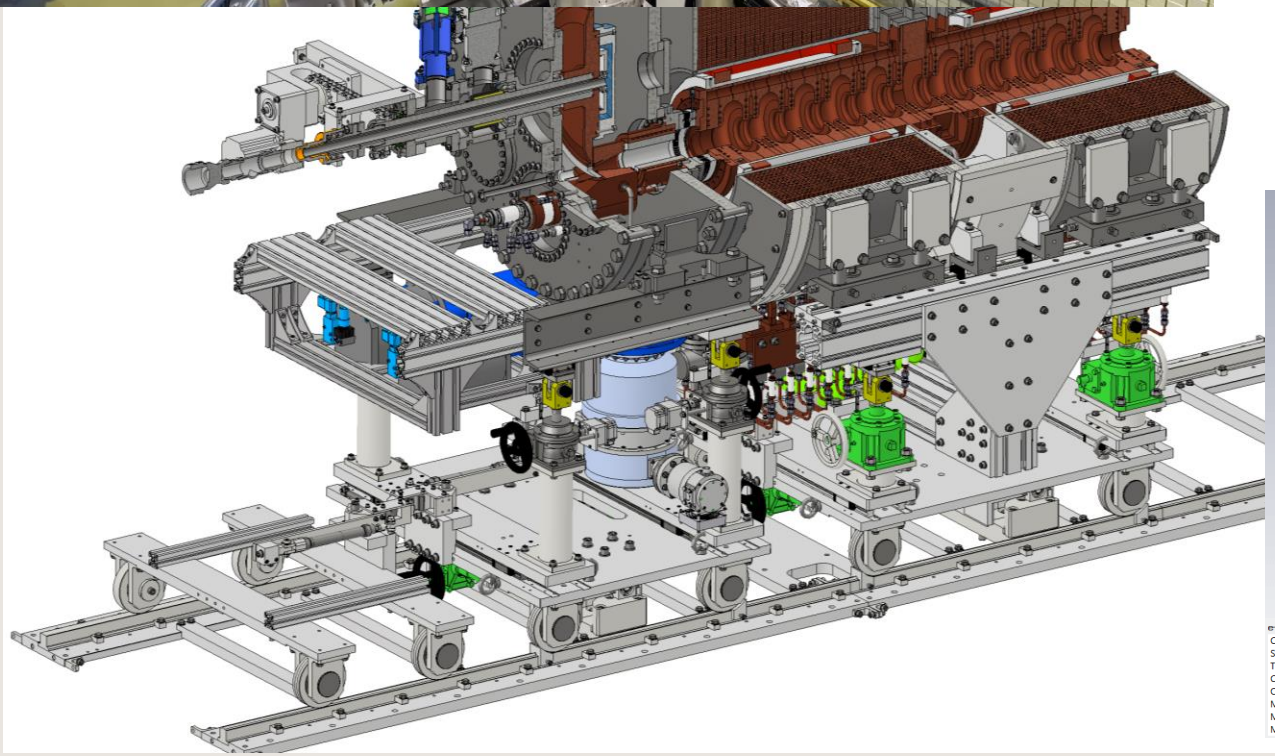
IPM
Institute for Research in Fundamental Sciences

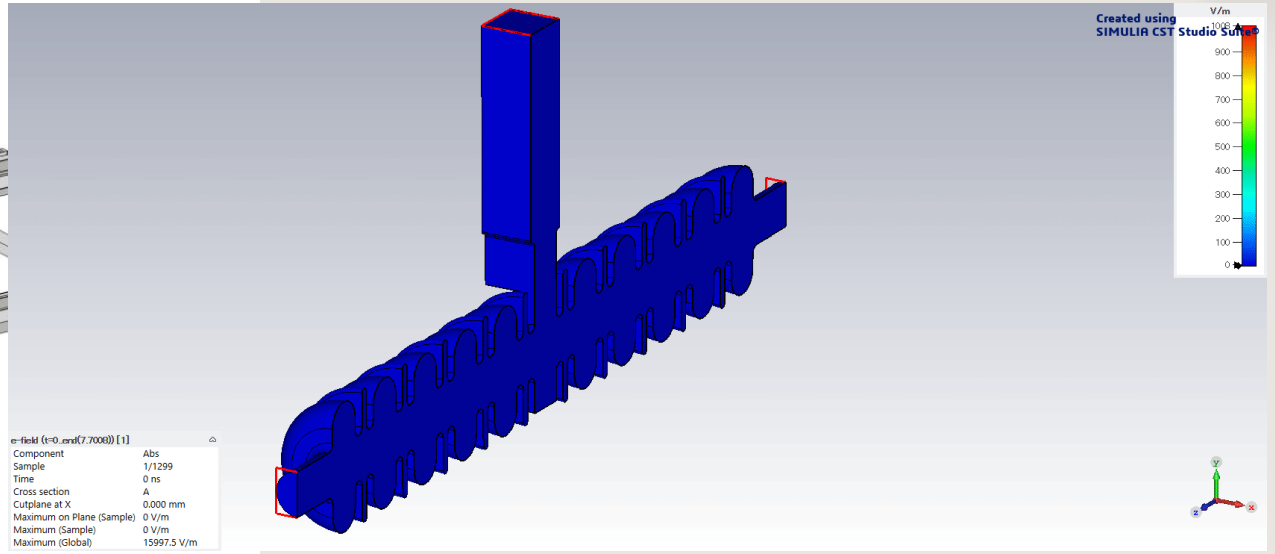
LCWS2024 International Workshop on Future Linear Colliders

8–11 Jul 2024
Tokyo, Japan




Objective Value
Trial
Trial 1
f(x)
x
Actual Function
Samples
Current Point
Best Point
Objective Value
Best Value




Created using
SIMULIA CST Studio Suite
V/m
e-field (t=0_end(7.7008)) [1]
Component Abs
Sample 1/1299
Time 0 ns
Cross section A
Cutplane at X 0.000 mm
Maximum on Plane (Sample) 0 V/m
Maximum (Sample) 0 V/m
Maximum (Global) 15997.5 V/m

Cornell Laboratory for Accelerator-based Sciences and Education (CLASSE)

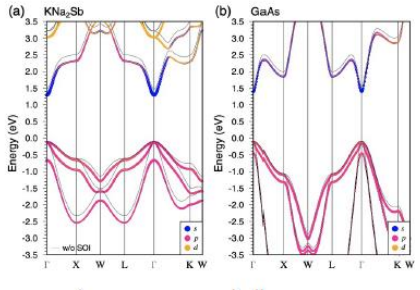
Spin-polarized electron sources for future linear colliders

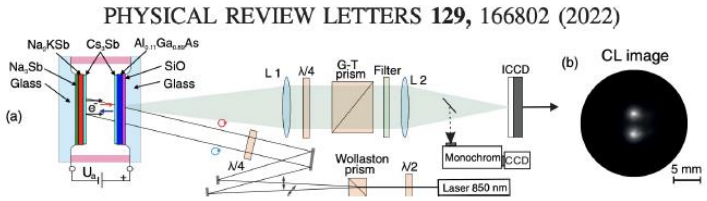
Jared Maxson
Cornell Physics, CLASSE
LCWS 2024

Cornell Laboratory for Accelerator-based Sciences and Education (CLASSE)

Alkali Antimonides for polarized photoemission

- Alkali antimonides have cubic crystal structure, are bulk visible light photoemitters, and generally more rugged than GaAs.
- Very challenging to grow high quality, crystalline films! Nonetheless, recent measurement suggests polarized photoemission is possible:





Polarization inferred from degree of circular polarization of cathodoluminescence (CL). Observed *similar levels of CL polarization as unstrained GaAs---- polarized electrons!*

ratory for
ased Sciences and
LASSE)

Current State of

ation of Brookhaven and Sandia National Labs pu
on GaAs sources. (Data from L. Cultrera)

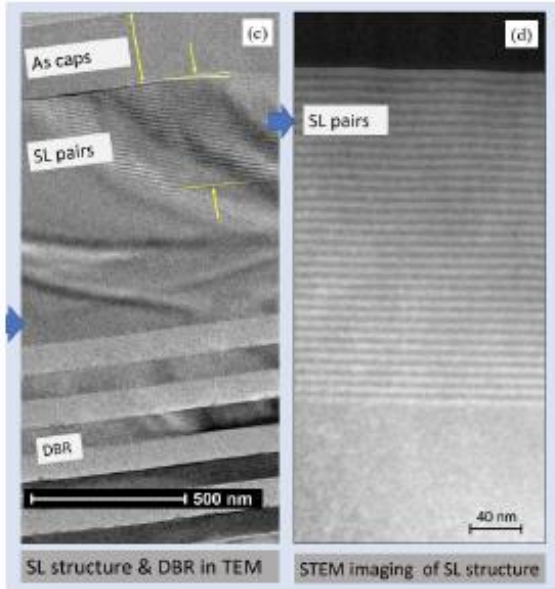
layer layout:

5 nm	$p = 5x10^{19}$ cm^{-3}
4 nm	$p = 5x10^{17}$ cm^{-3}
4 nm	$p = 5x10^{17}$ cm^{-3}
300 nm	$p = 5x10^{18}$ cm^{-3}
65 nm	$p = 5x10^{18}$ cm^{-3}
55 nm	$p = 5x10^{18}$ cm^{-3}
2000 nm	$p = 5x10^{18}$ cm^{-3}
2750 nm	$p = 5x10^{18}$ cm^{-3}
200 nm	$p = 5x10^{18}$ cm^{-3}
	$p > 1x10^{18}$ cm^{-3}

30 pairs

10 pairs

TEM Micrographs:



, M.
owski, S.
PAC 2024,

~90% spin polarization with >10% QE!

New Brookhaven/Sandia/KEK collaborati
has been formed

No Source, No Collision!