

# **Snowmass2021 Electron Source Workshop**

## **Report of Contributions**

Contribution ID: 3

Type: **not specified**

# **Electron Source Requirements for Electron Colliders**

*Wednesday, February 16, 2022 10:00 AM (30 minutes)*

**Presenter:** LATINA, Andrea (CERN)

Contribution ID: 4

Type: **not specified**

## Electron Source Requirements of Electron Ion Collider

*Thursday, February 17, 2022 10:00 AM (30 minutes)*

electron sources will be developed to provide a polarized electron beam for collision and a high current unpolarized electron beam for electron cooling. The polarized electron source must provide two batches of four bunches. Each bunch must have a total charge of 5-7 nC and 85% polarization. The unpolarized electron source must provide 1-1.5 nC high brightness electron beam, with an average current of above 100 mA. This talk will discuss the requirements of both electron sources and current R&D activities in the EIC project.

**Presenter:** WANG, Erdong (BNL)

Contribution ID: 5

Type: **not specified**

# **Electron Source Requirements for Advanced Accelerators**

*Friday, February 18, 2022 10:00 AM (30 minutes)*

**Presenter:** GESSNER, Spencer (SLAC)

Contribution ID: 7

Type: **not specified**

## Welcome and Introduction

*Wednesday, February 16, 2022 9:40 AM (20 minutes)*

**Presenter:** SUN, Yine (Argonne National Lab.)

Contribution ID: 8

Type: **not specified**

## Recent Progress on advanced photocathode operation in SRF Guns

*Thursday, February 17, 2022 10:55 AM (25 minutes)*

As well known, the quality of the photocathodes is critical for the stability and reliability of the gun operation. In last years, thanks to the developed photocathode technology, several SRF guns were successfully used for beam operation at kHz-MHz repetition rate. In this presentation, we will together view the achievements as well as open questions for the reliable SRF gun operation, and discuss the possible improvement of photocathodes in the future application.

**Presenter:** XIANG, Rong

**Session Classification:** Guns

Contribution ID: 9

Type: **not specified**

## Capability and Future Ideas of Polarized Beams from GaAs in DC HV Photo-guns

*Thursday, February 17, 2022 10:30 AM (25 minutes)*

The landscape of high energy particle physics experiments requiring polarized electron beams was forever changed by the introduction of the GaAs-based electron source to particle accelerators. Introduced in the 1970's to the SLAC accelerator, such a source was used to help establish the Standard Model. Since then DC high voltage polarized electron sources based on GaAs photocathodes were developed and operated at a number laboratories including Nagoya University, the Mainz Microtron, the MIT-Bates Laboratory, NIKHEF, Bonn University, and CEBAF at Jefferson Lab. The prospects continue, with new or upgraded polarized electron sources planned or imagined world-wide including at EIC, MESA, KEK, ILC, and CERN. In this presentation, I will begin with a brief summary of the basic requirements for constructing a DC high voltage polarized electron source and summarize demonstrated and expected performance of various facilities. Next, I will explore the evolution GaAs-source performance leading up to what we describe today as state-of-the-art. I will conclude describing prospects for performance improvement, paying special attention to capability improvements in the areas which may offer to generate higher beam intensities and with longer operating lifetimes.

**Presenter:** GRAMES, Joe

**Session Classification:** Guns

Contribution ID: **10**

Type: **not specified**

## **Particle Sources for Advanced Accelerators**

**Presenter:** FUCHS, M.

**Session Classification:** Guns



Contribution ID: 11

Type: **not specified**

# High Brightness Photoinjectors Based on High Gradient C-band Technology

*Friday, February 18, 2022 10:30 AM (25 minutes)*

**Presenter:** LUCAS, Thomas (PSI)

**Session Classification:** Injectors

Contribution ID: 12

Type: **not specified**

## Shaping for Electron Injectors

*Friday, February 18, 2022 10:55 AM (25 minutes)*

**Presenter:** GROSS, Matthias (DESY)

**Session Classification:** Injectors

Contribution ID: 13

Type: **not specified**

## **Development of a Damping Ring Free Electron Injector for Linear Colliders**

*Friday, February 18, 2022 11:20 AM (25 minutes)*

**Presenter:** XU, Tianzhe (Northern Illinois University)

**Session Classification:** Injectors

Contribution ID: **14**

Type: **not specified**

## **Break**

**Session Classification:** Injectors

Contribution ID: 15

Type: **not specified**

## Plasma Photocathode Injectors

*Friday, February 18, 2022 12:00 PM (25 minutes)*

**Presenter:** SCHROEDER, Carl (LBL)

**Session Classification:** Injectors

Contribution ID: 16

Type: **not specified**

## **A Low Emittance Injector for LCLS-II HE**

*Friday, February 18, 2022 12:25 PM (25 minutes)*

**Presenter:** JI, Fuhao (SLAC)

**Session Classification:** Injectors

Contribution ID: 17

Type: **not specified**

## **LCLS Injector using Pulsed RF Gun and LCLS-II CW Gun**

*Friday, February 18, 2022 12:50 PM (25 minutes)*

**Presenter:** ZHOU, Feng

**Session Classification:** Injectors

Contribution ID: **18**

Type: **not specified**

## Discussions

*Friday, February 18, 2022 1:30 PM (30 minutes)*

**Presenters:** WANG, Erdong (BNL); POWER, John (Argonne National Lab)

**Session Classification:** Injectors



Contribution ID: 19

Type: **not specified**

## Particle Sources for Advanced Accelerators

*Thursday, February 17, 2022 12:50 PM (25 minutes)*

Experimental and theoretical development of particle injectors for the generation of high-brightness beams are important for future accelerators. Topics include novel methods to generate particle beams with increased efficiency, peak and average brightness, methods that will allow the manipulation of their 6D phase space distribution and novel diagnostics. This includes particle injectors that can generate beams with sufficient brightness for future particle colliders and for near term applications. Topics include spin-polarized sources (e.g. from polarized gases) and methods to rapidly capture and accelerate secondary particles, such as positrons and muons. High-fidelity phase-space manipulation methods including during injection, during acceleration and post initial acceleration, such as compact cooling in plasma undulators, etc and high resolution diagnostics are also of interest.

**Presenter:** FUCHS, Matthias**Session Classification:** Guns

Contribution ID: 20

Type: **not specified**

# **Ultra-high brightness cryogenic gun for linear collider and FEL applications**

*Thursday, February 17, 2022 12:25 PM (25 minutes)*

**Presenter:** ROSENZWEIG, James (UCLA)

**Session Classification:** Guns

Contribution ID: 21

Type: **not specified**

# The First Beam of an Ultrahigh Gradient RF Photogun

*Thursday, February 17, 2022 12:00 PM (25 minutes)*

High brightness electron beams are appealing for light sources, electron microscopy, and high energy collider, etc. An Ultra-high gradient on cathode is one of the most desirable parameters that improve the beam brightness. However, the maximum gradient is limited by the effects of RF breakdown in general. We present development of an X-band electron photoinjector operating in a very short RF pulse regime, 10 ns scale, which has demonstrated a stable beam emission at greater than 300MV/m of gradient on cathode.

**Presenter:** JING, Chunguang (Euclid Techlabs)

**Session Classification:** Guns

Contribution ID: 22

Type: **not specified**

## **Overview of High QE photocathode R&D in Europe**

*Wednesday, February 16, 2022 10:30 AM (25 minutes)*

**Presenter:** SERTORE, Daniele (INFN Milano - LASA)

**Session Classification:** Cathodes

Contribution ID: 23

Type: **not specified**

## **Cathode R&D needs and status for European High energy physics/Nuclear Physics projects**

*Wednesday, February 16, 2022 10:55 AM (25 minutes)*

**Presenter:** AULENBACHER, Kurt (MESA)

**Session Classification:** Cathodes

Contribution ID: 24

Type: **not specified**

## **Cathode technologies to produce highly spin-polarized electron beams**

*Wednesday, February 16, 2022 11:20 AM (25 minutes)*

**Presenter:** POELKER, Matt (JLab.)

**Session Classification:** Cathodes

Contribution ID: 25

Type: **not specified**

## **Robust Cathodes to Produce High Current Electron Beams**

*Wednesday, February 16, 2022 12:25 PM (25 minutes)*

**Presenter:** CULTRERA, Luca (BNL)

**Session Classification:** Cathodes

Contribution ID: 26

Type: **not specified**

## **Cathodes to produce ultra bright beams for accelerators including XFELs and UED**

*Wednesday, February 16, 2022 12:00 PM (25 minutes)*

**Presenter:** MAXSON, Jared (Cornell University)

**Session Classification:** Cathodes



Contribution ID: 27

Type: **not specified**

## **Cathodes Characterization and Fabrication needs for existing and future DOE HEP/NP projects**

*Wednesday, February 16, 2022 12:50 PM (25 minutes)*

**Presenter:** SMEDLEY, John (LANL)

**Session Classification:** Cathodes

Contribution ID: 28

Type: **not specified**

## **CW Normal-Conducting RF sources for future linear colliders**

*Thursday, February 17, 2022 11:20 AM (25 minutes)*

Normal-Conducting VHF guns provides short, stable, high repetition rate, relativistic electron pulses with transverse brightness required to drive X-Ray Free Electron Lasers. In this talk will review the current status of the technology and discuss its possible use in High Energy Physics, together with future possible R&D avenues for increased performance.

**Presenter:** FILIPPETTO, Daniele (Lawrence Berkeley National Lab)

**Session Classification:** Guns

Contribution ID: 29

Type: **not specified**

## Discussions

*Thursday, February 17, 2022 1:30 PM (30 minutes)*

**Presenters:** HERNANDEZ-GARCIA, Carlos; FILIPPETTO, Daniele (Lawrence Berkeley National Lab)

**Session Classification:** Guns

Contribution ID: **30**

Type: **not specified**

## Discussions

*Wednesday, February 16, 2022 1:30 PM (30 minutes)*

**Presenters:** GRAMES, Joe; KARKARE, Siddharth (Arizona State University)

**Session Classification:** Cathodes