

Photocathode Physics for Photoinjectors 2018

Monday, 15 October 2018 - Wednesday, 17 October 2018

Hilton-Buffalo Thunder

Book of Abstracts

Contents

Welcome	1
Overview of Photocathode Physics	1
Overview of Photocathode Applications	1
Review of requirements and challenges for UED/UEM	1
Spatio-temporal quantum limits forUED/UEM from MTE	1
<10 meV MTE from Cu	1
Laser-triggered, high-coherence electron emitters for femtosecond pulses generation in high-field environments	1
Nanocrystalline diamond cathodes	2
Workshop Discussion	2
Review of requirements and challenges for FEL	2
Cathodes for Swiss FEL	2
GaN, n-type and 2-photon pump probe studies	2
Measurements of physical and chemical roughness of alkali-antimonides	2
Increase of intrinsic emittance by multiphoton photoemission	2
Workshop Discussion	3
Source requirements and polarization measurements at different energies	3
Absorption enhanced nanostructured GaAs	3
High average current at CEBAF	3
BNL activities on spin polarized sources	3
KEK activities on spin polarized sources	3
Improving lifetime of GaAs photocathode using CsTe on GaAs	3
Spin polarized microscopy	4
SPLEEM	4

Spin filters based photocathode	4
Workshop Discussion	4
Review of requirements and challenges	4
Cs ₂ Te growth physics	4
Cathode thermal decomposition	4
Capsule Cathodes	5
Workshop Discussion	5
Review of requirements and challenges for holistic cathode design	5
Blade cathodes	5
Ultra-thin cathodes	5
Etalon Photocathodes	5
2D photocathode coatings	5
Cathode surface layers for emittance improvement	6
Workshop Discussion	6
Space charge dominated photoemission from Cs ₂ Te photocathodes in an L-band NC RF gun at PITZ	6
Photocathode preparation, characterization, and fundamental study using L-band NCRF guns at the AWA facility	6
APEX	6
PEGASUS	6
IHEP	6
Shanghai	6
Tsinghua	7
Workshop Discussion	7
Cathode performance for electron cooling	7
Cornell DC cryogun	7
BerlinPro	7
Jlab magnetized gun	7
PKU	7
Workshop Discussion	8

Review of requirements and challenges	8
High intensity laser & photoemission / Laser heating limits	8
Tunneling time	8
Density Functional Theory and Surfaces	8
Density Functional Theory and Surfaces	8
Quantum Dots and QE	8
(approved by PC) Many-body processes in Photoemission (DFT)	9
(suggested by PC) Computational Screening for New Photocathode Materials	9
Workshop Discussion - combine with Session 10 WD	9
Surface Acoustic Waves and enhanced PE	9
Space charge and laser intensity	9
Modeling quantum yield, emittance, and surface roughness effects	9
(Suggested by Pietro and Sid) Chemical and surface roughness	9
Trajectories, beam codes, and delayed emission modeling	10
A predictive QE simulation using DFT input for beam codes	10
Workshop Discussion	10
The accelerator on a chip with a special focus on source requirements	10
Generation of attosecond electron pulses by inelastic ponderomotive scattering at an optical traveling wave	10
Quantum well and dot cathodes and their characterization	10
Workshop Discussion	10
Towards adaptive, automated growth of photocathodes	10
Fabrication and photoemission results of diamond field arrays	11
Cryogenic TEMeter and sample exchange with STM and ARPES system	11
Workshop Discussion	11

Welcome and Overview / 1

Welcome

Corresponding Author: nmoody@lanl.gov

Welcome and Overview / 2

Overview of Photocathode Physics

Corresponding Author: ib38@cornell.edu

Ivan Bazarov

Welcome and Overview / 3

Overview of Photocathode Applications

Corresponding Author: jwlewellen@lanl.gov

Session 2: Application Oriented Research: Low Average Current / 4

Review of requirements and challenges for UED/UEM

Corresponding Author: lirenkai@gmail.com

Session 2: Application Oriented Research: Low Average Current / 5

Spatio-temporal quantum limits for UED/UEM from MTE

Corresponding Author: jmm586@cornell.edu

Session 2: Application Oriented Research: Low Average Current / 6

<10 meV MTE from Cu

Corresponding Author: karkare@asu.edu

Session 2: Application Oriented Research: Low Average Current / 7

Laser-triggered, high-coherence electron emitters for femtosecond pulses generation in high-field environments

Session 2: Application Oriented Research: Low Average Current / 8

Nanocrystalline diamond cathodes

Session 2: Application Oriented Research: Low Average Current / 9

Workshop Discussion

Session 3: Application Oriented Research: FEL / 10

Review of requirements and challenges for FEL

Corresponding Author: dunham@slac.stanford.edu

Session 3: Application Oriented Research: FEL / 11

Cathodes for Swiss FEL

Corresponding Author: romain.ganter@psi.ch

Session 3: Application Oriented Research: FEL / 12

GaN, n-type and 2-photon pump probe studies

Corresponding Author: cmp285@cornell.edu

Session 3: Application Oriented Research: FEL / 13

Measurements of physical and chemical roughness of alkali-antimonides

Corresponding Author: wjd74@cornell.edu

Session 3: Application Oriented Research: FEL / 14

Increase of intrinsic emittance by multiphoton photoemission

Corresponding Author: zhurui@pku.edu.cn

Session 3: Application Oriented Research: FEL / 15

Workshop Discussion

Session 4: Application Oriented Research: Spin Polarized Sources / 16

Source requirements and polarization measurements at different energies

Session 4: Application Oriented Research: Spin Polarized Sources / 17

Absorption enhanced nanostructured GaAs

Corresponding Author: shukui@jlab.org

Session 4: Application Oriented Research: Spin Polarized Sources / 18

High average current at CEBAF

Corresponding Author: suleiman@jlab.org

Session 4: Application Oriented Research: Spin Polarized Sources / 19

BNL activities on spin polarized sources

Corresponding Author: wliu@bnl.gov

Session 4: Application Oriented Research: Spin Polarized Sources / 20

KEK activities on spin polarized sources

Session 4: Application Oriented Research: Spin Polarized Sources / 21

Improving lifetime of GaAs photocathode using CsTe on GaAs

Corresponding Author: lc572@cornell.edu

Session 4: Application Oriented Research: Spin Polarized Sources / 22

Spin polarized microscopy

Corresponding Author: kuwahara@imass.nagoya-u.ac.jp

Session 4: Application Oriented Research: Spin Polarized Sources / 23

SPLEEM

Session 4: Application Oriented Research: Spin Polarized Sources / 24

Spin filters based photocathode

Session 4: Application Oriented Research: Spin Polarized Sources / 25

Workshop Discussion

Session 5: Application Oriented Research: High Average Current / 26

Review of requirements and challenges

Session 5: Application Oriented Research: High Average Current / 27

Cs₂Te growth physics

Corresponding Author: mgaowei@bnl.gov

Session 5: Application Oriented Research: High Average Current / 28

Cathode thermal decomposition

Corresponding Author: smedley@bnl.gov

Session 5: Application Oriented Research: High Average Current / 29

Capsule Cathodes

Corresponding Authors: defazio.jeff@gmail.com, lc572@cornell.edu

Session 5: Application Oriented Research: High Average Current / 30

Workshop Discussion

Session 6: Application Oriented Research: Cathode Design / 31

Review of requirements and challenges for holistic cathode design

Corresponding Author: dowell@slac.stanford.edu

Session 6: Application Oriented Research: Cathode Design / 32

Blade cathodes

Session 6: Application Oriented Research: Cathode Design / 33

Ultra-thin cathodes

Corresponding Author: spentzouris@iit.edu

Session 6: Application Oriented Research: Cathode Design / 34

Etalon Photocathodes

Corresponding Author: anna.alexander967@gmail.com

Session 6: Application Oriented Research: Cathode Design / 35

2D photocathode coatings

Corresponding Author: erb@lanl.gov

Session 6: Application Oriented Research: Cathode Design / 36

Cathode surface layers for emittance improvement

Session 6: Application Oriented Research: Cathode Design / 37

Workshop Discussion

Session 7: Operations and Demonstrations - Normal conducting / 38

Space charge dominated photoemission from Cs₂Te photocathodes in an L-band NC RF gun at PITZ

Corresponding Author: ye.lining.chen@desy.de

Session 7: Operations and Demonstrations - Normal conducting / 39

Photocathode preparation, characterization, and fundamental study using L-band NCRF guns at the AWA facility

Corresponding Author: jshao@anl.gov

Session 7: Operations and Demonstrations - Normal conducting / 40

APEX

Session 7: Operations and Demonstrations - Normal conducting / 41

PEGASUS

Session 7: Operations and Demonstrations - Normal conducting / 42

IHEP

Session 7: Operations and Demonstrations - Normal conducting / 43

Shanghai

Session 7: Operations and Demonstrations - Normal conducting / 44

Tsinghua

Session 7: Operations and Demonstrations - Normal conducting / 45

Workshop Discussion

Session 8: Operations and Demonstrations - Superconducting & DC / 46

Cathode performance for electron cooling

Corresponding Author: mgaowei@bnl.gov

Session 8: Operations and Demonstrations - Superconducting & DC / 47

Cornell DC cryogun

Corresponding Author: whl64@cornell.edu

Session 8: Operations and Demonstrations - Superconducting & DC / 48

BerlinPro

Corresponding Author: julius.kuehn@helmholtz-berlin.de

Session 8: Operations and Demonstrations - Superconducting & DC / 49

Jlab magnetized gun

Corresponding Author: mamun@jlab.org

Session 8: Operations and Demonstrations - Superconducting & DC / 50

PKU

Corresponding Author: hmxie@pku.edu.cn

Session 8: Operations and Demonstrations - Superconducting & DC / 51

Workshop Discussion

Session 9: Theory and Computation / 52

Review of requirements and challenges

Session 9: Theory and Computation / 53

High intensity laser & photoemission / Laser heating limits

Corresponding Author: jb2483@cornell.edu

Session 9: Theory and Computation / 54

Tunneling time

Corresponding Author: luca.castiglioni@physik.uzh.ch

Session 9: Theory and Computation / 55

Density Functional Theory and Surfaces

Corresponding Author: finkenst@usna.edu

Session 9: Theory and Computation / 56

Density Functional Theory and Surfaces

Corresponding Author: andreas@uic.edu

Session 9: Theory and Computation / 57

Quantum Dots and QE

Session 9: Theory and Computation / 58

(approved by PC) Many-body processes in Photoemission (DFT)

Corresponding Author: jn459@cornell.edu

Session 9: Theory and Computation / 59

(suggested by PC) Computational Screening for New Photocathode Materials

Session 9: Theory and Computation / 60

Workshop Discussion - combine with Session 10 WD

Session 10: Theory and Computation - continued / 61

Surface Acoustic Waves and enhanced PE

Session 10: Theory and Computation - continued / 62

Space charge and laser intensity

Corresponding Author: pz@egr.msu.edu

Session 10: Theory and Computation - continued / 63

Modeling quantum yield, emittance, and surface roughness effects

Corresponding Author: dad@txcorp.com

Session 10: Theory and Computation - continued / 64

(Suggested by Pietro and Sid) Chemical and surface roughness

Corresponding Author: ggevorkeyan@protonmail.com

Session 10: Theory and Computation - continued / 65

Trajectories, beam codes, and delayed emission modeling

Session 10: Theory and Computation - continued / 66

A predictive QE simulation using DFT input for beam codes

Corresponding Author: kevin.jensen@nrl.navy.mil

Session 10: Theory and Computation - continued / 67

Workshop Discussion

Session 11: Novel Research and Applications / 68

The accelerator on a chip with a special focus on source requirements

Corresponding Author: alexander.tafel@fau.de

Session 11: Novel Research and Applications / 69

Generation of attosecond electron pulses by inelastic ponderomotive scattering at an optical traveling wave

Corresponding Author: kozak@karlov.mff.cuni.cz

Session 11: Novel Research and Applications / 70

Quantum well and dot cathodes and their characterization

Session 11: Novel Research and Applications / 71

Workshop Discussion

Session 12: Novel Research and Applications (and concluding discussion) / 72

Towards adaptive, automated growth of photocathodes

Corresponding Author: pavlenko@lanl.gov

Session 12: Novel Research and Applications (and concluding discussion) / 73

Fabrication and photoemission results of diamond field arrays

Corresponding Author: smirnova@lanl.gov

Session 12: Novel Research and Applications (and concluding discussion) / 74

Cryogenic TEMeter and sample exchange with STM and ARPES system

Corresponding Author: ag733@cornell.edu

Session 12: Novel Research and Applications (and concluding discussion) / 75

Workshop Discussion