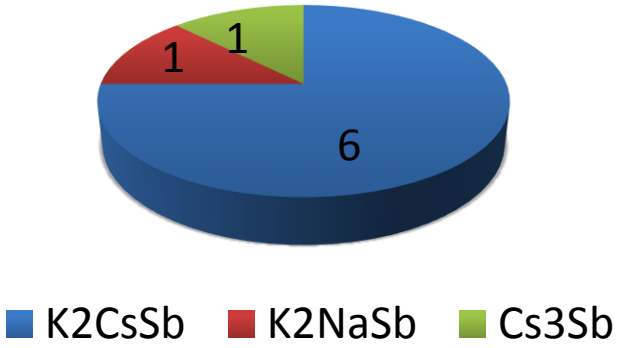
WG1 :ERL electron source

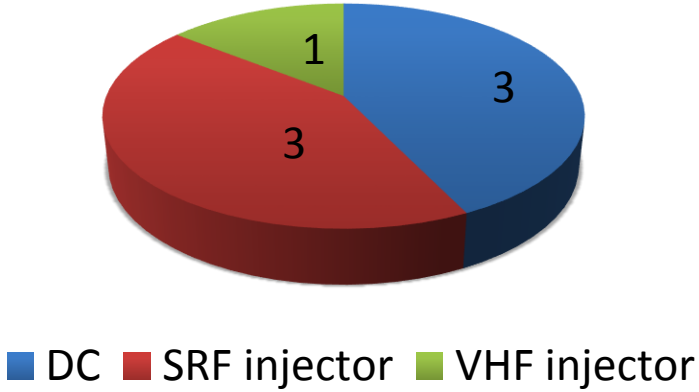
Kurt Aulenbacher (Uni. Mainz)

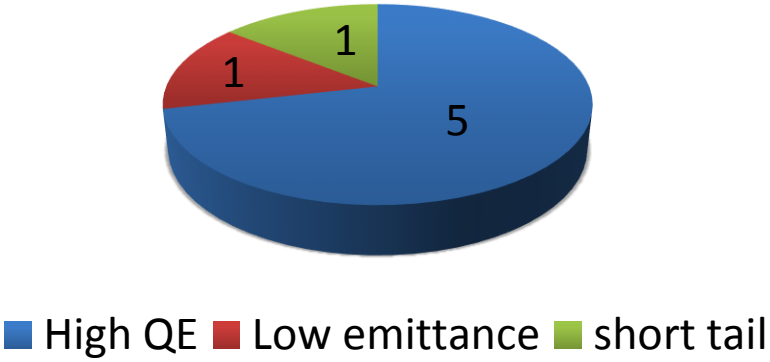
Erdong Wang (BNL)

Talks summary: Photocathode



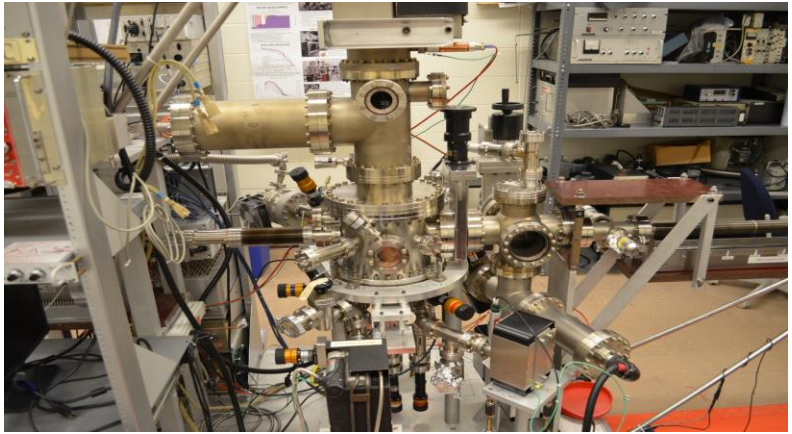
6 invitation talks+1 contribution talks

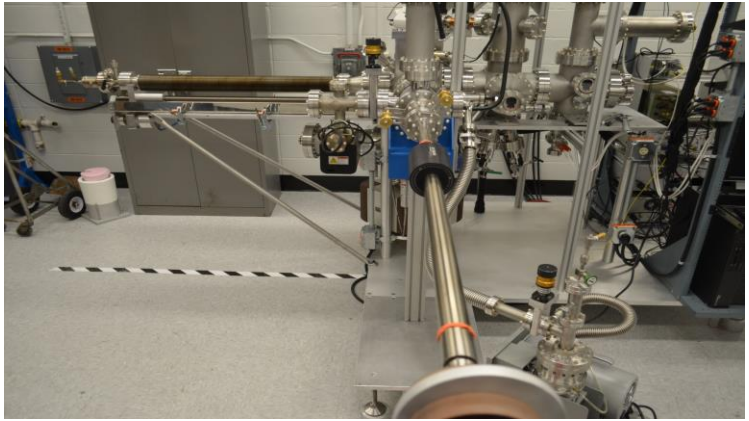


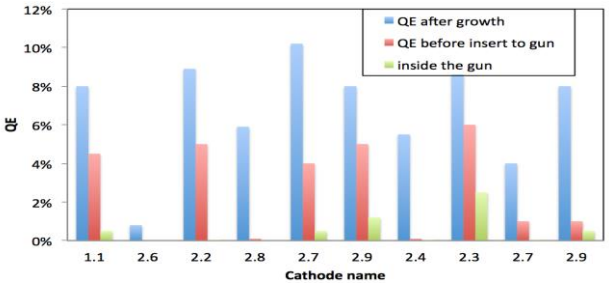


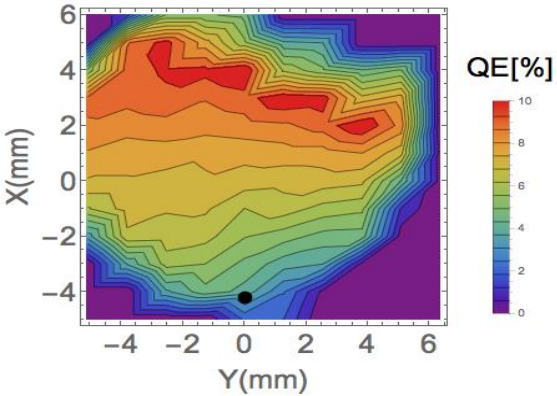
Multialkali Cathode for High Current Electron Injector

- Speaker: Triveni Rao



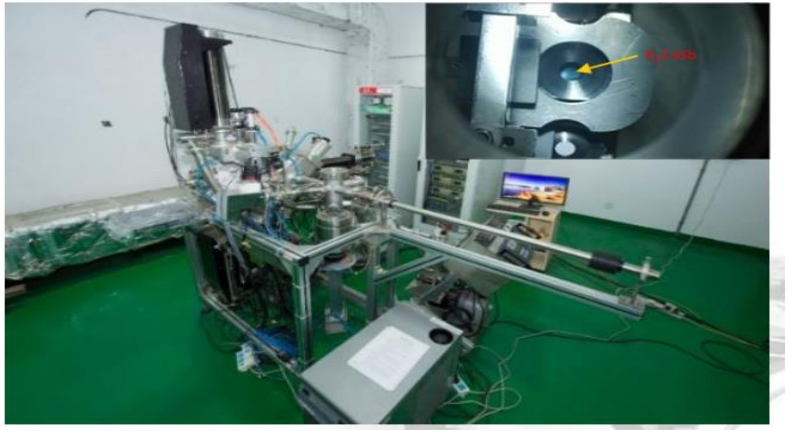


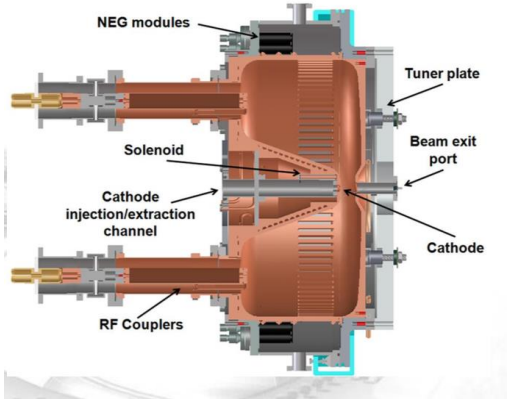


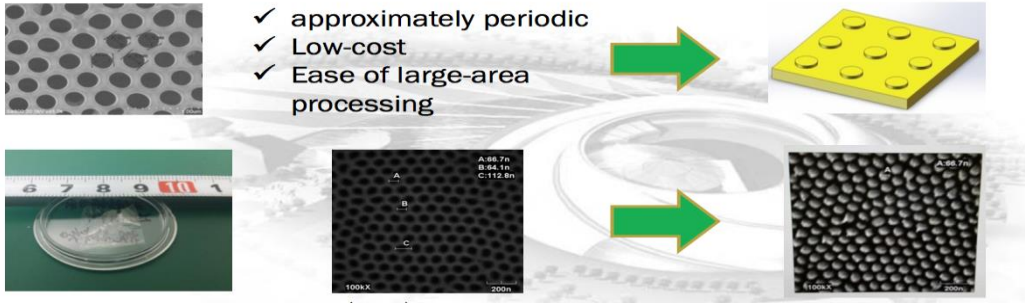


VHF gun and electron source development at SINAP

- Speaker: Zenggong Jiang

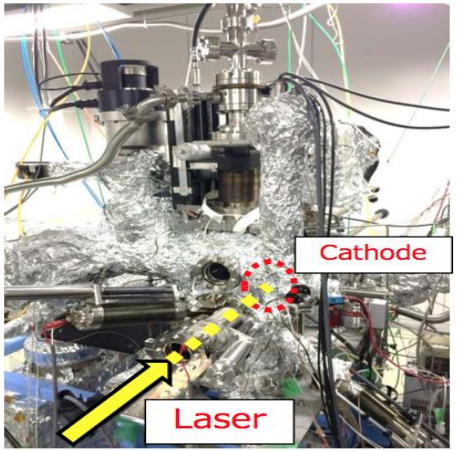


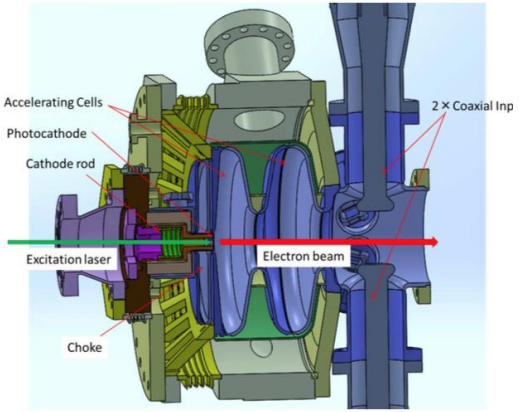


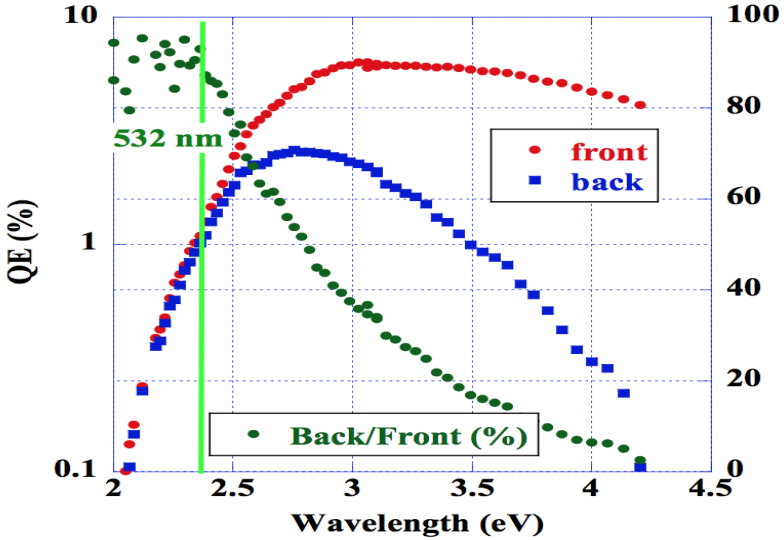


SRF gun using a transparent superconducting layer

Speaker: Taro Konomi



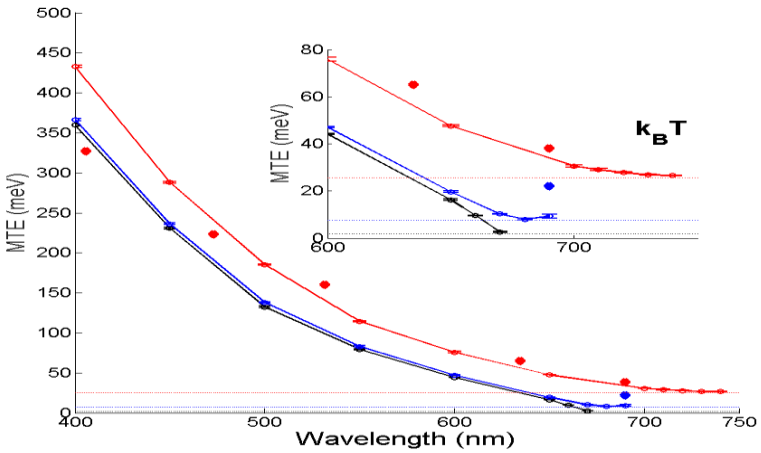


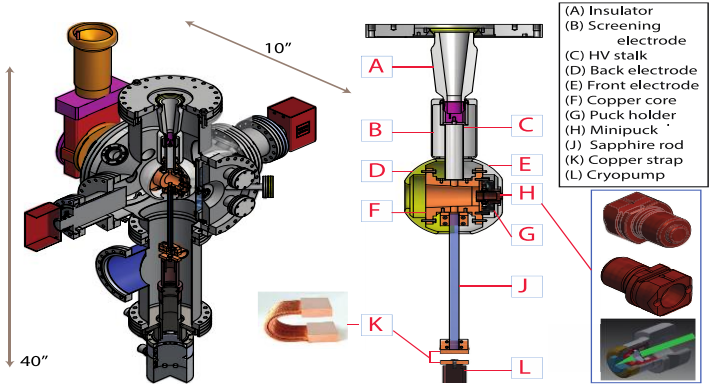


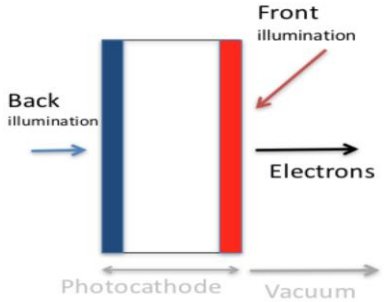
High brightness electron source using cryo-DC gun

- Speaker: Ivan Bazarov

~2 meV is predicted @ 20K







When you shine the laser from back, electrons travel longer through the cathode

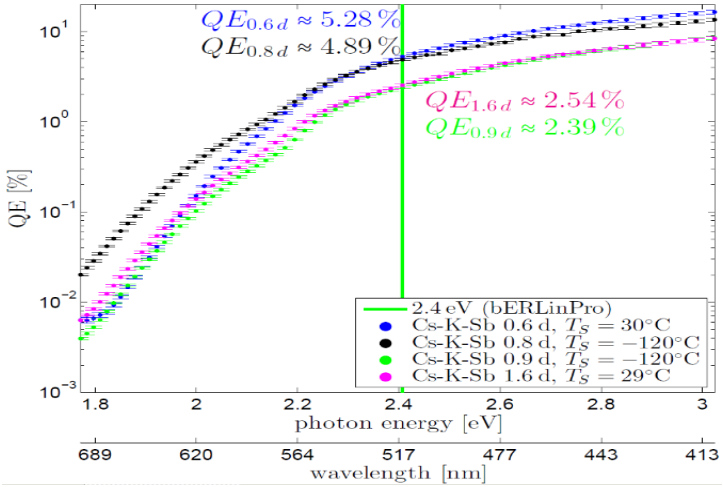
Semiconductor photocathode development for the bERLinPro SRF photoinjector

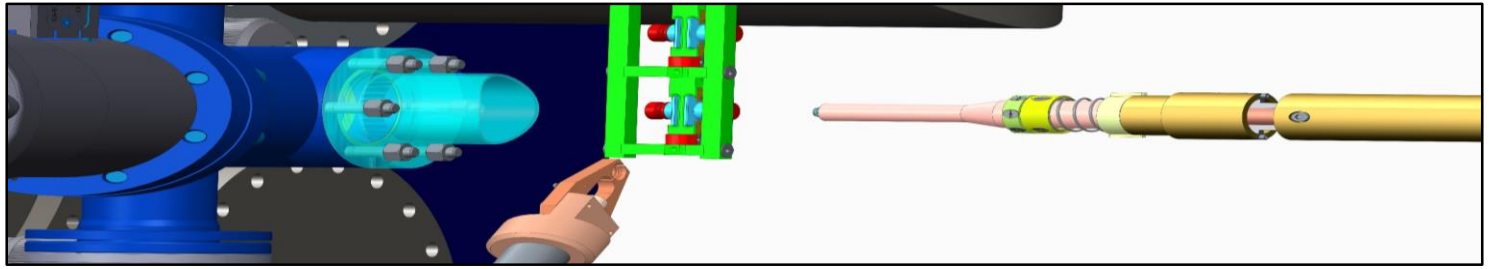
- Speaker:Julius Kühn

Photocathode History

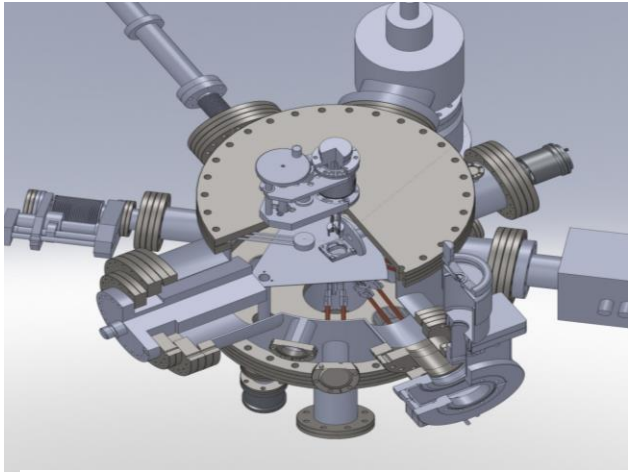
	No.	QE	λ (nm)
SEQ	P006	4.9 %	532
	P007	2.3%	515
K,Cs co-dep	P008	1.3%	515
	P009	4.9%	515
	P011	2.9%	515
	P013	7.3%	515
	P014	10.1%	515

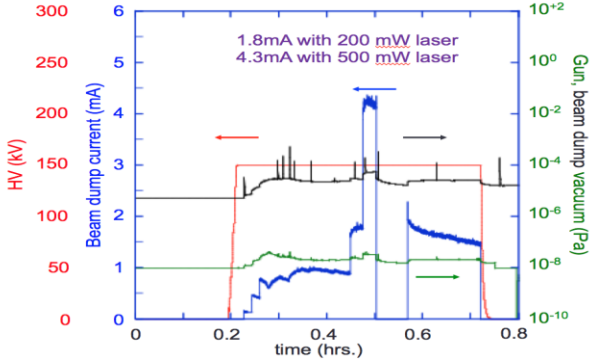
High QE CsK_2Sb photocathodes



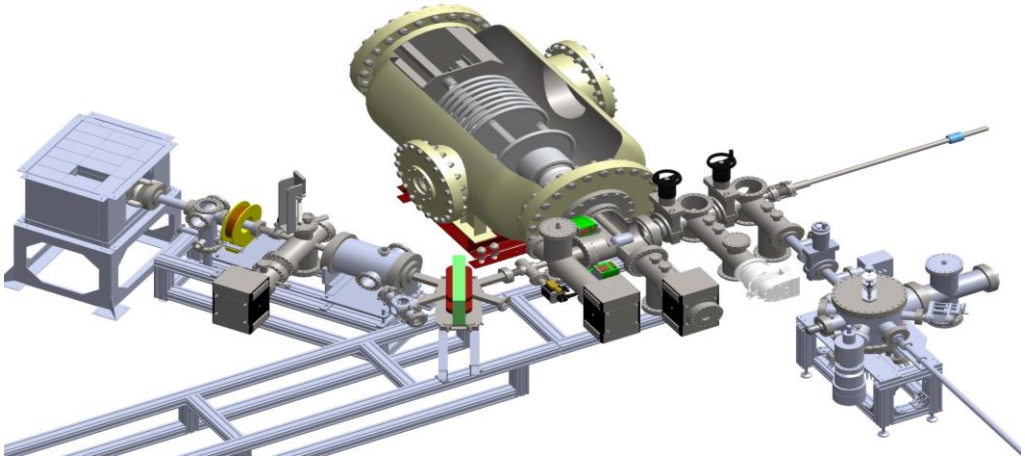


Development of a multialkali photocathode DC gun for high current operation

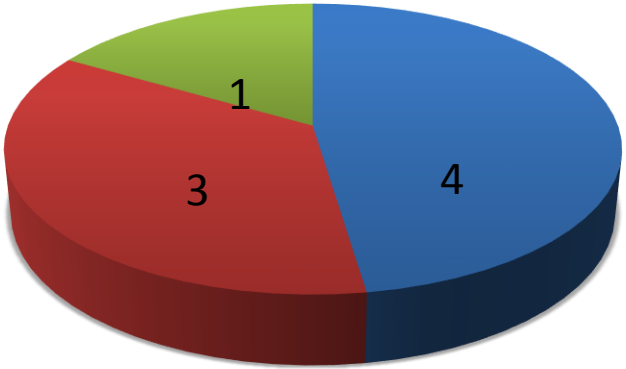




Speaker:N. Nishimori



Talks summary: Electron gun

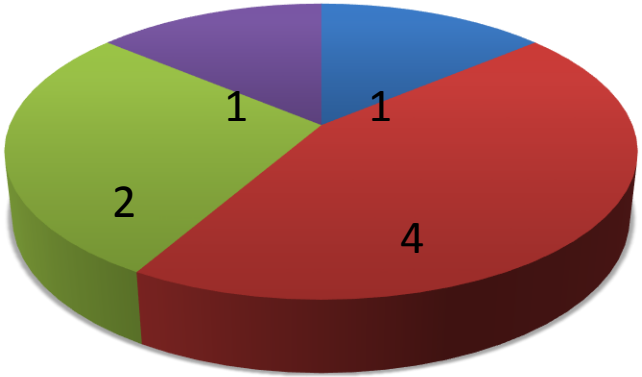


DC GUN

SRF GUN

DC SRF

8 invitation talks



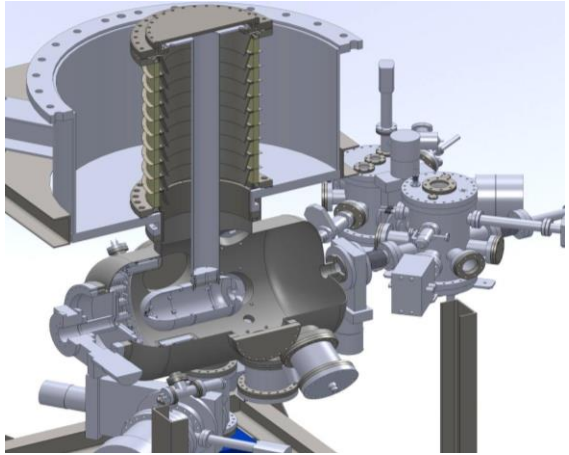
In preparation

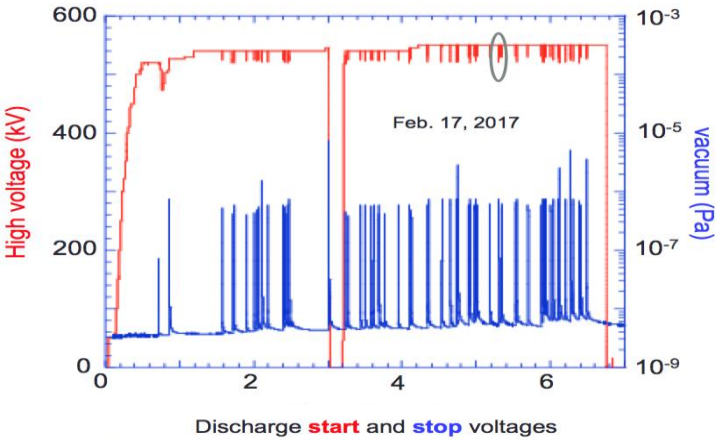
Beam commissioning

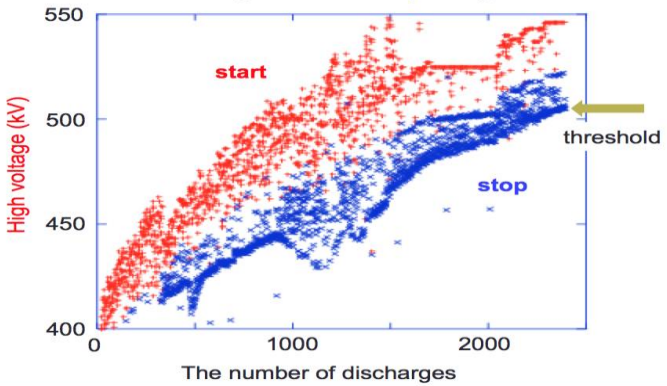
User

Commission results of the compact ERL High voltage DC gun

Speaker:N. Nishimori



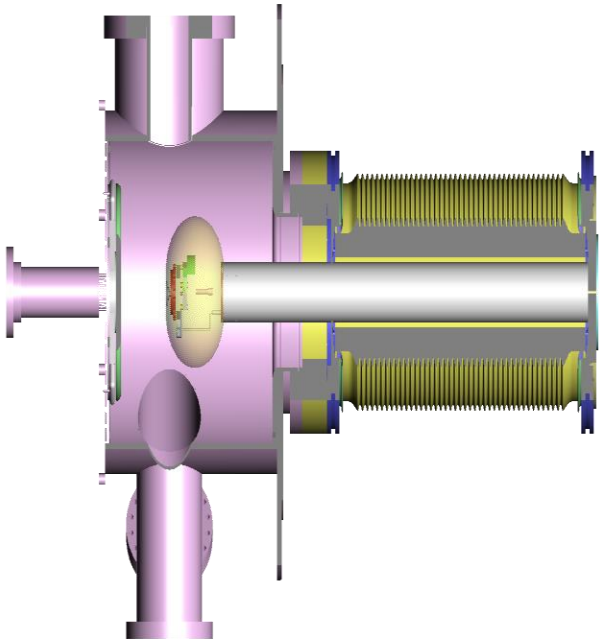


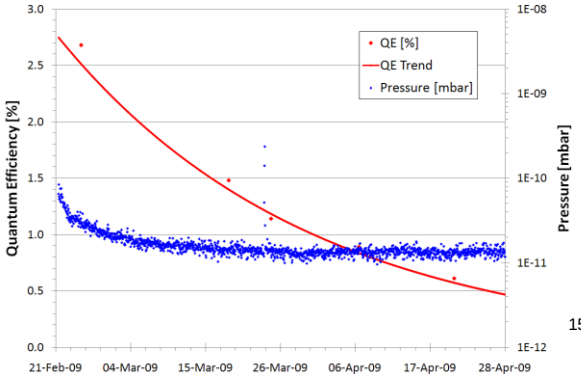


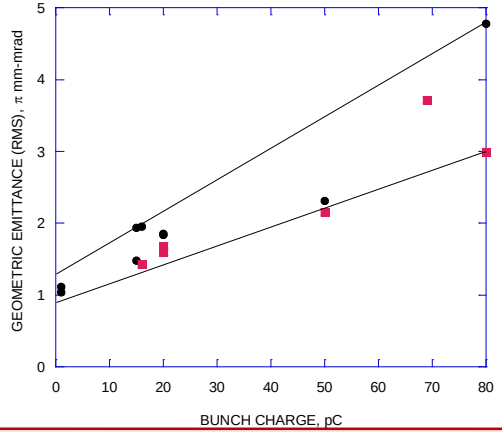
- ✓ Delivered 1mA-390keV beam with extraction charge > 30 C from GaAs cathode.
- ✓ Performed high voltage conditioning upto 550 kV.
- ✓ Delivered 450keV beam stably for more than 140 hours.

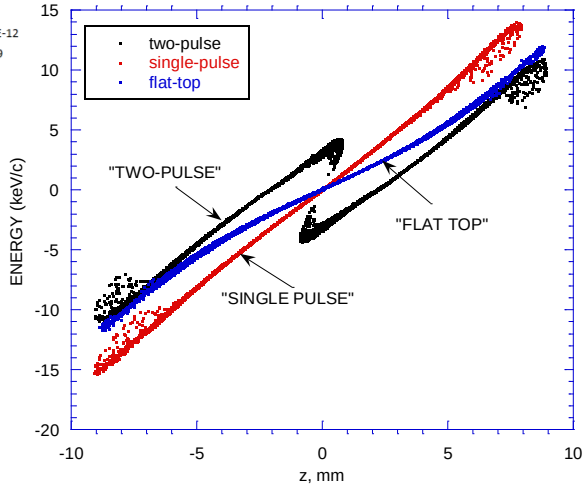
ALICE DC Photocathode Electron Gun

- Speaker:Lee Jones



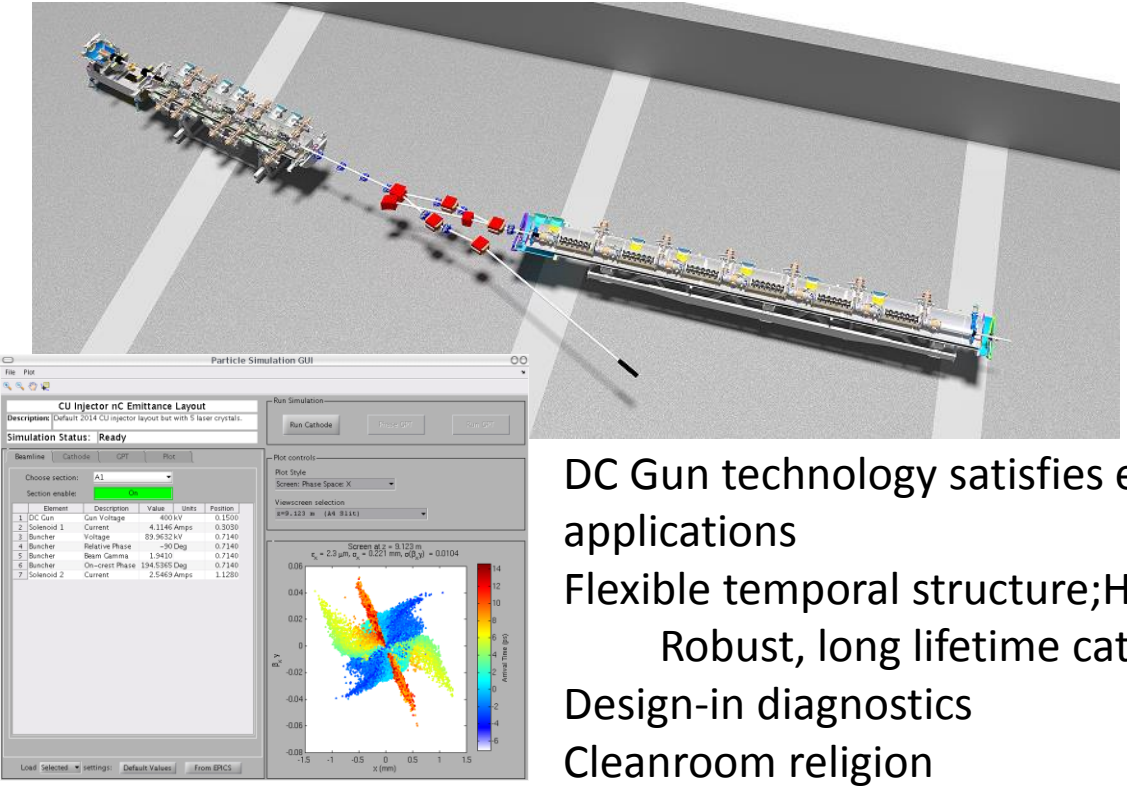


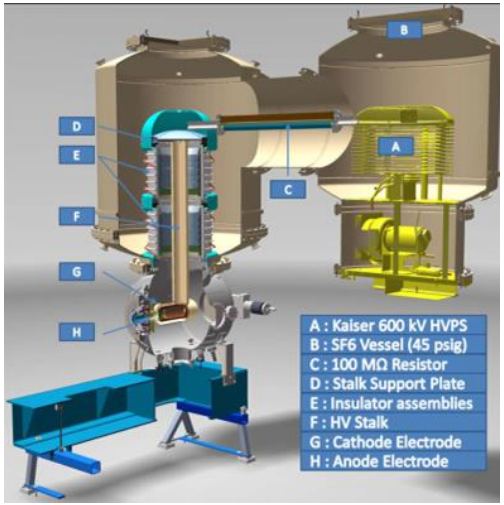




Injector Status and Challenges for CBETA

- Speaker:Karl Smolenski





DC Gun technology satisfies existing requirements for many applications

Flexible temporal structure;High currents, flexible bunch charge

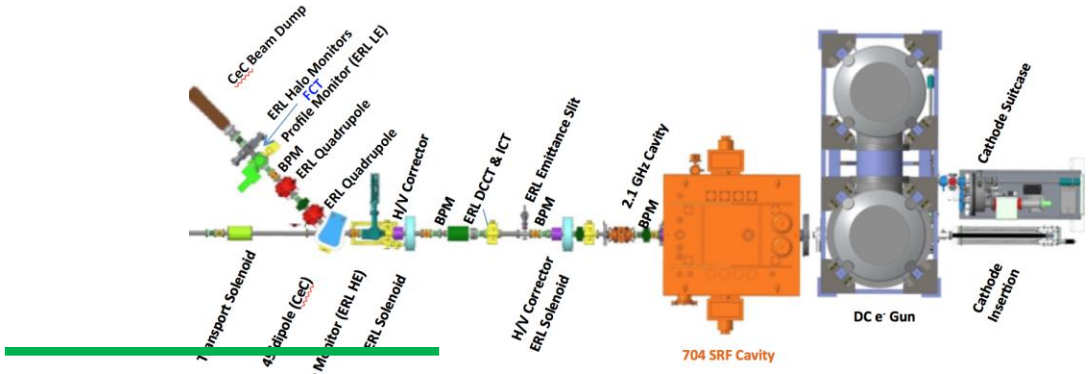
Robust, long lifetime cathodes

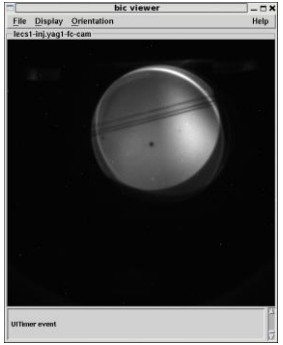
Design-in diagnostics

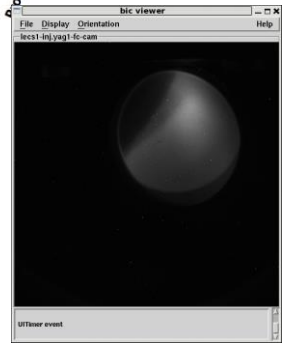
Cleanroom religion

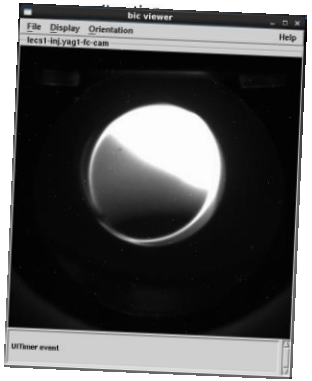
First Results of Commissioning DC Photocathode gun for RHIC Low Energy Electron Cooler (LEReC)

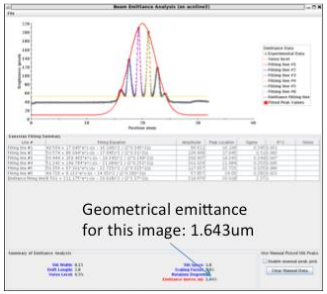
- Speaker:Dmitrv Kavran

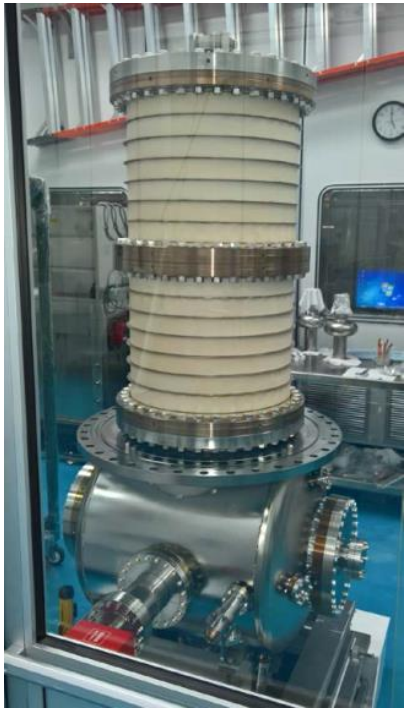






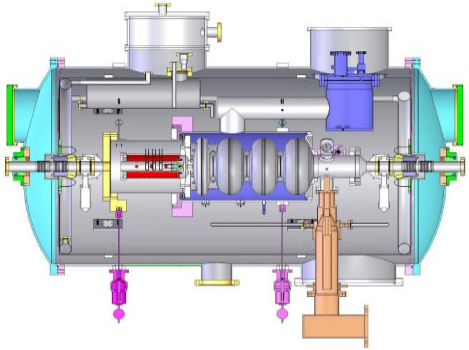


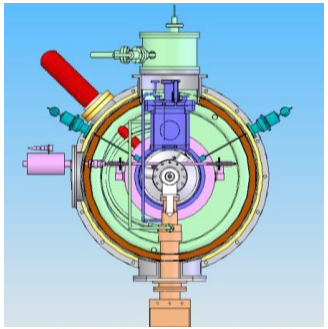


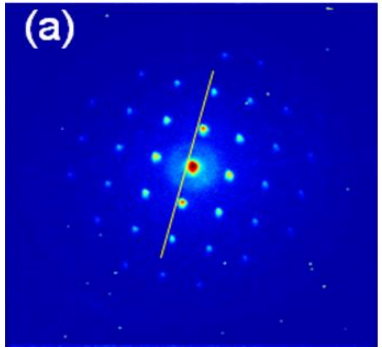


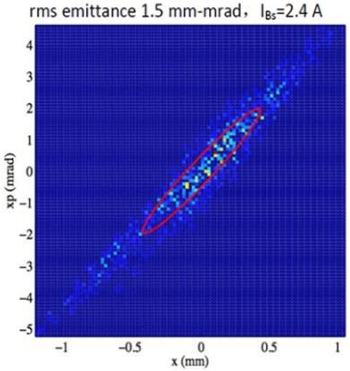
DC-SRF Photoinjector at Peking University

- Speaker:Huamu XIE





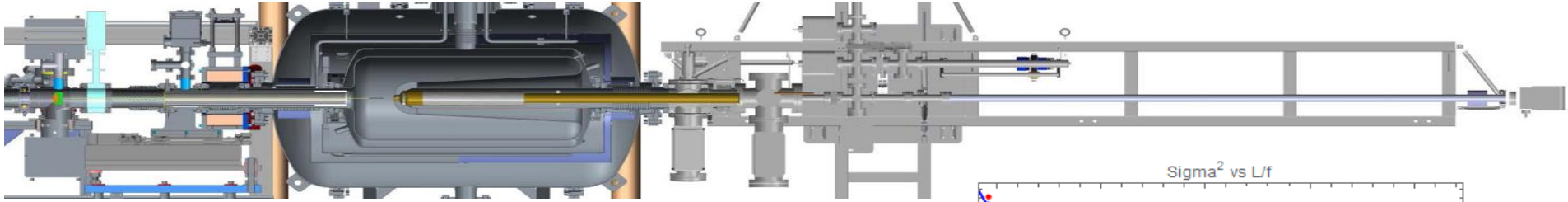


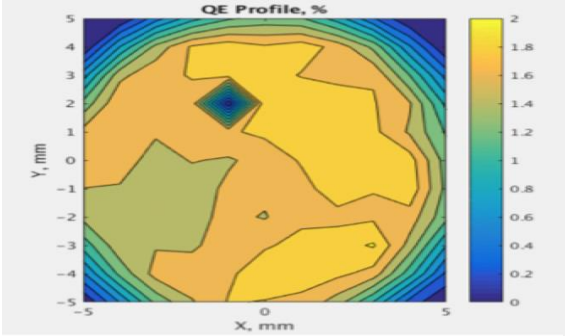


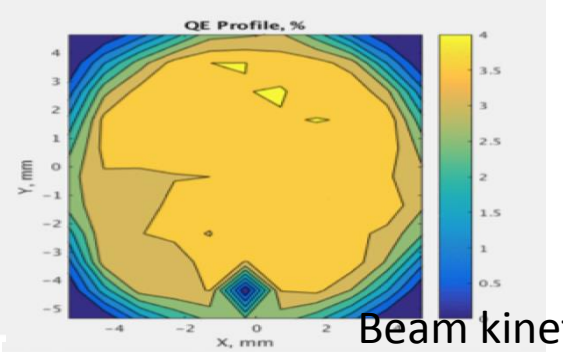
Parameter	Value	Unit
Eacc	14.5	MV/m
DC voltage	50	kV
Beam Energy	3.4	MeV
Beam current	~1.0	mA
Bunch length(FWHM)	~5	ps
RF amplitude instability	<0.1	%
RF phase instability	<0.02	degree
Dark current	<1.0	nA
Beam emittance	1.5	mm.mrad

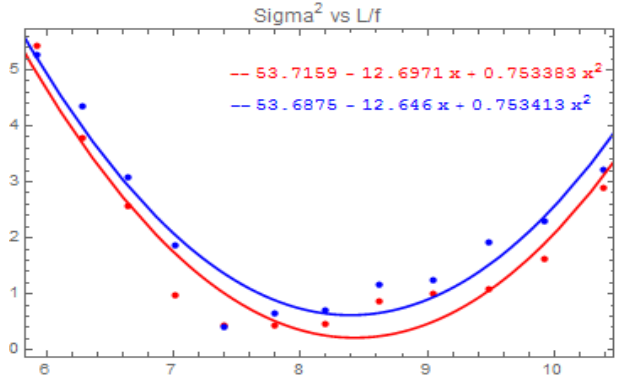
High Charge High Current Beam from BNL 113 MHz SRF Gun

- Speaker:Igor Pinayev





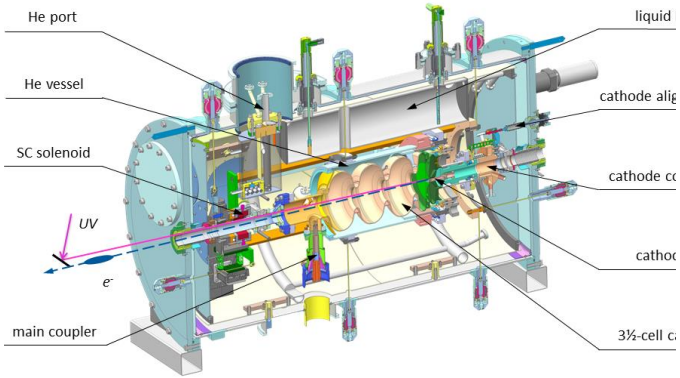


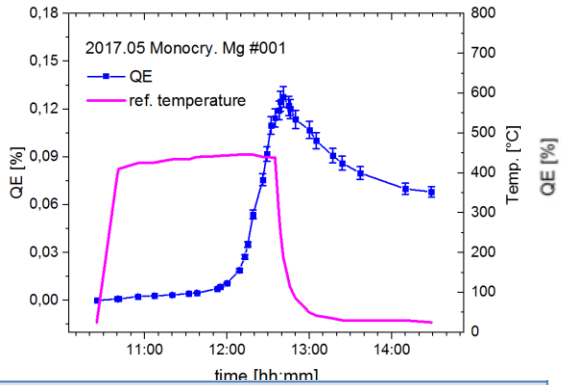


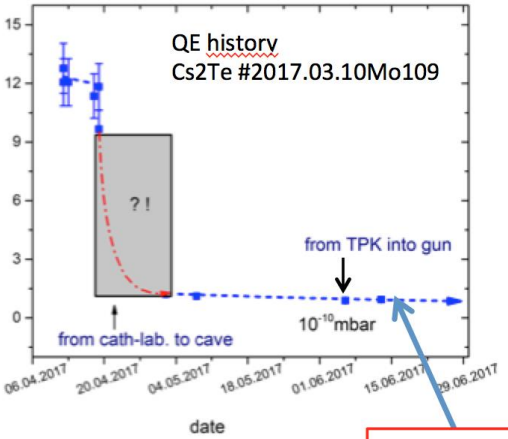
Beam kinetic energy is 1.04 MeV, beam charge 0.5 nC. Normalized emittance is 0.32 mm mrad.

Metal and Semiconductor Photocathodes in the HZDR SRF Gun

Speaker: J. Teichert







June 15, 2017
QE: ~1.3 %
25 h beam
4.2 C extracted

Mg (#207)	Mar. 17 – May 17	0.2 %	150 pC / 15 µA	cathode laser cleaned 3rd time, stable beam operation
Cs_2Te	since June 17	1.3 %	15 pC / 200 µA	13 MHz CW no multipacting, no dark current from PC prelimary results after 1 week

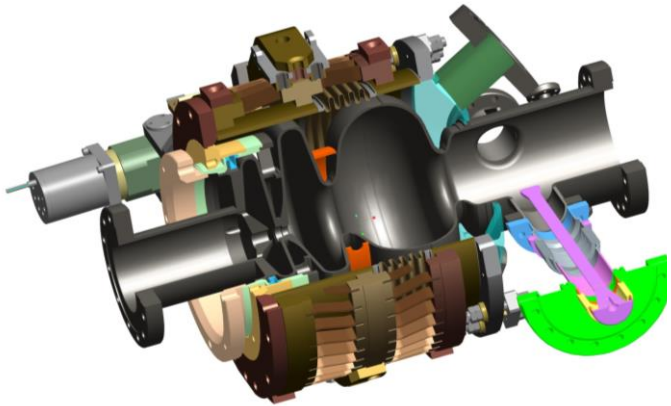
- Normal contacting photo cathodes operate successfully in SC cavities
- Metallic photocathodes can easily be used in SC cavity

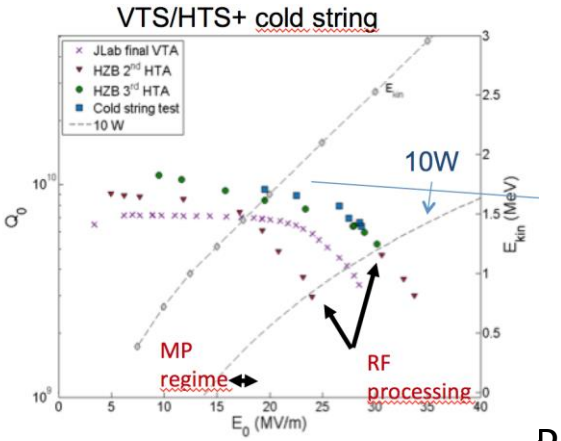
  Medium and high currents require semiconductor photocathodes

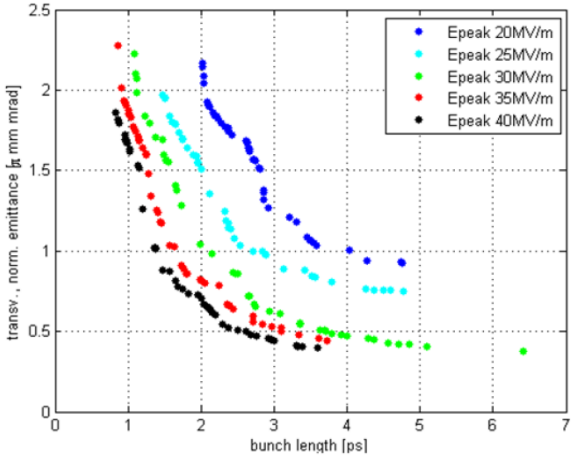
  - Cs2Te + UV light is still our choice for medium currents (1 mA)

The bERLinPro SRF Photoinjector system

- Speaker:Axel Neumann







Peak fields achieved:
E_{peak}=57.3 MV/m
B_{peak}=110.4 mT
Corresponds to E_{acc}=26 MV/m of a TESLA cavity