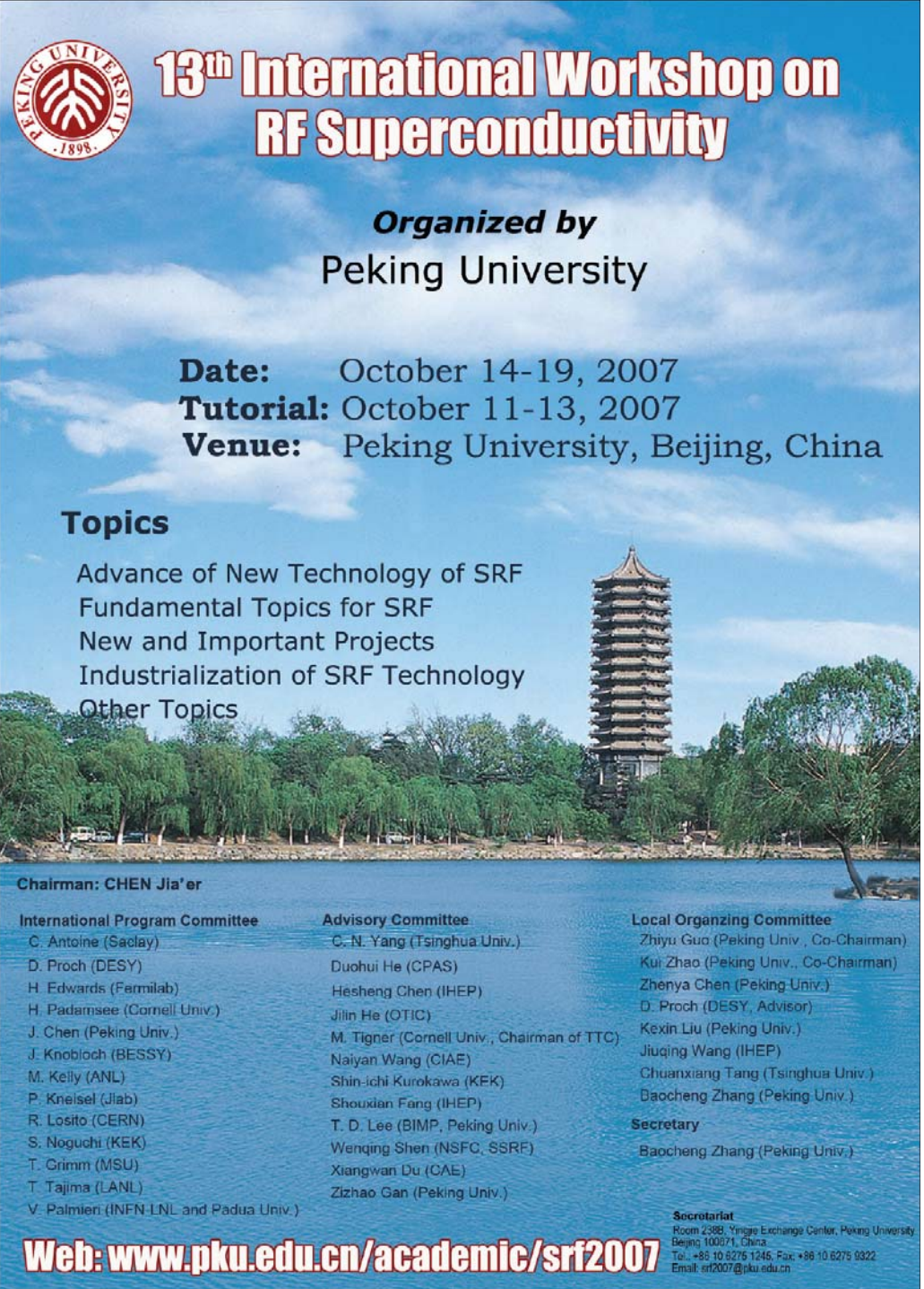


Tutorials during October 11-13

Workshop during October 14-19

Registrants: total 265
Chinese 70

Industrial sponsors 22

Support for students 13

Students price 2 x 1000 $

This workshop will be published in JACoW

We also try to get all previous SRF Workshops documented in JACoW, need financial support by laboratories

Sponsers of SRF 07

Tutorial 1a: General Aspects of Superconductivity. A.Gurevich (FSU)

Tutorial 1b: Basics of Superconducting RF. J.Knobloch (BESSY)

Tutorial 2a: Superconducting High Beta Cavities. .Sekutowicz (DESY)

Tutorial 2b: Design and Fabrication of Coupler for SC Cavities. W.Moeller (DESY)

Tutorial 3a: SC Cavities: Material, Fabrication and QA W.Singer (DESY)

Tutorial 3c: Limits in cavity performance D.Reschke (DESY)

Tutorial 4a: Low and Medium Beta Cavities and accelerators J.Delayen (JLab)

Tutorial 4b: LLRF Control systems and Tuning systems J.Delayen (JLab)

Tutorial 5a: Fundamentals of Cryogenic / Module Engineering B.Petersen (DESY)

Tutorial 5b: Operational Aspects of SC RF Cavities with Beam M.Liepe (Cornell)

Tutorial 6a: Thin Film Review. Enzo.Palmieri (INFN-LNL)

Tutorial 6b: SRF material other than Niobium. A.Valente (JLAB)

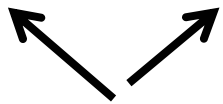

第十
届射频超
13th Inte tional Workshop
Tutorial
Peking Unive
Oct. 11-1
北京大学对外交流中心

What is the phase coherence?

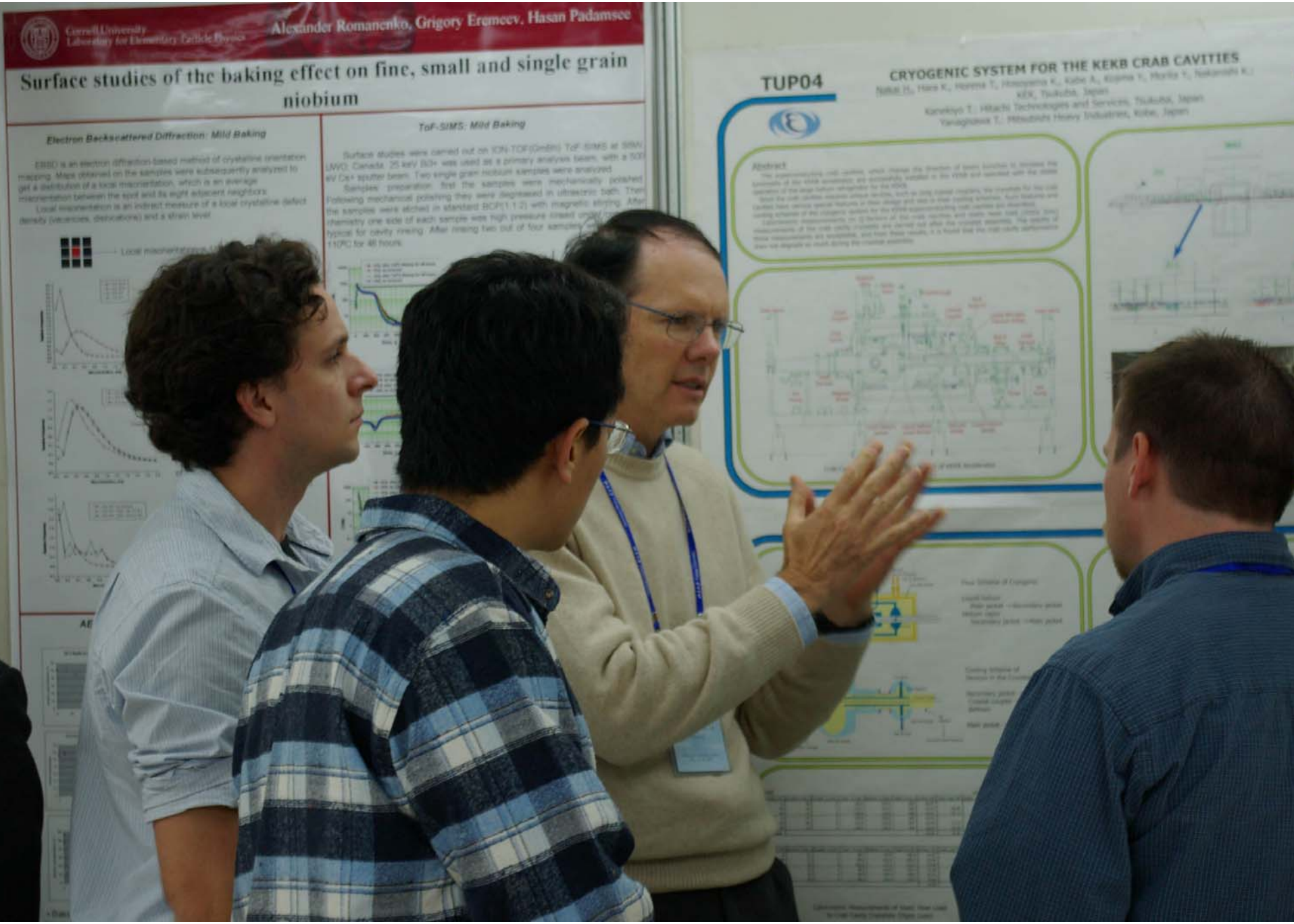
Incoherent (normal) crowd:
each electron for itself

Phase-coherent (superconducting) condensate
of electrons

SRF2007 Workshop Program						
	Sunday Oct.14	Monday Oct.15	Tuesday Oct.16	Wednesday Oct.17	Thursday Oct.18	Friday Oct.19
8:00am- 8:30am		Registration	Registration	Registration	Registration	Registration
8:30am- 9:00am			**Basic SRF**	**Students**	**Advances in SRF technology III && Hot Topic I**	**Future projects and new ideas I**
9:00am- 9:30am		Opening address				
9:30am-10:00am		**Progress Reports I**				
10:00am-10:30am						
10:30am-11:00am		coffee	coffee	coffee	coffee	coffee
11:00am-11:30am		**Progress Reports II**	**Advances in SRF technology I**	**Advances in SRF technology II**	**Hot Topc II**	**Future projects and new ideas II**
11:30am-12:00pm						
12:00pm-12:30pm					**Industrialization on SRF accelerators**	**Awards/Closing**
12:30pm- 1:00pm						
1:00pm- 1:30pm		Lunch	Lunch	Lunch	Lunch	Lunch
1:30pm- 2:00pm						
2:00pm- 2:30pm	Registration (till 9:00pm)	**Progress Reports III**	**Poster I Industry exhibition**	**Poster II Industry exhibition**	Excursion (Summer Palace boat tour)	Lab tours (PKU, IHEP, Tsinghua U)
2:30pm- 3:00pm						
3:00pm- 3:30pm						
3:30pm- 4:00pm						
4:00pm- 4:30pm		coffee	coffee	coffee		
4:30pm- 5:00pm		**Progress Reports IV**	**Poster I Industry exhibition**	**Poster II Industry exhibition**		
5:00pm- 5:30pm						
5:30pm- 6:00pm						
6:00pm- 6:30pm						



Poster: 172 Contributions

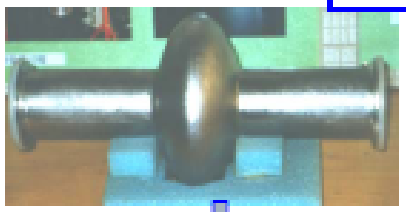

Cornell University
Laboratory for Elementary Particle Physics
Alexander Romanenko, Grigory Eremeev, Hasan Padamsee
Surface studies of the baking effect on fine, small and single grain niobium
Electron Backscattered Diffraction: Mild Baking
ToF-SIMS: Mild Baking
TUP04
CRYOGENIC SYSTEM FOR THE KEKB CRAB CAVITIES
Abstract


第十三届射频超导国际研讨会
13th International Workshop on RF Superconductivity
Peking University, China
Oct. 15–19, 2007

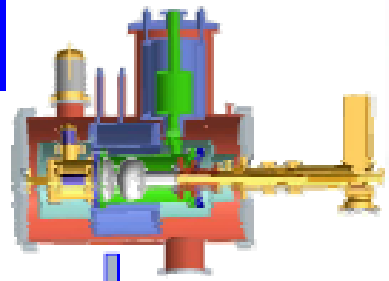
Session MO1: Progress Reports I (Sunny Hall, Yingjie Exchange Center)

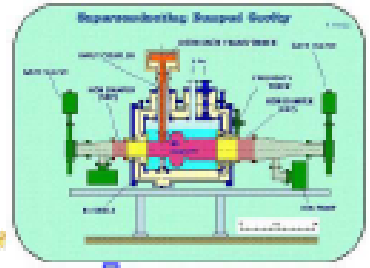
09:30-10:00	**The Growth of SRF in China**, Jia-er Chen (IHIP, School of Physics, Peking University)
10:00-10:40	**XFEL: Plans for 100 Cryomodules**, Lutz Lilje (DESY)
11:00-11:30	**SNS Commissioning and Upgrade Plans**, Isidoro Campisi (ORNL/SNS)
11:30-12:00	**Status of the Cornell ERL Injector Cryomodule**, Matthias Liepe (Cornell University)
12:00-12:30	**ERLP and 4GLS at Daresbury**, Peter McIntosh (STFC Daresbury Laboratory)
12:30-13:00	**FLASH Progress Report**, Elmar Vogel (DESY)
14:00-14:30	**Review of SRF Linac-based FELs**, Jens Knobloch (BESSY)
14:30-15:00	**Superconducting RF in Storage-Ring-Based Light Sources**, Sergey Belomestnykh (Cornell University)

Milestones of SRF in China



Beijing SRF Center
(PKU-IHEP)

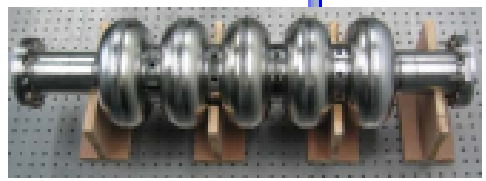




1988 1994 2000 2001 2002 2004 2005 2006 2007

PKU SRF
Lab founded

SRF based FEL
approved by MOST



Final assembly and horizontal test in IHEP

1. Assemble the damper with the beam taper

2. Mount the damper on the cryostat

3. Mount the coupler on the cryostat

4. Install the doorknob on the coupler

5. Ready for horizontal test at test stand

Layout of the SSRF Complex & Campus

- 150 MeV Electron Linac and 3.5GeV Booster & Storage Ring
- User operation scheduled on Spring 2009

Session MO1: Progress Reports, cont.

15:00-15:25	**SRF ACTIVITES AT IUAC, NEW DELHI AND OTHER LABORATORIES IN INDIA,** Amit Roy (Inter-University Accelerator Centre)
15:25-15:55	**MSU Re-accelerator - the Reacceleration of Low Energy RIBs at the NSCL**, Xiaoyu Wu (MSU/NSCL)
16:30-16:55	**The Spiral 2 Project: Construction Progress and Recent Developments on the SC Linac Driver**, Tomas Junquera (GANIL (CEA-CNRS))
16:55-17:15	**Recent Progress in the Superconducting RF Program at TRIUMF/ISAC**, Robert Laxdal (TRIUMF)
17:15-17:35	**Development of the superconducting CH-cavity and application to proton and ion acceleration**, Holger Podlech (IAP, Frankfurt University)
17:35-18:05	**ALPI QWR and Superconducting RFQ Operating Experience**, Giovanni Bisoffi (INFN – LABORATORI NAZIONALI DI LEGNARO)
18:05-18:25	**Construction and Commissioning of KEKB Superconducting Crab Cavities**, Kenji Hosoyama (KEK High Energy Accelerator Research Organization)

Inter-University Accelerator Centre Pelletron & Linac Booster

EBW

VAC FURNACE

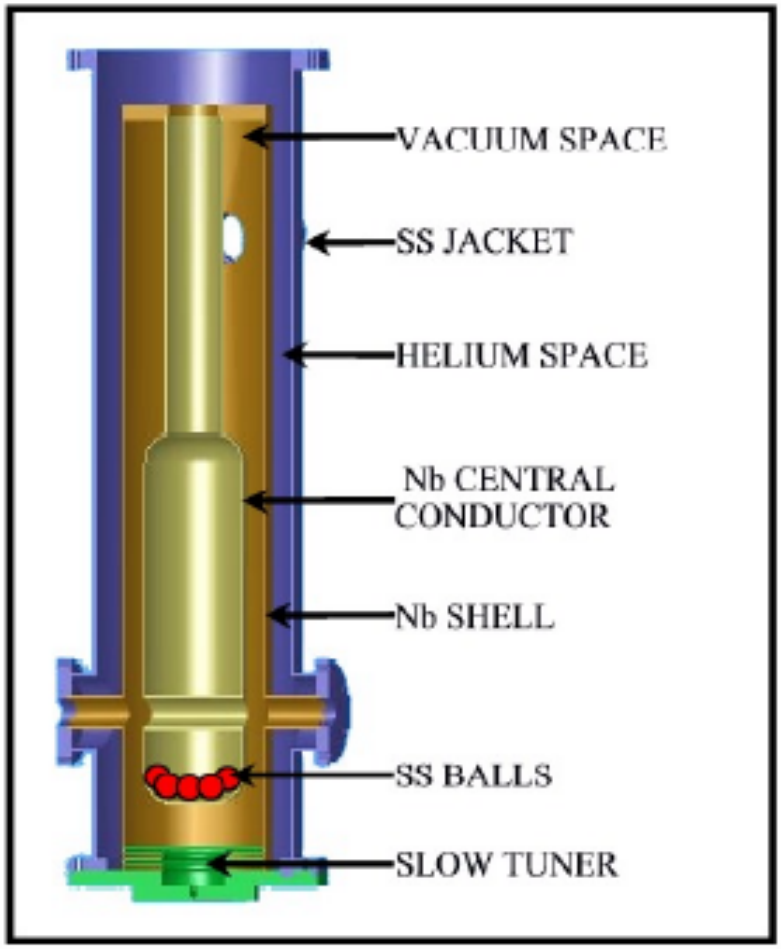
EP SET-UP

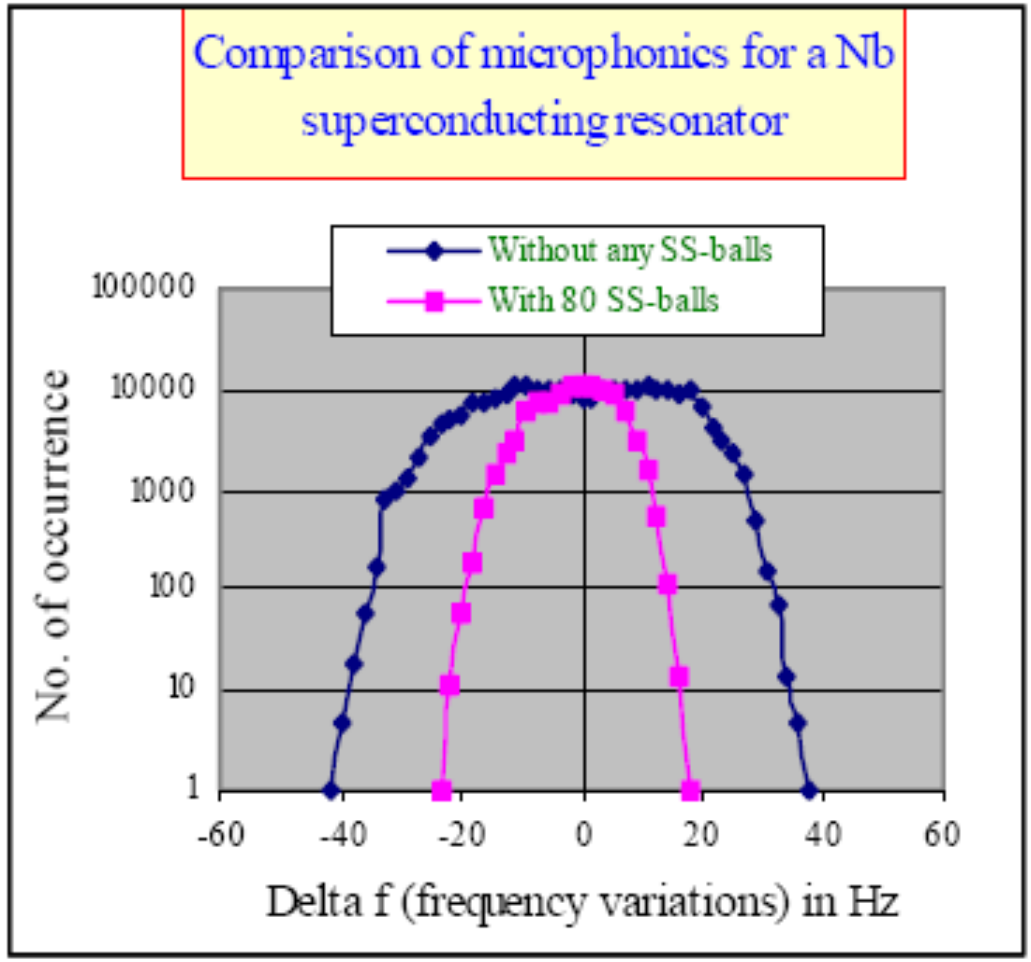
HPR

Test Cryostat

Parts of Nb QWR cavities

Damping of Mechanical vibrations of resonators studied.





S.Ghosh, P.N.Patra, B.K.Sahu, A.Rai, G.K.Chaudhuri, A.Pandey, D.Kanjilal and A.Roy, Physical Review ST AB 10 (2007) 042002

Session TU1: Basic SRF Topics (Sunny Hall, Yingjie Exchange Center)
Chairman: P. Kneisel (JLab). Each presentation includes 5 minutes for discussion

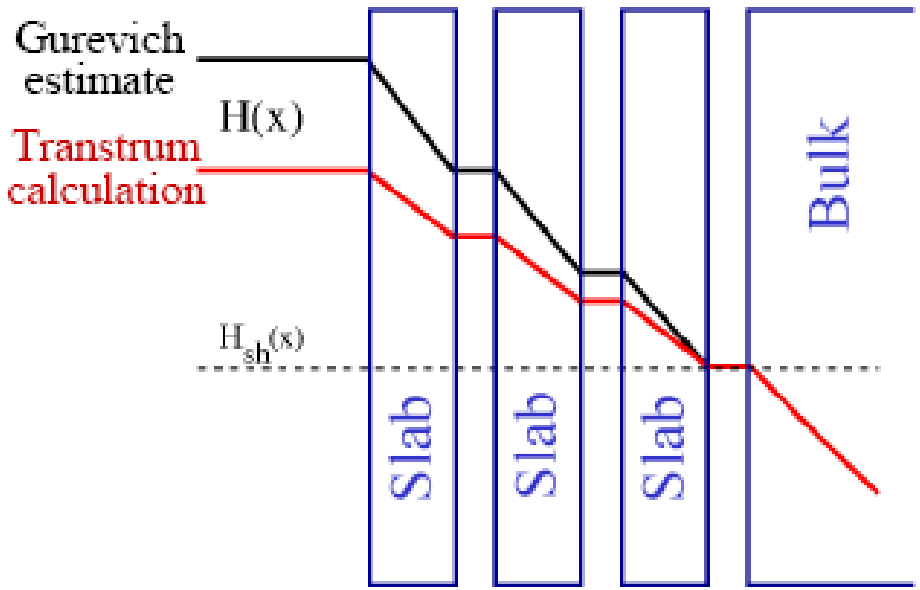
08:30-09:00 **Outstanding Issues in RF Superconductivity: What can Theory Tell Us?** James Sethna (Cornell University)

09:00-09:30 **Review of high field Q slope, cavity measurements**, Gianluigi Ciovati (Jefferson Lab)

09:30-10:00 **Review of high field Q-slope, surface measurement**, Alexander Romanenko (Cornell University)

10:00-10:30 **Dynamics of vortex penetration, jumpwise instabilities, dissipation and nonlinear surface resistance in strong rf fields**, Alex Gurevich (NHMFL, Florida State Univeristy)

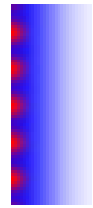
Thin slabs within Ginzburg-Landau



Thin slabs in parallel fields have enhanced H_{c1} (little flux expulsion, so little cost to ψ). Gurevich proposes to use slabs to protect bulk superconductor, $H(x)$ below H_{sh} at surface (Interesting theory questions about the AC dynamics arise from Gurevich's proposal.)

Elegant calculation of H_{sh} for thin film

First variation of free energy:
ψ(z), **H**(z) (1D solution)
Second variation, wavevector k:
eigen*function* analysis
δψ(z) exp(i k y),
δ**H**(z) exp(i k y)



H_{sh} from first zero eigenvalue
- thin film, Tinkham/Gurevich
- thick film = bulk $H_{sh}(\kappa)$

Conclusion

- Preliminary new calculation from basic superconductivity Eilenberger equations gives
  - $H_{sh} = 0.84\ H_c$ at $T = 0$ K and
  - $H_{sh} = 0.745\ H_c$ at $T = T_c$ in agreement with GL
- Encouraging for perfect Nb_3Sn and perfect MgB_2
- More work on the way to predict effect of real defects like grain boundaries….

Summary

- SIMS, XPS do not support O related pollution layer or its change due to baking
- Grain boundaries – no contribution observed
- Preferred crystalline orientation – not a cause
- Roughness is not playing a primary role but may be subsidiary
- Crystalline defect structure within penetration depth might play a role
  - Different in BCP and EP
  - Sensitive to mild baking
  - Preliminary - different in "hot" and "cold" spots
  - More studies needed

Session TU2: Advances in SRF Technology I (Sunny Hall, Yingjie Exchange Center)
Chairman: S. Noguchi (KEK). Each presentation includes 5 minutes for discussion

11:00-11:30	**Advances in Electropolishing / Rinsing and Assembly Techniques to Reduce Field Emission**, John Mammosser (ORNL/SNS) (withdrawed)
11:30-12:00	**Gradient Yield Improvement Efforts for Single and Multi-Cells AND Progress for very high gradient cavities**, Kenji Saito (KEK)
12:00-12:30	**Prospects for higher Tc superconductors for SRF application, Xiaoxing Xi** (Peking University and Pennsylvania State University)
12:30-13:00	**Review of SRF materials workshop**, Genfa Wu (Fermilab)

Conclusion

— For higher T_c superconductors beyond Nb for RF cavities, materials with high T_c, low residual resistivity, low microwave nonlinearity, and high H_c and H_{sh} are required for high Q and high ultimate RF critical field

— A15 compounds such as Nb_3Sn are promising

— Due to short coherence length and *d*-wave gap symmetry, high-T_c cuprate superconductors show poor power dependence

— Clean MgB_2 thin films have excellent properties:

- low resistivity (<0.1 μΩcm) and high T_c promise low BCS surface resistance
- long coherence length and short penetration depth promise high H_c ~ 820 mT
- smooth surface (RMS roughness < 10 Å)
- well connected grains and clean grain boundaries
- good thermal conductivity (free from dendritic magnetic instability)
- nonlinearity properties can be tuned by changing scattering in the two bands, e.g. by carbon doping

— Coating RF cavities with MgB_2 is feasible:

- films on some metallic substrates, polycrystalline films maintain good properties
- MgB_2 films prepared by reacting CVD boron films with Mg vapor show good properties. The technique is compatible to coating of cavities.

Session WE1: Student and Young Researchers Session I - Basic SRF & Thin films (Sunny Hall, Yingjie Exchange Center)
Chairman: V. Palmieri (INFN and Padua Univ). Each presentation includes 2 minutes for discussion

08:30-08:40	Temperature Map studies on Nearly Oxide-Free, Thin-Oxide and Standart-Oxide Cavities, G. Eremeev (Cornell University) **download**
08:40-08:50	THERMAL DESIGN STUDIES OF NIOBIUM SRF CAVITIES, Ahmad Aizaz (Michigan State University/NSCL) **download**
08:50-09:00	R&D on the 3+1/2 cell DC-SC photo-cathode injector, Wencan Xu (IHIP, School of Physics, Peking University)**download**
09:00-09:10	Improved Characterization of the Electropolishing of Niobium with Sulfuric and Hydrofluoric Acid Mixtures, Hui Tian (Virginia Polytechnic Institute & State University) **download**
09:10-09:20	An investigation of the influence of grain boundaries on flux penetration in high purity large grain niobium for particle accelerators, ZuHawn Sung (Applied Superconductivity Center, Florida State University) **download**

Session WE2: Student and Young Researchers Session II - SRF Technology - Work on couplers, tuners, LLRF etc. (Sunny Hall, Yingjie Exchange Center) **Chairman: J. Knobloch (BESSY).** Each presentation includes 2 minutes for discussion

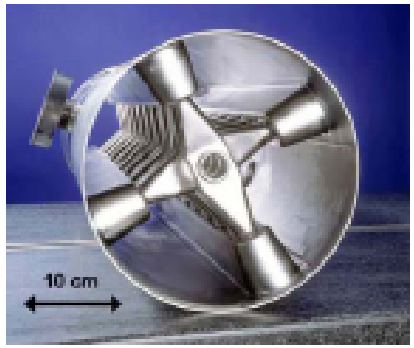
09:20-09:30	**Microphonics in CW TESLA cavities and their compensation with fast tuners, Axel Neumann (BESSY GmbH**) **download**
09:30-09:40	Different sputtering configurations for coating 1.5 GHz copper cavities, Giulia Lanza (University of Rome, Rome, Italy) **download**
09:40-09:50	The progress at LNL on Nb3Sn and V3Si, Silvia Deambrosis (INFN-LNL, Padua University) **download**
09:50-10:00	**Application of plasma cleaning to cavity processing, Niccolò Patron (INFN-LNL**) **download**
10:00-10:10	Electro-Mechanical Properties of Spoke-Loaded Superconducting Cavities, Zachary Conway (Argonne National Laboratory) **download**
10:10-10:20	First Test Results of Half-Reentrant Single-Cell Superconducting Cavities, Mandi Meidlinger (Michigan State University) **download**


Award to
Mr. Niccolò Patron, INFN-LNL
Prof. Dr. Ehrfeld Preuß
Chair of International Program Committee
Oct. 19, 2007
第十三届射频超
13th International Worksho
Peking Unive
Oct. 15–
北京大学对外交流中心

Session WE3: Advances in SRF technology II (Sunny Hall, Yingjie Exchange Center)
Chairman: T. Grimm (MSU). Each presentation includes 5 minutes for discussion

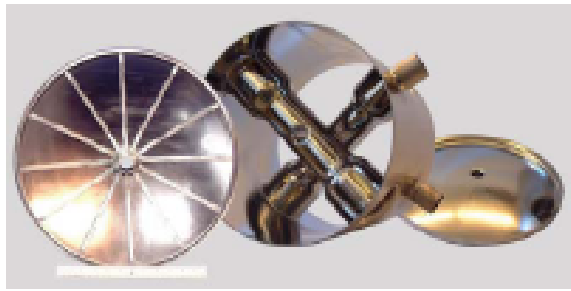
11:00-11:20	**Progress in Seamless Cavities,** Waldemar Singer (DESY)
11:20-11:40	**Status of SC Spoke Cavity Development**, Michael Kelly (Argonne National Laboratory)
11:40-12:00	**Review of New Tuner Designs**, Shuichi Noguchi (KEK)
12:00-12:20	**Review of HOM couplers and broadband absorbers**, Nikolay Solyak (Fermi National Accelerator Lab) (withdrawed)
12:20-12:40	**Overview of Input Power Coupler Developments, Pulsed and CW,** Sergey Belomestnykh (Cornell University)
12:40-13:00	**Superconducting RF Photoinjectors: an Overview**, Sekutowicz Jacek (DESY)

I. Background
Multi-Spoke Cavities



360 MHz β=0.1 Frankfurt

760 MHz β=0.2 Juelich



345 MHz β=0.40 ANL

345 MHz β=0.50 ANL

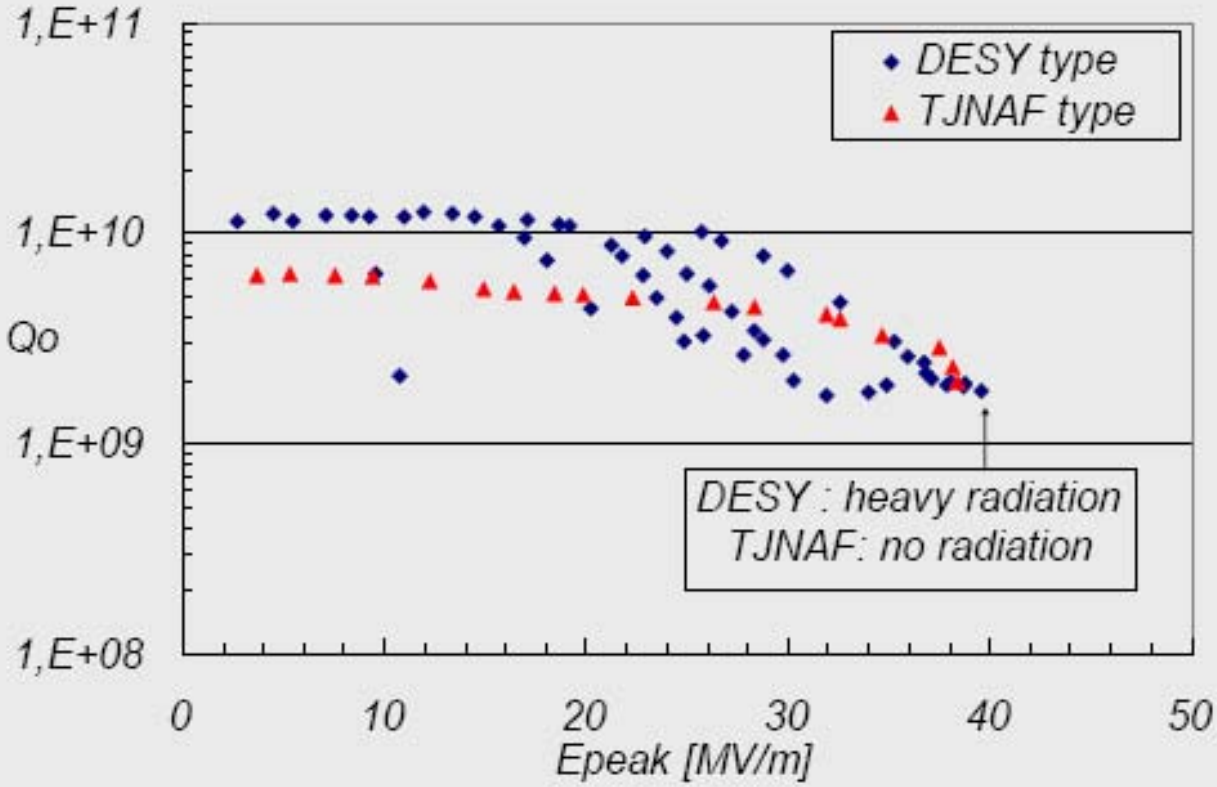
345 MHz β=0.63 ANL

References [6,7,8]

RF-PERFORMANCE TEST with the Pb spots.

The emitting 4 mm diameter lead spot at the center of the back wall of the DESY cavity was deposited by the arc-discharge method at A. Soltan INS.

The 7 mm diameter plug of the TJNAF cavity was electroplated with lead at Stony Brook University.



Session TH1: Advances in SRF technology III (Sunny Hall, Yingjie Exchange Center)
Chairman: R. Losito (CERN). Each presentation includes 5 minutes for discussion

08:30-09:00	**Review of the Thin Film Workshop**, Vincenzo Palmieri (INFN and University of Padua)
09:00-09:30	**Progress on Large Grain and Single Grain Niobium – Ingots and Sheet and Review of Progress on Large Grain and Single Grain Niobium Cavities**, Peter Kneisel (Jefferson Lab)

Hot Topic I
Sunny Hall, Yingjie Exchange Center. **outline, talk 1, talk 2, talk 3, talk 4**

09:30-10:30	Is large grain/ single crystal Nb an alternative material to polycristallline niobium? Hasan Padamsee (Cornell University)
10:30-11:00	**Coffee Break**

Hot Topic II
Sunny Hall, Yingjie Exchange Center. **outline**

11:00-12:00	Is 35 MV/m still a good choice for ILC? Dieter Proch (DESY)

Summary

- Large grain material provides some challenges in fabrication of cavities, but is no "show stopper"
- Single crystal sheets would be desirable, but no significant performance improvements over large grain niobium
- Performance is comparable with fine grain niobium
- But does not need electro-polishing, BCP is fine and very smooth surfaces can be achieved
- For projects such as the XFEL or cw applications cavities from large grain niobium offer "streamlined" procedures:
  - Bcp, shorter "in situ" baking times, high Q-values at high fields
- Reproducibility of performance after bcp treatment seems to be quite good – to be further " hardened"
- Cost advantage over poly-crystalline niobium needs to be realized , effective cutting method presently only pursued by W.C. Heraeus
- Further confidence will be "built up" with add. 9-cell cavities (cryomodule)

Session FR1: Future projects and new ideas I (Sunny Hall, Yingjie Exchange Center)

Chairman: H. Edwards (Fermilab). Each presentation includes 5 minutes for discussion

08:30-09:00 **BNL - electron cooling and electron-ion colliders**, Ilan Ben-Zvi (Brookhaven National Laboratory)

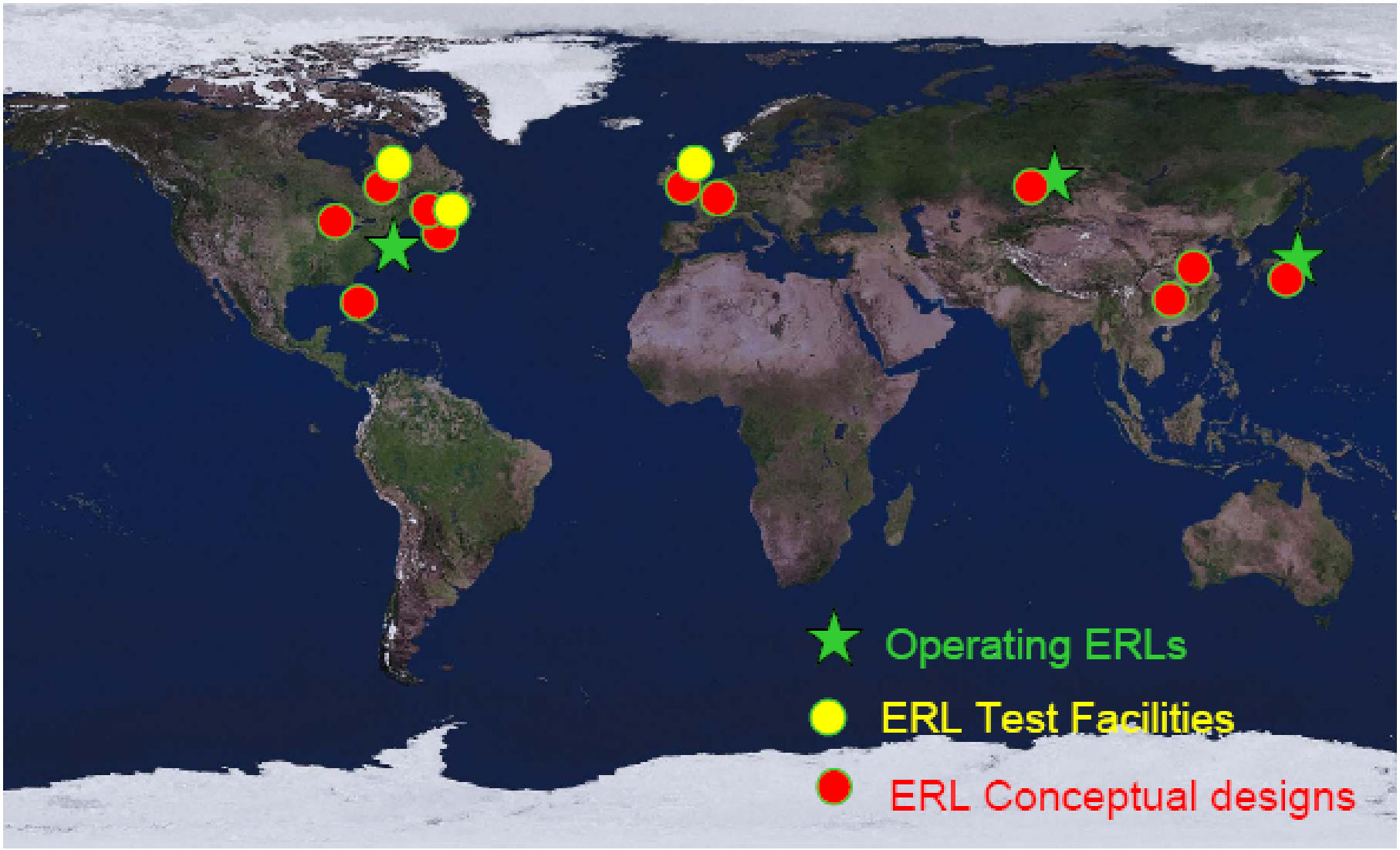
09:00-09:30 **High average power ERL FEL**, George Neil (Center for Advanced Studies of Accelerators, Jefferson Laboratory)

09:30-10:00 **Future High Intensity Proton Accelerators**, Frank Gerigk (CERN)

10:00-10:30 **CEBAF energy upgrade program including re-work of CEBAF cavities**, Joseph Preble (Jefferson Lab)

11:00-11:45 **ILC: Goals and Progress of SRF R&D**, Hitoshi Hayano (KEK)

Operating and Future ERLs




See You in 2009 at the
14th International WORKSHOP ON RF Superconductivity
Organized by BESSY and FZR, Germany