HIGHLIGHTS FROM THE CLASS OF 2020

What are today's students working on?

What were yesterday's students working on?

Jean Delayen

Center for Accelerator Science
Old Dominion University
and
Thomas Jefferson National Accelerator Facility

What was the class of 1970-1980 working on

- Materials
  - Lead and Pb-Sn alloys

Residual microwave surface resistance of superconducting lead*

John M. Pierce

Physics Department, University of Virginia, Charlottesville, Virginia 22901

(Received 13 July 1972)

J. Appl. Phys., Vol. 44, No. 3, March 1973

FIELD DEPENDENT EFFECTS ON SUPERCONDUCTING LEAD LAYERS AT HIGH RF-POWER LEVELS

W. KÜHN, P. KNEISEL, H. P. SCHTTENHELM, O. STOLTS

Institut für Experimentelle Kernphysik. Karlsruhe GFR

presented by A. Citron

Yerevan 1969

MEASUREMENT OF THE DEPENDENCE ON FREQUENCY OF THE RESIDUAL RESISTANCE OF SUPERCONDUCTINC LAYERS OF LEAD

L. SZECSI

Institut für Experimentelle Kernphysic Karlsruhe, GFR

presented by A. Citron

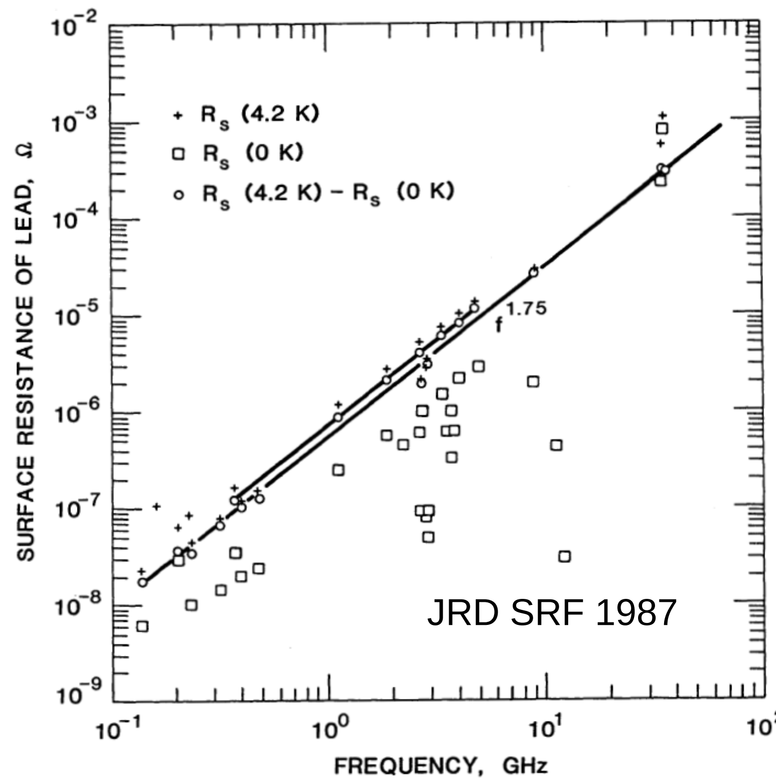
MEASUREMENTS AT HIGH ELECTRIC FIELD STRENGTHS ON SUPERCONDUCTING ACCELERATOR CAVITIES *

H. A. Schwettman, P. B. Wilson, and G. Y. Churilov [1]

Department of Physics and High Energy Physics Laboratory, Stanford University, Stanford, California (USA)

(Presented by H. A. Schwettman)

Frascati 1965



JRD SRF 1987

Figure 1. Frequency dependence of the surface resistance of Pb.

What was the class of 1970-1980 working on?

- Materials
  - Niobium

SUPRALEITENDE NIOBRESONATOREN IM

MILLIMETERWELLENBEREICH

WUB - DI 83 - 1
JUNI 1983

GÜNTER MÜLLER

FACHBEREICH PHYSIK
BERGISCHE UNIVERSITÄT - GESAMTHOCHSCHULE WUPPERTAL
BUNDESREPUBLIK DEUTSCHLAND

SURFACE PREPARATION OF NIOBIUM

P. Kneisel

Kernforschungszentrum Karlsruhe
Institut für Kernphysik
P.B. 3640
7500 Karlsruhe
Federal Republic of Germany

SRF 1980
Karlsruhe

What was the class of 1970-1980 working on?

- Materials
  - Nb3Sn and other Nb alloys

IEEE TRANSACTIONS ON MAGNETICS, VOL. MAG-15, NO. 1, JANUARY 1979

MEASUREMENTS OF SUPERCONDUCTING Nb_3Sn CAVITIES IN THE GHz RANGE

P. Kneisel, O. Stoltz, J. Halbritter[+]

SURFACE IMPEDANCE OF SUPERCONDUCTING Nb_3Sn

G.Arnolds, R.Blaschke, H.Piel, D.Proch [*]

HIGH FIELDS IN SUPERCONDUCTING Nb_3Sn ACCELERATING STRUCTURES

G.Arnolds, R.Blaschke, H.Piel, D.Proch[*]

Juni 1976 KFK-Ext. 3/76-4

Institut für Experimentelle Kernphysik

Untersuchung von supraleitenden Inhomogenitäten in Nb und Nb_3Sn mit Eindringtiefenmessungen $\Delta\lambda(T,f,B_{ac})$

W. Schwarz

MICROWAVE SUPERCONDUCTIVITY OF Nb_3Sn

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

in Partial Fulfillment for the Degree of

Doctor of Philosophy

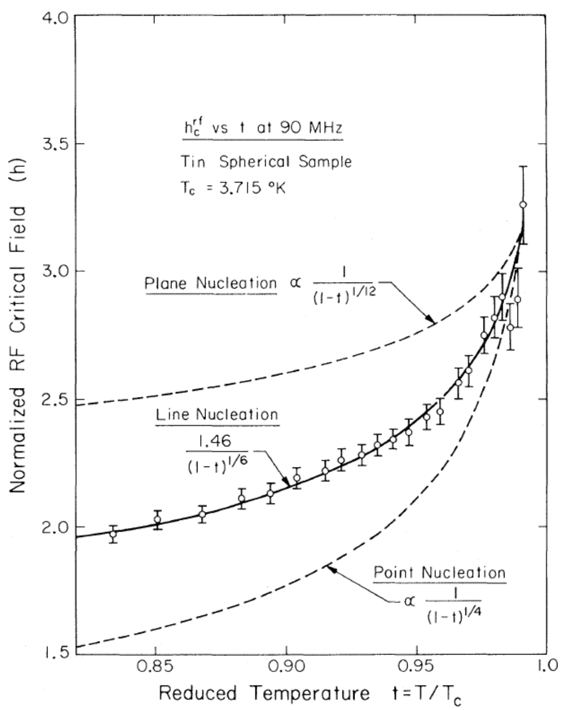
by

James Bradley Stimmell

August 1978

What was the class of 1970-1980 working on?

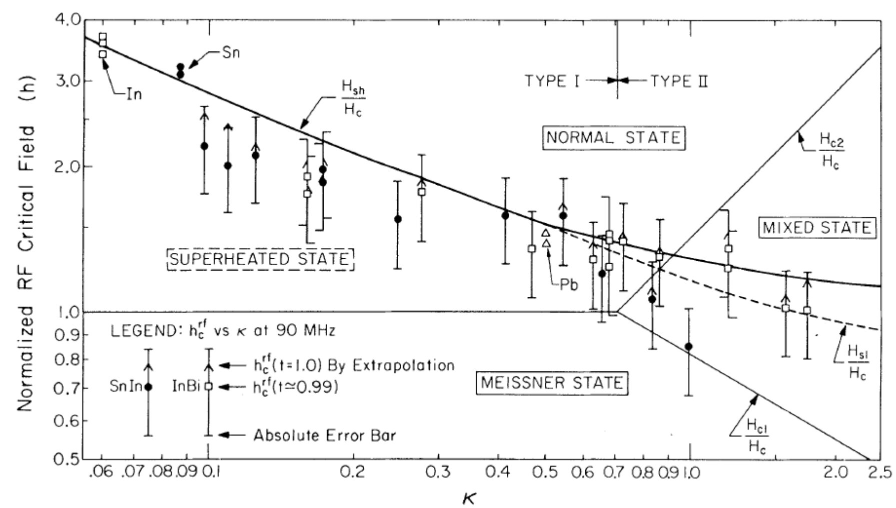
- Properties of SRF materials
  - Surface resistance
  - Critical and superheating fields



Critical rf Magnetic Fields for Some Type-I and Type-II Superconductors

T. Yogi, G. J. Dick, and J. E. Mercereau
Department of Physics, California Institute of Technology, Pasadena, California 91125

(Received 23 May 1977)



What was the class of 1970-1980 working on?

- Field Emission

PAC 1977

A POLISHING PROCEDURE FOR HIGH SURFACE ELECTRIC FIELDS IN SUPERCONDUCTING LEAD RESONATORS*

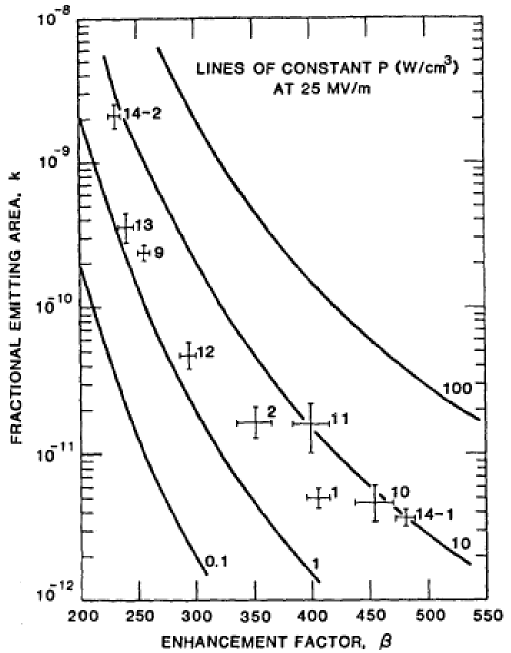
G. J. Dick, J. R. Delayen, and H. C. Yen
California Institute of Technology
Low Temperature Physics, 63–37
Pasadena, California 91125

FELDABHÄNGIGE WIDERSTÄNDE UND FELBEGRENZENDE PHÄNOMENE IN SUPRALEITENDEN HOCHFREQUENZRESONATOREN+

von

W. Kühn

Gesellschaft für Kernforschung m.b.H.,
Karlsruhe



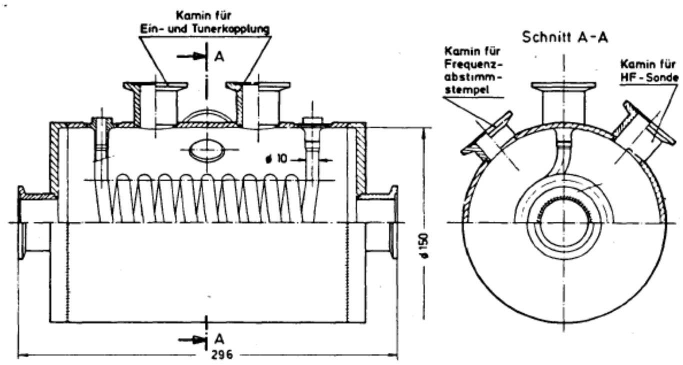
JRD SRF 1987

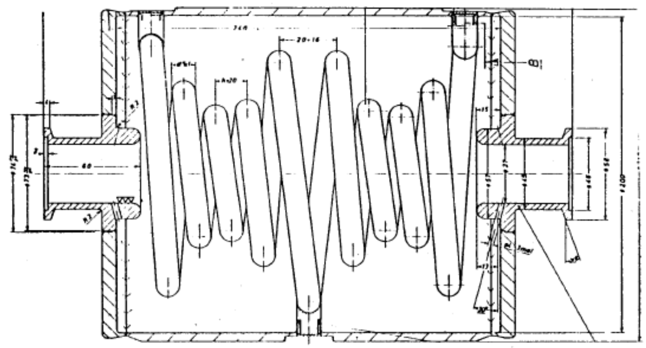
Figure 9. Fractional emitting area vs enhancement factor for several unpolished, unconditioned Pb surfaces (from [D12]).

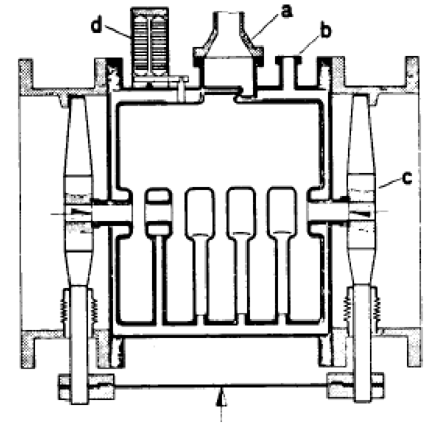
What was the class of 1970-1980 working on?

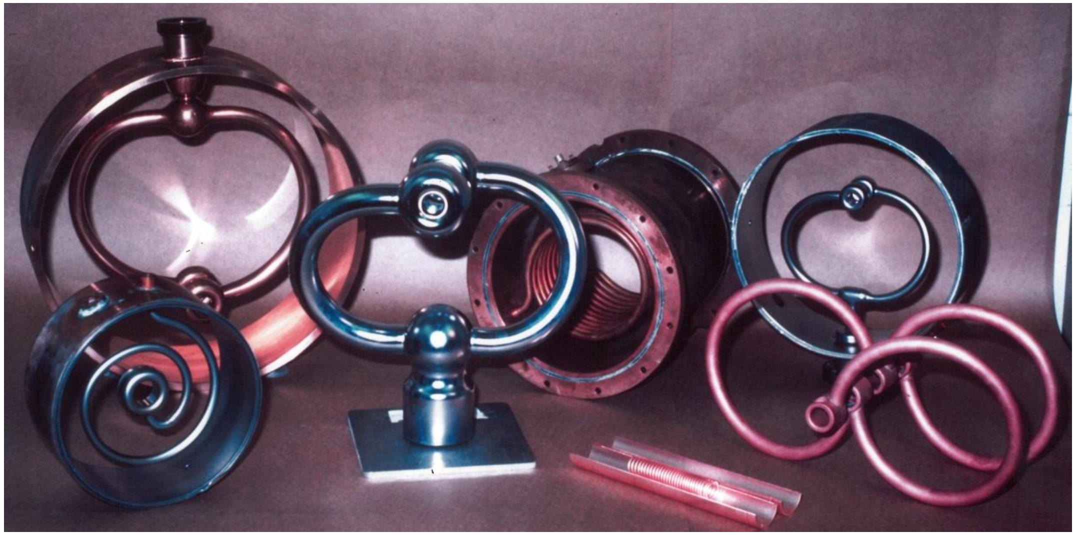
- Electromagnetic structures

Karlsruhe





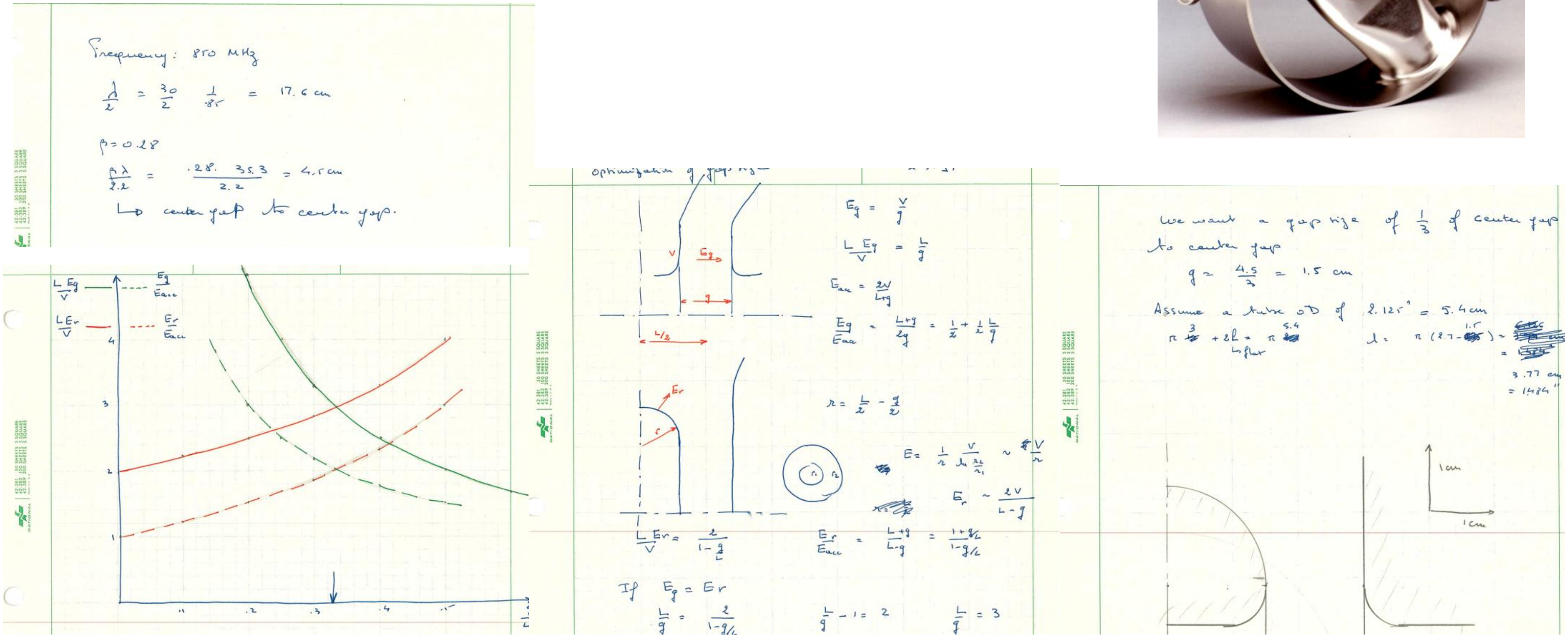




Caltech

What was the class of 1970-1980 working on?

- What tools did we have?
  - Slide rule, log table
  - If we were lucky, an adding machine and later a pocket calculator



What was the class of 1970-1980 working on?

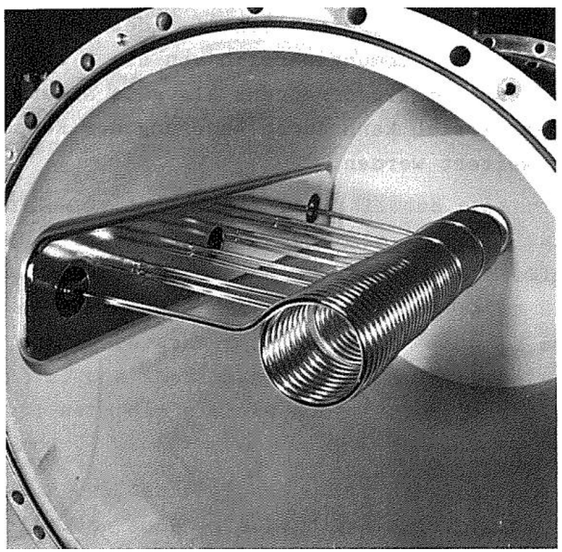
- LLRF

Dezember 1971 KFK 1493

Institut für Experimentelle Kernphysik

Ponderomotorische Stabilität von Hochfrequenzresonatoren und Resonatorregelungssystemen

D. Schulze



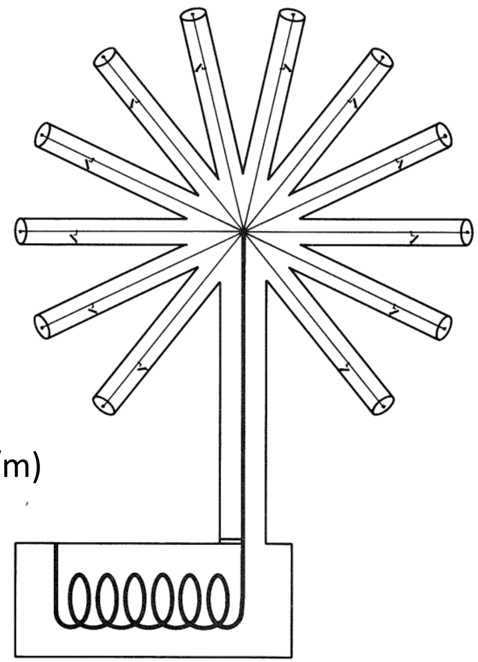
$$k_{\mu} = -460 \text{ kHz/(MV/m)}$$

Februar 1975 KFK 2094

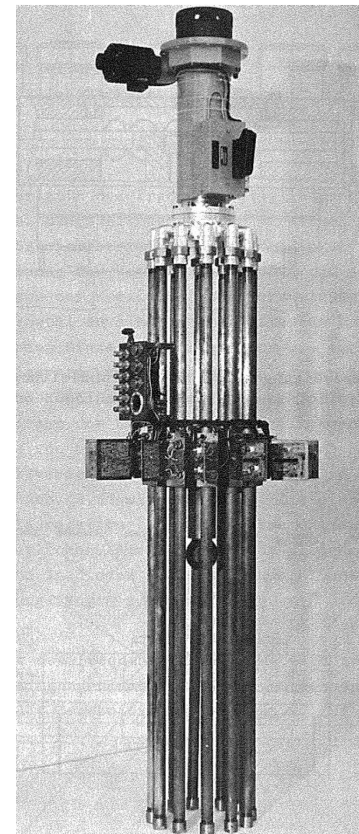
Institut für Experimentelle Kernphysik

Phasensynchronisierung supraleitender Beschleunigungsresonatoren

G. Hochschild



WENDELRESONATOR



What was the class of 1970-1980 working on?

- LLRF

PHASE AND AMPLITUDE STABILIZATION

OF SUPERCONDUCTING RESONATORS

Thesis by

Jean Roger Delayen

In Partial Fulfillment of the Requirements

for the Degree of

Doctor of Philosophy

California Institute of Technology

Pasadena, California

1978

(Submitted August 8, 1977)

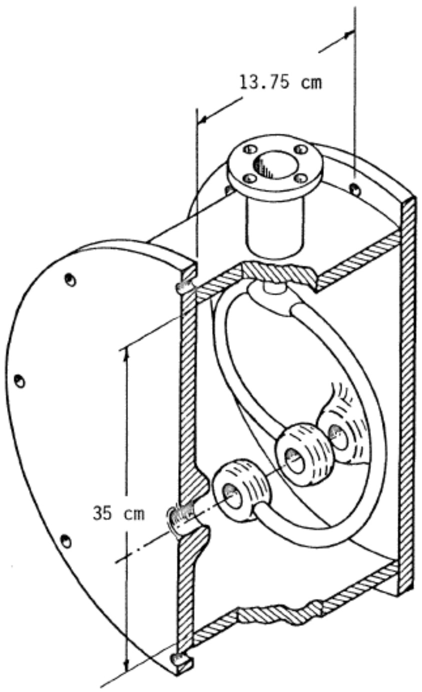


Fig. 1.2. Drawing of a 150 MHz split-ring resonator.

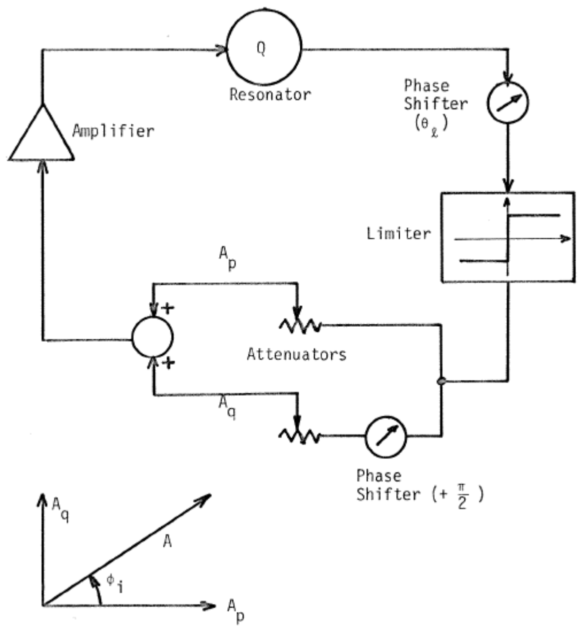


Fig. 2.3 Principle of stabilization of a self-excited loop by addition of a signal in quadrature

What was the class of 1970-1980 working on?

- Multipacting

UNTERSUCHUNGEN ZU FELDBEGRENZUNGSPHÄNOMENEN UND

OBERFLÄCHENWIDERSTÄNDEN VON SUPRALEITENDEN RESONATOREN

UDO KLEIN

FACHBEREICH PHYSIK

UNIVERSITÄT - GESAMTHOCHSCHULE WUPPERTAL

BUNDESREPUBLIK DEUTSCHLAND

WUB - DI 81 - 2

DEZEMBER 1981

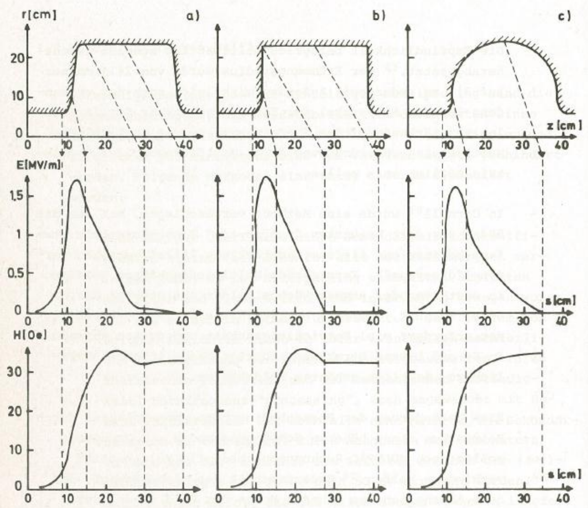


Abb. 3 Verschiedene Resonatorgeometrien und deren Feldverteilung auf der Oberfläche bei 1 MV/m Beschleunigungsfeldstärke (nach LALA). Der Weg s läuft entlang der Oberfläche. Dargestellt sind drei typische Formen am Beispiel von 500 MHz Einzellern mit elliptischer Blendenrundung. In Klammern ist für die Fälle a) und b) das maximale elektrische Feld am Außenrand bezogen auf die Beschleunigungsfeldstärke angegeben ($E_{r,max}/E_{acc}$).

a) auf 500 MHz skalierte typische Stanford-Geometrie mit leicht gekippten Blenden und rundem Übergang[52] (≈ 6.0 %)

b) scharfkantige, rechtwinklige Zylindergeometrie (≈ 0.4 %)

c) Kugelgeometrie

MULTIPACTING IN SUPERCONDUCTING RF STRUCTURES

U.Klein and D.Proch

Fachbereich Physik der Gesamthochschule Wuppertal

56oo Wuppertal, Germany

Wuppertal, December 1978

WU B 78 - 34

What is the class of 2020 working on?

Young scientists : Special Poster session

First Name	Family name	lab	Poster ID + Titlle	Panel #
Rossana	**BONOMI**	CERN	**THP049** SPL RF Coupler Cooling Efficiency	75
Enrico	**CENNI**	Sokendai U.	**TUP091** Field EmissionMeasure During cERLMain Linac Cryomodule High Power Test in KEK	76
Heejin	**DO**	IBS	**THP089** Design of LLRF System for RAON	77
Daniel	**GONNELLA**	Cornell	**TUP026** Performance of a FNAL Nitrogen Treated Superconducting Niobium Cavity at Cornell	78
Daniel	**HALL**	Cornell	• **TUP072** Quality FactorMeasurements of the Ultramet 3 GHz Cavity Constructed Using Chemical Vapour Deposition • **THP038** Development and Performance of aHigh Field TE-Mode SampleHost Cavity	79
Johann	**HELLER**	U Rostock	**MOP092** Computation of Wakefields and HOM Port Signals by Means of Reduced Order Models	80
Jeremiah	**HOLZBAUER**	APS	• **MOP077** Cryomodule Development for the APS Upgrade Short Pulse X-Ray Project at Jefferson Laboratory • **MOP078** Horizontal Testing of a Dressed Deflecting Mode Cavity for the APS Upgrade Short Pulse X-Ray Project • **THP092** Study of an AlternativeMethod of Superconducting RF Cavity Test Data Analysis	81
Shichun	**HUANG**	IMPCAS	**THP015** Design of a 325MHz ¯=0.21 Single Spoke Cavity at IMP	82
Yulu	**HUANG**	IMPCAS	**THP016** Mechanical Simulations of Double Spoke Resonator for China-ADS – Y.L. Huang,	83
Noémie	**JECKLIN**	CERN	**TUP073** Niobium Coatings for theHIE-ISOLDEQWRSuperconducting Accelerating Cavities	84
Hyung Jin	**KIM**	IBS	**MOP008** RAON Superconducting Linac –	85
Philipp	**KOLB**	Triumf	• **THP019** 1.3 GHz SRF Cavity Tests for ARIEL at TRIUMF • **THP020** Measuring the Higher OrderMode Spectrumof the TRIUMF 9-cell Cavity –	86
Takayuki	**KUBO***	KEK	• **TUP007** RF Electromagnetic Field and Vortex Penetration in Multilayered Superconductors • **TUP008** Analytical Model of the Magnetic Field Enhancement at Pits on the Surface of Superconducting Accelerating Cavity	87
Ayaka	**KURAMOTO**	KEK	**THP094** BeamInduced HOMAnalysis in STF Accelerator	88
Han	**LI**	IHEP	**THP022** Design Study on Very Low Beta Spoke Cavity For China-ADS	89
Cecilia	**MAIANO**	INFN Milan	**TUP035** NeutronActivation Analysis as a Foreign IntrusionCavityDiagnostic Tool	90
Aliaksandr	**NAVITSKI**	DESY	• **MOP043** ILC-HiGrade Cavities as a Tool of Quality Control for EXFEL • **MOP053** R&D on Cavity Treatments at DESY towards the ILC Performance Goal	91
gunn tae	**PARK**	IBS	**THP027** Multipactor Analysis of theHWR at RISP	92
Jacob	**RODNIZKI**	SOREQ	**THP066** SARAF Phase-I HWR Coupler Cooling Design –	93
Janardan	**UPADHYAY**	ODU	**TUP066** Plasma Processing of Large Surfaces with Application to SRF Cavity Modification	94
Hannes	**VENNEKATE**	HZDR	**MOP026** Emittance Compensation for an SRF Photo Injector	95
Silvia	**VERDU-ANDRES**	BNL	**THP041** Optimization of theDoubleQuarterWave Crab Cavity Prototype for Testing at SPS	96

What is the class of 2020 working on?

Yi	**XIE***	Euclid Techlabs LLC	• **THP032** Update on Superconducting Conical Half-Wave Resonator Developments • **THP074** Update on Quarter-Wave Coaxial Coupler for 1.3GHz Superconducting Cavity	97
Chen	**XU**	SLAC	**TUP010** Simulation ofNon-linear RF LossesDerived fromCharacteristic Nb Topography	98
Liang	**ZHAO**	JLAB	**TUP068** Laser Polishing of Niobium for SRF Applications –	99
Robert	**AINSWORTH**	London U.	**THP048** The Influence of Tuners and Temperature on the Higher Order Mode Spectrum for 1.3GHz SCRF Cavities	100
Marco	**BUSCH**	IAP	**THP003** ColdMeasurements on the 325MHz CH-Cavity	101
Chaoyue	**CAO**	IIT	**TUP019** Probing the Surface of SRF Cavities with Tunneling and Raman Spectroscopies	102
Xu	**CHEN**	IHEP	**THP050** Development of Power Coupler for Superconducting Spoke Cavities for China-ADS Proton Linac	103
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Thibault	**HAMELIN**	IPNO	**TUP092** MUSICC3D: a Code for Modeling the Multipacting –	105
Tobias	**JUNGINGER**	CERN	**TUP098** MediumField Q-Slope of Niobium–	106
Raphael	**KLEINDIENST**	HZB	**TUP074** Development of an Optimized Quadrupole Resonator at HZB	107
Sergey	**KUTSAEV**	ANL	**THP060** High Power RF Coupler for ADS Accelerating Cavities	108
Ricarda	**LAASCH**	Hamburg U.	**TUP109** Towards a Better Understanding and Optimization of the Quench Localization Systems at DESY	109
Stefan	**LAGOTZKY**	BUW	• **TUP093** Field Emitter Current Conditioning on Nb Single Crystals with Different Roughness due to Varying EP/BCP ratio • **TUP094** Influence of Heat Treatments on Field Emitters on Nb Crystals	110
Dominik	**MÄDER**	IAP	**MOP065** Consolidated Design of the 17MeV Injector for MYRRHA	111
Ari	**PALCZEWSKI**	JLAB	• **TUP063** Quench Studies and Preheating Analysis of Seamless Hydroformed Cavities Processed at Jefferson Laboratories. • **TUP064** Exploration of Material Removal Rate of SRF Elliptical Cavities as a Function of Media Type and Cavity Shape on Niobium and Copper Using Centrifugal Barrel Polishing (CBP).	112
Kai	**PAPKE**	Rostock U.	**THP064** HOMCouplers for CERN SPL Cavities –	113
Sam	**POSEN**	Cornell U.	**TUP087** RF Test Results of the first Nb3Sn Cavities Coated at Cornell	114
Giovanni	**TERENZIANI**	Cern	**TUP078** Nb Coating Developments with HIPIMS for SRF Applications	115
Yulia	**TRENIKHINA**	IIT	• **TUP043** Nanostructural TEM/STEM Studies of Hot and Cold Spots in SRF Cavities. • **TUP065** Chemical Structure of NiobiumSamples Vacuum Treated in Nitrogen in ParallelWith Very High Q0 Cavities.	116
Zhongyuan	**YAO**	Triumf	• **TUP117** Second Sound Diagnostic Systemat TRIUMF – • **THP033** Study of Balloon SpokeCavities –	117
Hongjuan	**ZHENG**	IHEP	**MOP022** High Frequency System Design of 700MHz China Higgs Factory –	118*

What is the class of 2020 working on?

- Niobium

STUDY OF AC/RF PROPERTIES OF SRF INGOT NIOBIUM

P. Dhakal , G. Ciovati, and G. R. Myneni, Jefferson Lab, Newport News, VA 23606, USA
V.M. Genkin, M. I. Tsindlekht, The Hebrew University of Jerusalem, Israel

QUALITY FACTOR MEASUREMENTS OF THE ULTRAMET 3 GHz CAVITY CONSTRUCTED USING CHEMICAL VAPOUR DEPOSITION*

D. L. Hall†, D. A. Gonnella, M. Liepe
Cornell Laboratory for Accelerator-based Sciences and Education, Ithaca, NY 14850, U.S.A.
V. A. Arrieta‡, S. R. McNeal , Ultramet Corporation, Pacoima, CA 91331, U.S.A.

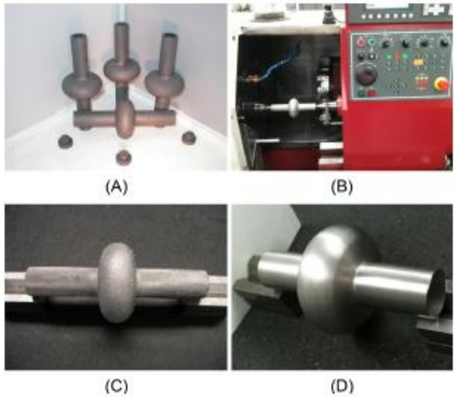

Figure 1: (A) Graphite mandrel prototypes machined using CNC methods. (B) The mandrel immediately following application of the sacrificial interlayer metal. (C) The cavity immediately after CVD. (D) The completed cavity, after removal of the mandrel and exterior finish. Photographs courtesy of Ultramet, Inc.

What is the class of 2020 working on?

- Nb_3Sn

RF TEST RESULTS OF THE FIRST Nb_3Sn CAVITIES COATED AT CORNELL*

S. Posen† and M. Liepe
Cornell Laboratory for Accelerator-Based Sciences and Education, Ithaca, NY

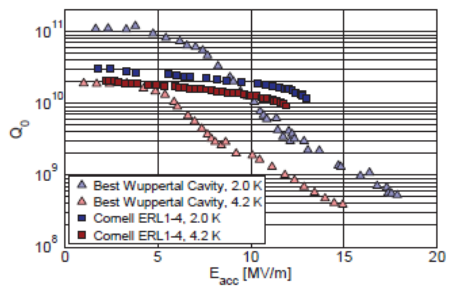

Figure 4: Q vs E curve from the new Cornell Nb_3Sn cavity, showing a small residual resistance at low fields and a large improvement in Q_0 at usable gradients over one of the best U. Wuppertal cavities. Uncertainty in Q and E is approximately 10%.

Figure 3: Coated cavity (left); view looking down into cavity before (top right) and after coating (bottom right).

What is the class of 2020 working on?

- Thin films

NIOBIUM COATINGS FOR THE HIE-ISOLDE QWR SUPERCONDUCTING ACCELERATING CAVITIES

N.Jecklin#, S. Calatroni, B. Delaup, L. Ferreira, I. Mondino, A. Sublet,
M. Therasse, W. Venturini Desolaro, CERN, Geneva, Switzerland

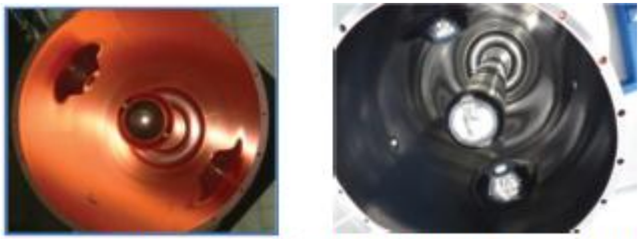

Figure 3: QWR before (left) and after (right) Nb coating.

NB COATING DEVELOPMENTS WITH HIPIMS FOR SRF APPLICATIONS

G. Terenziani, S. Calatroni, T. Junginger, I.A. Santillana, CERN, Geneva, Switzerland
A.P. Ehiasarian, Nanotechnology Centre for PVD Research, Materials and Engineering Research Centre, Sheffield Hallam University, S1 1WB Sheffield, UK

Roughness analysis applied to niobium thin films grown on MgO(001) surfaces for superconducting radio frequency cavity applications

D. B. Beringer,[1] W. M. Roach,[2] C. Clavero,[2] C. E. Reece,[3] and R. A. Lukaszew[1,2]
[1]*Department of Physics, The College of William & Mary, Williamsburg, Virginia 23187, USA*
[2]*Department of Applied Science, The College of William & Mary, Williamsburg, Virginia 23187, USA*
[3]*Thomas Jefferson National Accelerator Facility, Newport News, Virginia 23606, USA*
(Received 30 November 2011; published 5 February 2013)

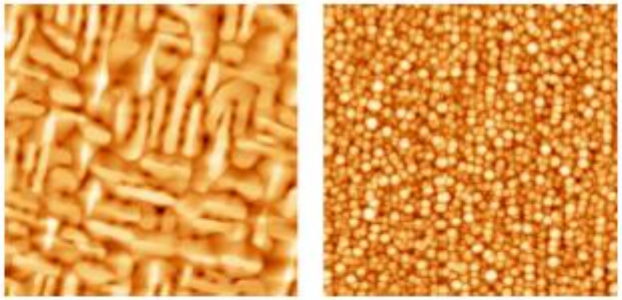

FIG. 6. Left: Representative 2 μm × 2 μm AFM scan from Series 1 for 600 nm Nb films. Right: Representative 2 μm × 2 μm AFM scan from Series 2 for a 1000 nm film.

What is the class of 2020 working on?

- Multilayers

**VORTEX PENETRATION FIELD OF
THE MULTILAYER COATING MODEL**

Takayuki Kubo*, Takayuki Saeki, High Energy Accelerator Research Organization, KEK
1-1 Oho, Tsukuba, Ibaraki 305-0801 Japan
Yoshihisa Iwashita, Institute for Chemical Research, Kyoto University, Uji, Kyoto 611-0011, Japan

MULTILAYERS ACTIVITIES AT SACLAY / ORSAY

C. Baumier[1,2,3], C.Z. Antoine[3], F. Fortuna[2], G. Martinet[1], J.-C. Villegier[4],
[1] IPNO, IN2P3-CNRS, Université Paris Sud 11, F-91406 Orsay Cedex, France
[2] CSNSM IN2P3-CNRS, Université Paris Sud 11, F-91406 Orsay Cedex, France
[3] CEA, Irfu, SACM, Centre d'Etudes de Saclay, 91191 Gif-sur-Yvette Cedex, France
[4] CEA, Inac, 17 Rue des Martyrs, 38054 Grenoble-Cedex-9, France

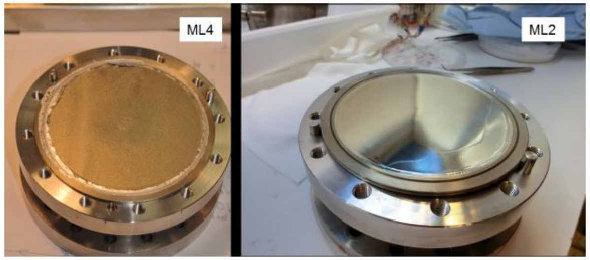

Figure 1: Samples rf-ML4 (polycrystalline Nb) and rf-ML2 (LG). Pitting due to the Nb substrate etching can still be observed underneath the nanometric layers. Rf-ML2 exhibits also a clear grain boundary between the two main grains of the surface.

What is the class of 2020 working on?

- Surface resistance (field dependence)

A NEW FIRST-PRINCIPLES CALCULATION OF FIELD-DEPENDENT RF SURFACE IMPEDANCE OF BCS SUPERCONDUCTOR*

B. P. Xiao[1#] and C. E. Reece[2]

[1] Brookhaven National Laboratory, Upton, New York 11973

[2] Thomas Jefferson National Accelerator Facility, Newport News, Virginia 23606

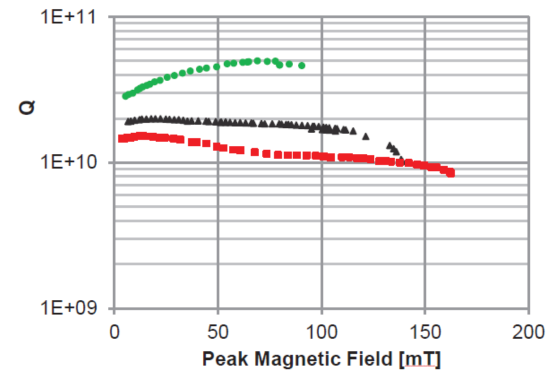

Figure 1: Cavity performance at 2 K for: ▲ 1.5 GHz 7-cell CEBAF cavity with 230 µm BCP ■ 230 µm BCP + 34 µm EP ● 1.5 GHz single cell CEBAF cavity with 3 h 1400 °C baking.

What is the class of 2020 working on?

- Surface resistance (residual)

HIGH Q_0 RESEARCH: THE DYNAMICS OF FLUX TRAPPING IN SUPERCONDUCTING NIOBIUM

J. Vogt, O. Kugeler, Helmholtz-Zentrum Berlin, Germany
J. Knobloch, Helmholtz-Zentrum Berlin and Universität Siegen, Germany

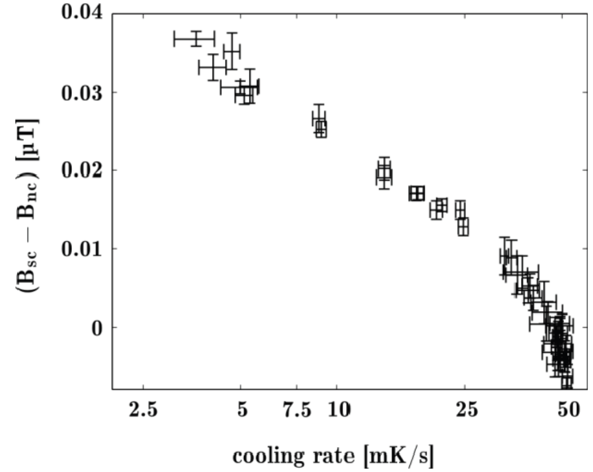

Figure 4: Expelled flux measured by FM1 versus cooling rate in the model system. B_{nc} during the measurement was 0.3 µT in FM1 direction and 3 µT in total.

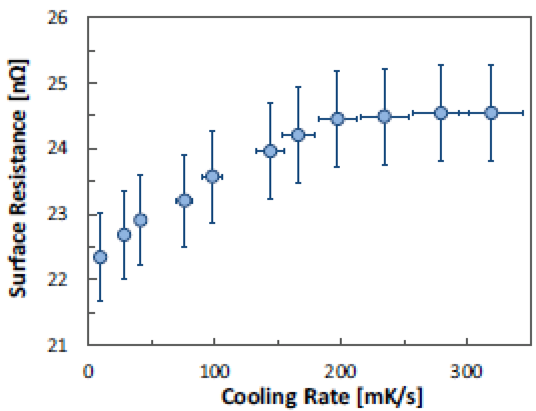

Figure 5: The surface resistance as a functiong of cooling rate.

HIGH RESOLUTION SURFACE RESISTANCE STUDIES*

S.Aull[†], CERN, Geneva, Switzerland and Universität Siegen, Germany
S. Doebert, T. Junginger, CERN, Geneva, Switzerland
J. Knobloch, Universität Siegen, Germany and Helmholtz-Zentrum Berlin, Germany

What is the class of 2020 working on?

- Surface treatment

PLASMA PROCESSING OF LARGE SURFACES WITH APPLICATION TO SRF CAVITY MODIFICATION

J. Upadhyay, Do Im, S. Popović, and L. Vušković
Department of Physics - Center for Accelerator Science, Old Dominion University, Norfolk, VA 23529, USA
A.-M. Valente-Feliciano and L. Phillips
Thomas Jefferson National Accelerator Facility, Newport News, VA 23606, USA

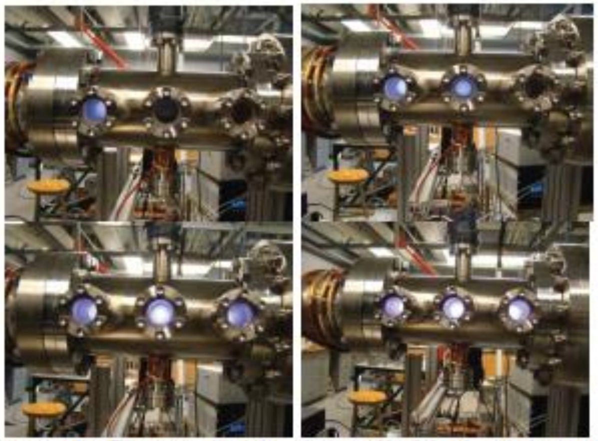

Figure 4: Plasma inside the cylindrical cavity at different pressure.

LASER POLISHING OF NIOBIUM FOR SRF APPLICATIONS*

Liang Zhao[1,2], J. Michael Klopf [2], Charles E. Reece [2], Michael J. Kelley[# 1,2]
[1] Applied Science Department, The College of William and Mary, Williamsburg, VA 23187
[2] Thomas Jefferson National Accelerator Facility, Newport News, VA 23606

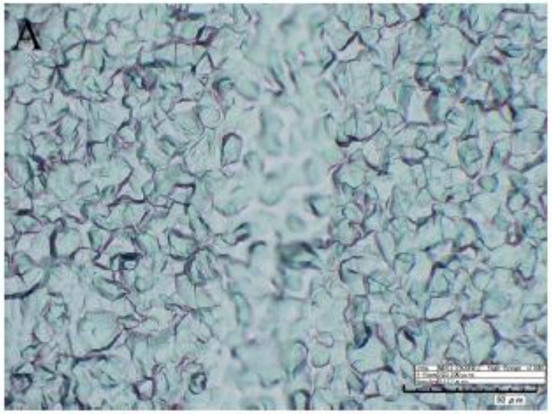

Figure 1A: Optical images of niobium surfaces after laser treatment: 0.24 J/cm^2, 53 pulses overlapped, 1.8 μm pulse displacement, scanning speed 3.4 cm/s.

What is the class of 2020 working on?

- Field emission

FIELD EMISSION MEASURE DURING CERL MAIN LINAC CRYOMODULE HIGH POWER TEST IN KEK

Enrico Cenni#, The Graduate University for Advanced Studies, KEK, Tsukuba, Ibaraki, Japan
Kazuhiro Enami, Takaaki Furuya, Hiroshi Sakai, Masato Satoh, Kenji Shinoe, Kensei Umemori
KEK, Tsukuba, Ibaraki, Japan
Masaru Sawamura, JAEA, Tokai, Naka, Ibaraki, Japan

FIELD EMITTER CURRENT CONDITIONING ON Nb SINGLE CRYSTALS WITH DIFFERENT ROUGHNESS DUE TO VARYING EP/BCP RATIO

S. Lagotzky, G. Müller, FB C Physics, University of Wuppertal, 42097, Germany
P. Kneisel, TJNAF, Newport News, VA, USA

INFLUENCE OF HEAT TREATMENTS ON FIELD EMITTERS ON Nb CRYSTALS

S. Lagotzky*, G. Müller, FB C Physics, University of Wuppertal, 42097, Germany
D. Reschke, A. Matheisen, DESY, 22603 Hamburg, Germany

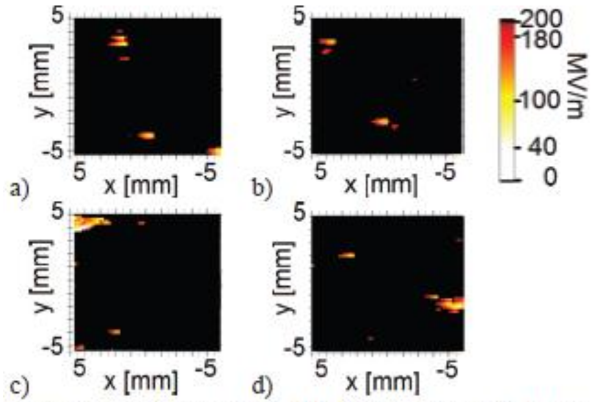

Figure 6: Field maps up to 200 MV/m of sample #1 (a), #2 (b), #3 (c) and #4 (d).

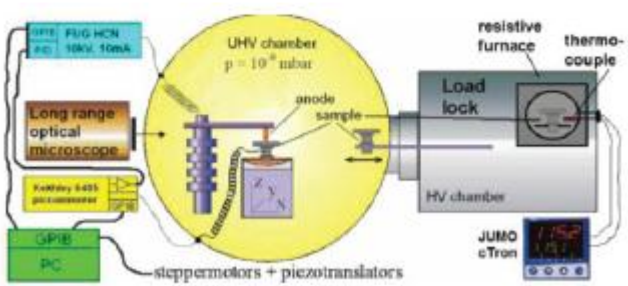

Figure 1: Schematic view of the FESM [7].

What is the class of 2020 working on?

- Analysis tools

NEUTRON ACTIVATION ANALYSIS AS A FOREIGN INTRUSION CAVITY DETECTION TOOL

Cecilia Maiano#, Paolo Michelato, INFN Milano-LASA, Segrate (MI), Italy
Massimiliano Clemenza, Massimiliano Nastasi, Università Milano Bicocca, Milano, Italy
Carlo Pagani, Università degli Studi di Milano & INFN Milano-LASA, Segrate (MI), Italy

$$n + {}^{A}_{Z}X \rightarrow {}^{A+1}_{Z}X + \gamma_{prompt} \quad \text{(capture)}$$
$${}^{A+1}_{Z}X \rightarrow {}^{A+1}_{Z+1}Y^{*} + e^{-} + \bar{\nu}_{e} \quad (\beta \text{ decay})$$
$${}^{A+1}_{Z+1}Y^{*} \rightarrow {}^{A+1}_{Z+1}Y + \gamma \quad \text{(de-excitation)}$$

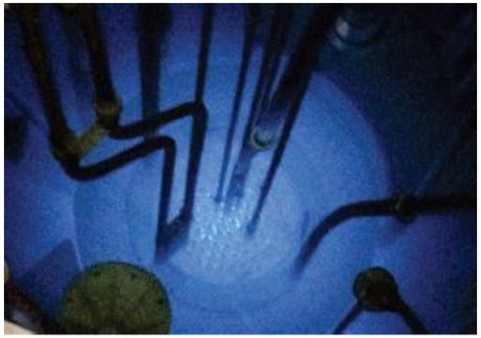

Figure 1: The LENA reactor core, when active.

PROBING HOT SPOT AND COLD SPOT REGIONS OF SRF CAVITIES WITH TUNNELING AND RAMAN SPECTROSCOPIES

C. Cao, J.F. Zasadzinski*, IIT, Chicago, IL 60616, USA
N. Groll, T. Proslier, ANL, Argonne, IL 60439, USA
A. Grassellino, L. Cooley, Fermilab, Batavia, IL , 60510 USA
G. Ciovati, JLAB, Newport News, IL 60439, USA

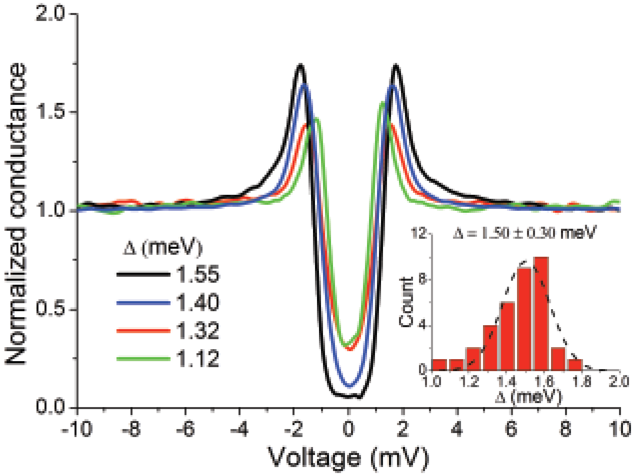

Figure 2: Spectra taken from Fermilab hot spot sample H2. Inset shows the distribution of gap values found in 35 junctions.

What is the class of 2020 working on?

- Multipacting

THE MULTIPACTION ANALYSIS OF THE HWR AT RISP*

G. T. Park †
Rare Isotope Science Project, Institute for Basic Science, Daejeon, Korea

(b) Multipacting electrons near the short plate. (c) Schematic view of the multipaction.

MULTIPACTING SUPPRESSION IN A SINGLE SPOKE CAVITY

Z.Y. Yao#, R.E. Laxdal, V. Zvyagintsev, TRIUMF, Vancouver, B.C., Canada
X.Y. Lu, K. Zhao, Peking University, Beijing, China

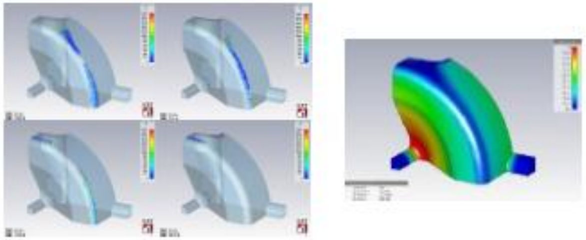

Figure 1: The simulation result of different orders of MP in the PKU-I spoke cavity. The growth rate of secondary electron vs. the gradient (top), and the MP positions (bottom left) with the surface electric field distribution (bottom right).

What is the class of 2020 working on?

- Electromagnetic structures (accelerating)

CHARACTERIZATION AND FABRICATION OF SPOKE CAVITIES FOR HIGH-VELOCITY APPLICATIONS*

C. S. Hopper†, H. Park, and J. R. Delayen
Center for Accelerator Science, Department of Physics,
Old Dominion University, Norfolk, VA, 23529, USA and
Thomas Jefferson National Accelerator Facility, Newport News, VA 23606, USA

PHYSICAL REVIEW SPECIAL TOPICS - ACCELERATORS AND BEAMS 16, 102001 (2013)

Superconducting spoke cavities for high-velocity applications

C. S. Hopper* and J. R. Delayen†

*Center for Accelerator Science, Department of Physics, Old Dominion University, Norfolk, Virginia 23529, USA,
and Accelerator Division, Thomas Jefferson National Accelerator Facility, Newport News, Virginia 23606, USA*
(Received 12 July 2013; published 3 October 2013)

What is the class of 2020 working on?

- Electromagnetic structures (accelerating)

STUDY OF BALLOON SPOKE CAVITIES

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R. Edinger, PAVAC, Richmond, B.C., Canada

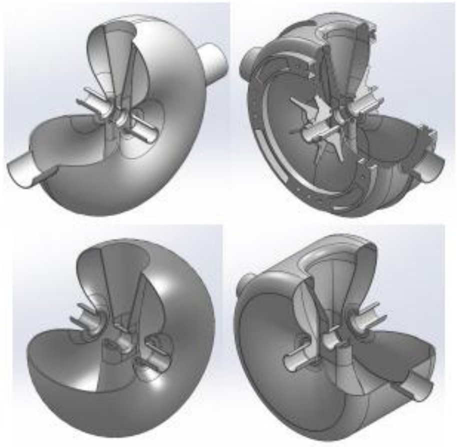

Figure 1: Geometry comparison of 0.12 balloon resonator (top left) and CADS spoke012 (top right), and that of 0.3 balloon resonator (bottom left) and RISP SSR1 (bottom right).

DEVELOPMENT OF A VERY LOW BETA SUPERCONDUCTING SINGLE SPOKE CAVITY FOR CHINA-ADS LINAC*

H. Li[#], J.P Dai, H. Huang, L.H. Li, H.Y. Lin, Q. Ma, W.P. Pan, P. Sha,Y. Sun, Q.Y. Wang, J. Zhang
Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China

Figure 7: Two bare Spoke012 prototype cavities fabricated in November 2012.

What is the class of 2020 working on?

- Electromagnetic structures (accelerating)

COLD MEASUREMENTS ON THE 325 MHz CH-CAVITY*

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M. Amberg, Helmholtz-Institut Mainz (HIM), 55099 Mainz, Germany

Figure 1: Layout of the superconducting 7-cell CH-Cavity (325.224 MHz, $\beta = 0.16$)[3].

1.3 GHz SRF CAVITY TESTS FOR ARIEL AT TRIUMF

P. Kolb, P. Harmer, D. Kishi, A. Koveshnikov, C. Laforge, D. Lang, R.E. Laxdal, Y. Ma, B.S. Wairach,
Z. Yao, V. Zvyagintsev, TRIUMF, 4004 Wesbrook Mall, V6T 2A3 Vancouver, BC, Canada

What is the class of 2020 working on?

- Electromagnetic structures (deflecting/crabbing)

SUPERCONDUCTING RF-DIPOLE DEFLECTING AND CRABBING CAVITIES*

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Thomas Jefferson National Accelerator Facility, Newport News, VA 23606, USA.

PHYSICAL REVIEW SPECIAL TOPICS - ACCELERATORS AND BEAMS **16**, 082001 (2013)

Cryogenic test of a proof-of-principle superconducting rf-dipole deflecting and crabbing cavity

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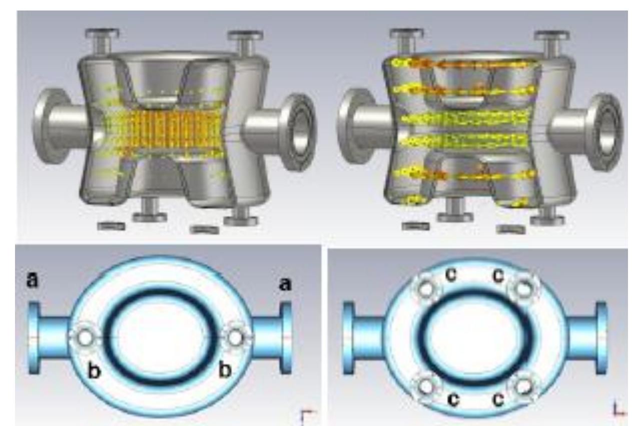
Center for Accelerator Science, Department of Physics, Old Dominion University, Norfolk, Virginia 23529, USA, and Accelerator Division, Thomas Jefferson National Accelerator Facility, Newport News, Virginia 23606, USA
(Received 26 June 2013; published 16 August 2013)



DESIGN AND VERTICAL TEST OF DOUBLE QUARTER WAVE CRAB CAVITY FOR LHC LUMINOSITY UPGRADE *

B. P. Xiao[1†], S. Belomestnykh[1,2], I. Ben-Zvi[1,2], R. Calaga[3], C. Cullen[1], L. Hammons[1], J. Skaritka[1], S. Verdú-Andrés[1], Q. Wu[1].
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[2]Stony Brook University, Stony Brook, New York, USA
[3]CERN, Geneva, Switzerland

What is the class of 2020 working on?

- Design tools?

MUSICC3D: A CODE FOR MODELING THE MULTIPACTING

T. Hamelin[1-2], J.L. Coacolo[1], M. Chabot[1], J. Lesrel[1], G. Martinet[1]
[1]Institut de Physique Nucléaire d'Orsay (IPNO), CNRS-IN2P3, Université Paris-Sud, F-91406 Orsay Cedex, France
[2]Thales Electron Devices, 2 Rue Marcel Dassault, 78140 Vélizy-Villacoublay, France

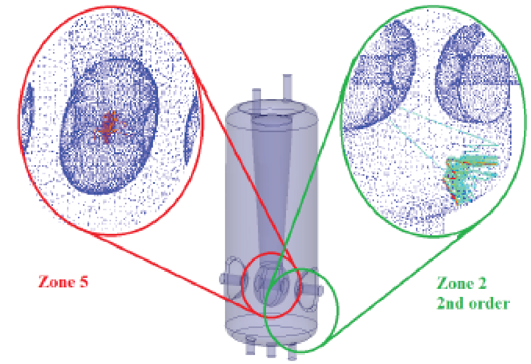
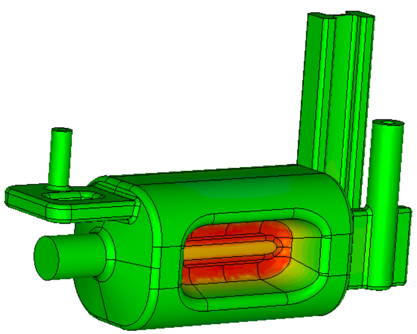
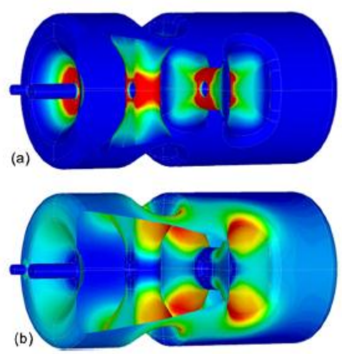
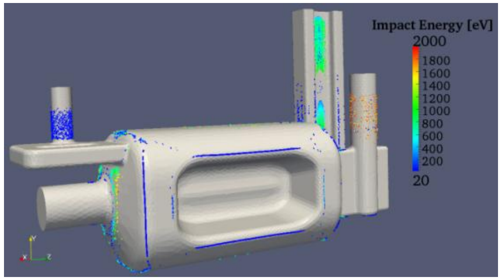
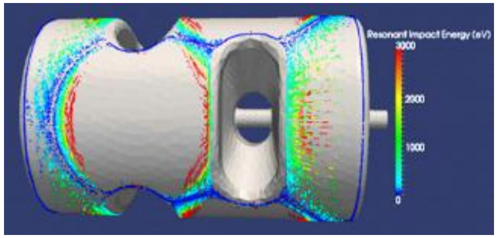


Figure 2: Visualisation of the electron trajectories for 2 and 5 Multipacting zones in the Spiral 2 cavity (MUSICC3D).









Microwave Studio

ACE3P

What is the class of 2020 working on?

- LLRF

DESIGN OF LLRF SYSTEM FOR RAON

H. Do#, O.R. Choi, J. Han, C.K. Hwang, J. W. Kim

Institute for Basic Science, Daejeon, Republic of Korea

DEMONSTRATION OF RF STABILITIES IN STF 9-CELL CAVITIES AIMING FOR THE NEAR QUENCH LIMIT OPERATION

M. Omet*, SOKENDAI, Hayama, Japan
T. Matsumoto, S. Michizono, T. Miura, KEK/SOKENDAI, Tsukuba, Japan

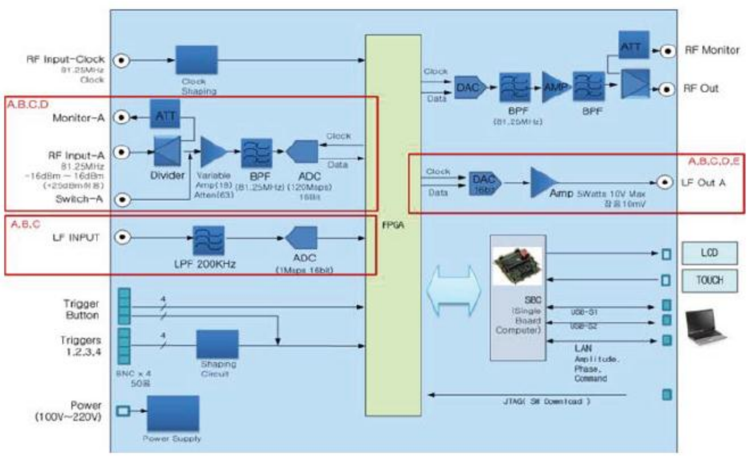


Figure 1: Block diagram of the prototype LLRF.

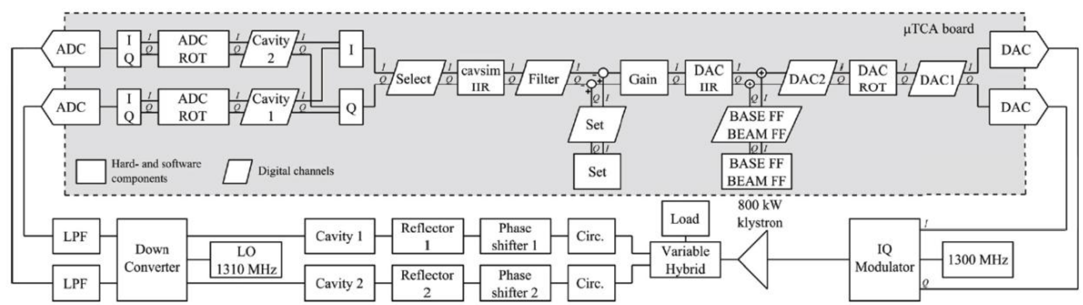


Figure 1: Schematic of the digital LLRF feedback loop controlling two superconducting cavities at STF.

What is the class of 2020 working on?

- Wakefields and HOMs

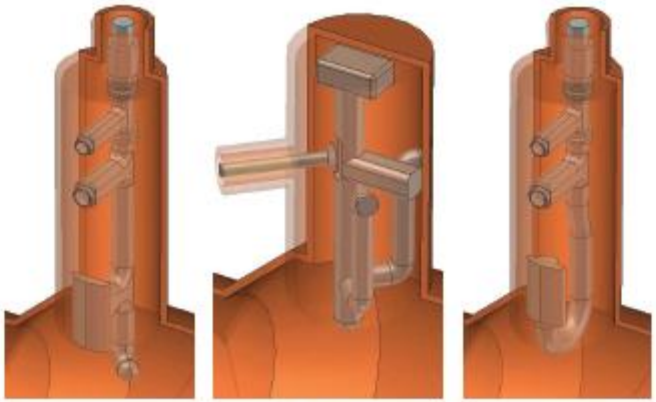
COMPUTATION OF WAKEFIELDS AND HOM PORT SIGNALS BY MEANS OF REDUCED ORDER MODELS

J. Heller, T. Flisgen and U. van Rienen, University of Rostock, 18059 Rostock, Germany

HOM COUPLERS FOR CERN SPL CAVITIES*

Kai Papke †1,2, F. Gerigk[1] and U. van Rienen[2]

[1]CERN, Geneva, Switzerland
[2]University of Rostock, Rostock, Germany



(a) (b) (c)

Figure 2: Design approaches of HOM coupler: a) probe coupler, b) modified TESLA design, c) hook coupler [6].

What is the class of 2020 working on?

- Machine design

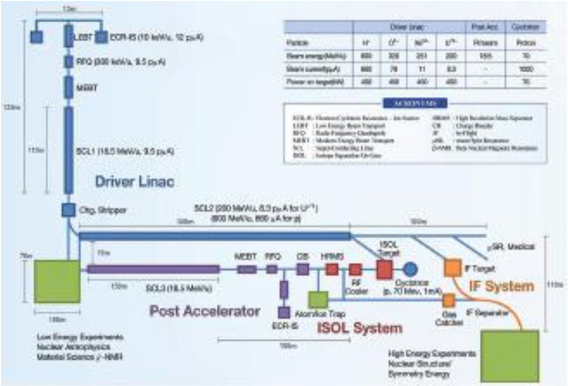


Figure 1: Layout of the RISP accelerator.

SUPERCONDUCTING LINAC FOR THE RISP

H. J. Kim, H. J. Cha, M. O. Hyun, H. J. Jang, D.-O Jeon, J. D. Joo, M. J. Joung, H. C. Jung, Y. C. Jung, Y. K. Kim, M. K. Lee, G.-T. Park, IBS, Daejeon, Korea

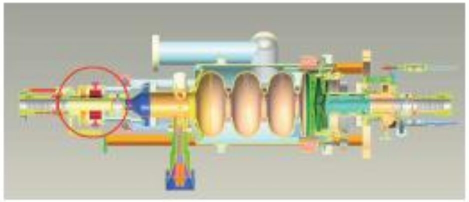


Figure 2: Drawing of the cavity string of the 3-1/2-cell resonator with highlighted position of the superconducting solenoid which is located about 70 cm from the cathode in the first half-cell.

EMITTTANCE COMPENSATION FOR AN SRF PHOTO INJECTOR

H. Vennekate*[1,2], A. Arnold[1], P. Kneisel[3], P. Lu[1,2], P. Murcek[1], J. Teichert[1], I. Will[4], and R. Xiang[1]

[1]Helmholtz-Zentrum Dresden-Rossendorf – [2]Technical University Dresden – [3]Thomas Jefferson National Accelerator Facility – [4]Max-Born-Institut

CONSOLIDATED DESIGN OF THE 17 MeV INJECTOR FOR MYRRHA*

D. Mäder†, D. Koser, H. Podlech, A.Schempp, IAP, Goethe-Universität, Frankfurt am Main, Germany

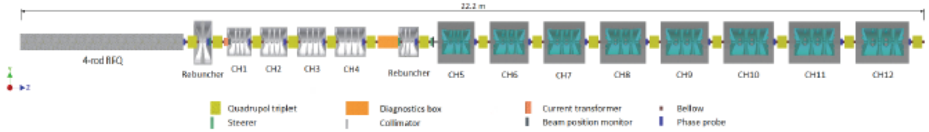


Figure 4: An overview of the 22.2 m long MYRRHA injector layout with phase probes after each cavity. Every SC CH structure (turquoise) has its own cryomodule (grey). The second Rebuncher needs to be designed and added to the overview (placeholder used).

Parting Thoughts

- There is still hope for the class of 2020
- SRF is in good hands
- I have had a lot of fun, I am sure Peter did also