

CONTENTS

Foreword.....	xxi
Samuel C. Collins Award.....	xxii
Russell B. Scott, Memorial Awards	xxiii
Student Awards.....	xxiv
1997 Cryogenic Engineering Conference Board	xxv
Acknowledgments.....	xxvi

PART A

Superconductivity Applications

EMERGING 21st CENTURY MARKETS AND OUTLOOK FOR APPLIED SUPERCONDUCTING PRODUCTS	1
C. H. Rosner	

Superconducting RF Technologies

LARGE APPLICATIONS AND CHALLENGES OF STATE-OF-THE-ART SUPERCONDUCTING RF (SRF) TECHNOLOGIES	25
Q.-S. Shu	
THE JEFFERSON LAB SUPERCONDUCTING ACCELERATOR	37
J. R. Delayen	
JEFFERSON LAB HIGH-POWER FREE-ELECTRON LASER	43
C. H. Rode	
SUPERCONDUCTING RADIO-FREQUENCY TECHNOLOGY: UNDERSTANDING AND IMPROVEMENTS OF LIMITATIONS THROUGH APPLICATION OF CRYOGENIC INSTRUMENTATION	53
P. Kneisel	
THERMAL STABILITY ANALYSIS OF SUPERCONDUCTING RF CAVITIES	63
T. Junquera, J. Lesrel, M. Fouaidy, and S. Bousson	
INFLUENCE OF RRR OF NIOBIUM ON THE RF PROPERTIES OF SUPERCONDUCTING CAVITIES	71
H. Safa	
STUDIES OF RF-SUPERCONDUCTIVITY PROPERTIES OF NIOBIUM FILM-COATED CAVITIES AT CERN	77
C. Benvenuti, S. Calatroni, I. E. Campisi, P. Darriulat, C. Durand, M. Peck, and R. Russo	
CONSTRUCTION, COMMISSIONING, AND CRYOGENIC PERFORMANCES OF THE FIRST TESLA TEST FACILITY (TTF) CRYOMODULE	87
C. Pagani, J. G. Weisend II, R. Bandelmann, D. Barni, A. Bosotti, G. Grygiel, H. Kaiser, U. Knopf, R. Lange, F. Loeffler, P. Pierini, O. Peters, B. Petersen, D. Sellmann, and S. Wolff	

THE PERFORMANCE OF 1.3 GHz 9-CELL SUPERCONDUCTING CAVITY SYSTEMS FOR THE TESLA TEST FACILITY	97
W.-D. Möller, and M. Pekeler	
SUPERCONDUCTING RF CAVITIES AND MAGNETS FOR A 4-TeV-ENERGY MUON COLLIDER	105
Q.-S. Shu, M. Green, D. Neuffer, D. Summers, S. Simrock, and E. Willen	
EXPERIENCE WITH THE LEP SUPERCONDUCTING RF ACCELERATING SYSTEM	113
G. Geschonke	
DESIGN AND PERFORMANCE OF KEKB SUPERCONDUCTING CAVITIES AND ITS CRYOGENIC SYSTEM	123
K. Hosoyama, S. Mitsunobu, and T. Furuya	
BEAM EFFECTS ON THE CRYOGENIC SYSTEM OF LEP2	131
Ph. Gayet, D. Kaiser, and G. Winkler	
Magnets: Design and Performance	
A CRYOGEN-FREE 0.5 T TESLA MRI MAGNET FOR HEAD IMAGING	139
J. M. van Oort, E. T. Laskaris, P. S. Thompson, B. Dorri, and K. G. Herd	
DESIGN, FABRICATION, AND TESTING OF THE ALISS SUPERCONDUCTING MINE- COUNTERMEASURES MAGNET	149
M. Heiberger, A. R. Langhorn, W. P. Creedon, S. Chapelle, R. A. Guzman, T. E. Harris, D. G. Morris, J. E. Medrano, J. Tannenbaum, M. E. Golda, T. H. Fikse, D. Waltman, G. F. Green, J. N. Chafe, J. D. Walters, and C. Prenger	
MANUFACTURING OF LIQUID HELIUM FREE SUPERCONDUCTING MAGNETS FOR INDUSTRIAL USE	157
T. Kobayashi, Y. Sato, T. Sasaki, and S. Mine	
RAMP RATE TESTING OF AN HTS HIGH GRADIENT MAGNETIC SEPARATION MAGNET	165
M. A. Daugherty, E. W. Roth, D. E. Daney, D. D. Hill, and F. C. Prenger	
Bi-2212 COILS FOR 1 T CLASS INSERT COILS	173
H. W. Weijers, D. Hazelton, L. Cowey, Y. S. Hascicek, I. H. Mutlu, U. P. Trociewitz, and S. W. Van Sciver	
COMPUTER SIMULATION OF QUENCH PROPAGATION IN QUELL	181
R. Zanino, L. Bottura, and C. Marinucci	
NUMERICAL EVALUATION OF THE QUENCH BEHAVIOR OF THE ITER TOROIDAL FIELD MODEL COIL	189
R. Heller, J. L. Duchateau, S. Nicollet, and F. Prat	
THERMAL AND HYDRAULIC MEASUREMENT IN THE ITER QUELL EXPERIMENTS	197
K. Hamada, Y. Takahashi, N. Koizumi, H. Tsuji, A. Anghel, B. Blau, A. Fuchs, B. Heer, G. Vecsey, S. Smith, S. Pourrahimi, and M. Zhelamskij	
REARRANGEMENT OF SUPERCONDUCTING WIRES IN SOLENOIDAL MAGNETS	205
H. Moriyama, F. Sawa, H. Mitsui, M. Arata, S. Nishijima, and T. Okada	
COMPLETION OF HELICAL COILS FOR LHD	213
S. Imagawa, H. Tamura, A. Nishimura, T. Satow, J. Yamamoto, O. Motojima, K. Nakanishi, O. Honma, M. Sudou, T. Kouda, T. Yamagiwa, and K. Asano	
DEVELOPMENT OF A SUPERCONDUCTING SOLENOID MAGNET SYSTEM FOR THE B-FACTORY DETECTOR (BELLE)	221
Y. Makida, H. Yamaoka, Y. Doi, J. Haba, F. Takasaki, and A. Yamamoto	
PRELIMINARY TESTING OF THE DØ SUPERCONDUCTING SOLENOID	229
R. P. Smith, H. E. Fisk, K. Krempetz, D. Markley, R. Rucinski, B. Squires, R. Yamada, S. Mine, K. Kimura, T. Kobayashi, H. Kozu, and W. Odashima	

PERFORMANCE AND OPERATING EXPERIENCE OF THE RHIC FIRST SEXTANT TEST ..	237
J. Sondericker, M. Iarocci, G. McIntyre, H.-C. Hseuh, K. C. Wu, G. Ganetis, M. Anerella, J. Benson, Y. Farah, R. Grandinetti, E. Killian, C. Lac, A. Morgillo, J. Rank, A. Nicoletti, E. Quimby, M. Rehak, and D. Zantopp	
MAGNETIC ELEMENTS FOR THE A1900 FRAGMENT SEPARATOR AT THE NSCL	245
A. F. Zeller, J. C. DeKamp, D. Johnson, F. Marti, D. J. Morrissey, B. M. Sherrill, J. Wagner, X. Wu, R. C. York, and R. Zink	
DESIGN AND CONSTRUCTION OF COIL SUPPORTING STRUCTURE AND CRYOSTAT VESSEL FOR LHD	253
H. Tamura, A. Nishimura, S. Imagawa, T. Satow, H. Hayashi, O. Motojima, K. Asano, Y. Takahashi, T. Kohda, M. Sudo, O. Honma, and S. Suzuki	
PERFORMANCE OF MAGNET LEADS FOR RHIC	261
A. Nicoletti and M. L. F. Rehak	
MECHANICAL AND THERMAL CONSIDERATIONS FOR THE SUPERCONDUCTING MAGNET TO NORMAL CONDUCTOR MAGNET "WARM-TO-COLD TRANSITIONS" OF THE RHIC ACCELERATOR	269
J. Rank, K. Malm, G. McIntyre, and J. Sondericker	
Magnets: Technology and Applications	
A GASEOUS-HELIUM COOLING SYSTEM FOR A HIGH-T _c SUPERCONDUCTING COIL ..	277
K. G. Herd, R. A. Ackermann, and P. S. Thompson	
A NOVEL THERMAL INSULATION METHOD FOR A NEXT-GENERATION CONDUCTION-COOLED SUPERCONDUCTING MAGNET	283
G. R. Chandratilleke, Y. Ohtani, H. Hatakeyama, M. Takahashi, M. Hiragishi, M. Okamura, and H. Nakagome	
CRYOCOOLER COOLED SUPERCONDUCTING MAGNETS AND THEIR APPLICATIONS	291
T. Hasebe, J. Sakuraba, K. Jikihare, K. Watazawa, H. Mitsubori, Y. Sugizaki, H. Okubo, Y. Yamada, S. Awaji, and K. Watanabe	
DEVELOPMENT OF TWO TYPES OF CRYOGEN FREE SUPERCONDUCTING MAGNETS (5 T - ϕ 300 mm AND 10 T - ϕ 100 mm)	299
K. Shibutani, S. Itoh, O. Ozaki, T. Takagi, T. Miyazaki, R. Hirose, S. Hayashi, M. Shimada, R. Ogawa, Y. Kawate, K. Matsumoto, N. Kimura, and K. Takabatake	
DESIGN OF THE THERMAL SHIELDS FOR THE NEW IMPROVED VERSION OF THE TESLA TEST FACILITY (TTF) CRYOSTAT	307
C. Pagani, D. Barni, M. Bonezzi, P. Pierini, and J. G. Weisend II	
COOLDOWN SIMULATIONS FOR TESLA TEST FACILITY (TTF) CRYOSTATS	315
D. Barni, C. Pagani, P. Pierini, and M. Todero	
NOVEL CONCEPT OF CONCENTRATOR OF MAGNETIC ENERGY	325
V. R. Sobol, O. N. Mazurenko, A. A. Drozd, and B. B. Boiko	
STABILITY ESTIMATE FOR CICC WITH COOLING CHANNEL USING ONE- AND TWO-FLUID CODES	333
S. De Palo, C. Marinucci, and R. Zanino	
A SIMPLE METHOD FOR MEASUREMENT OF AC LOSSES IN SUPERCONDUCTING WIRES UNDER CONFIGURATION OF A DOUBLE-LAYER NON-INDUCTIVE COIL ...	341
K. Funaki, K. Kajikawa, M. Tomiya, M. Nakamura, M. Iwakuma, S. Miyake, and T. Kumano	
HIGH-TEMPERATURE SUPERCONDUCTOR COIL SYSTEM FOR A PARTICLE DETECTOR ANALYZING MAGNET	349
R. C. Niemann, L. R. Turner, M. W. Morgan, P. Haldar, and J. G. Hoehn	
THREE-DIMENSIONAL NUMERICAL ANALYSES OF THE STABILITY OF Ag/BSCCO TAPE	357
E. E. Burkhardt and J. Schwartz	

DESIGN CONSIDERATIONS AND EXPERIENCE OF THE RHIC DUAL MAGNET CRYOSTAT INSTALLATION	365
R. Grandinetti, J. Koehler, J. Sondericker, G. Ganetis, and G. McIntyre	
HIGH CURRENT DIFFUSION TYPE DIODES AT CRYOGENIC TEMPERATURES FOR THE LHC SUPERCONDUCTING MAGNET PROTECTION	371
L. Coull, R. Denz, and L. D. Hagedorn	
CRITICAL CURRENT DENSITY AND DISSIPATION IN SINTERED YBCO FILAMENTS ...	379
Y. S. Cha, S. Y. Seol, and J. R. Hull	

Large Hadron Collider – LHC

A POSSIBLE 1.8 K REFRIGERATION CYCLE FOR THE LARGE HADRON COLLIDER	387
F. Millet, P. Roussel, L. Tavian, and U. Wagner	
A SIMPLIFIED CRYOGENIC DISTRIBUTION SCHEME FOR THE LARGE HADRON COLLIDER	395
M. Chorowski, W. Erdt, Ph. Lebrun, G. Riddone, L. Serio, L. Tavian, U. Wagner, and R. van Weelderen	
CRYOGENIC SYSTEM AND CRYOSTAT DESIGN FOR THE LHC IR QUADRUPOLE MAGNETS	403
Y. Huang, J. Kerby, T. Nicol, and T. Peterson	
THE NEW SUPERFLUID HELIUM CRYOSTATS FOR THE SHORT STRAIGHT SECTIONS OF THE CERN LARGE HADRON COLLIDER (LHC)	411
W. Cameron, Ph. Dambre, T. Kurtyka, V. Parma, T. Renaglia, J. M. Rifflet, P. Rohmig, B. Skoczen, T. Tortschanoff, Ph. Trilhe, P. Vedrine, and D. Vincent	
COOLING STRINGS OF SUPERCONDUCTING DEVICES BELOW 2 K: THE HELIUM II BAYONET HEAT EXCHANGER	419
Ph. Lebrun, L. Serio, L. Tavian, and R. van Weelderen	
SUPPORTING SYSTEMS FROM 293 K TO 1.9 K FOR THE LARGE HADRON COLLIDER (LHC) CRYO-MAGNETS	427
M. Mathieu, V. Parma, T. Renaglia, P. Rohmig, and L. R. Williams	
DESIGN OF THE SECOND SERIES OF LHC PROTOTYPE DIPOLE MAGNET CRYOSTATS .	435
J. C. Brunet, V. Parma, G. Peón, A. Poncet, P. Rohmig, B. Skoczen, and L. R. Williams	
A FACILITY FOR EVALUATING SUPERCONDUCTORS ABOVE ATMOSPHERIC PRESSURE AT 1.8 K	443
A. G. Prodel and A. Arn	
CABLE MAGNETIZATION EFFECTS IN THE LHC MAIN DIPOLE MAGNETS	451
L. Bottura, M. Schneider, R. Walckiers, and R. Wolf	
THERMOHYDRAULICS OF RESISTIVE TRANSITIONS OF THE LHC PROTOTYPE MAGNET STRING: THEORETICAL MODELING AND EXPERIMENTAL RESULTS	459
M. Chorowski, B. Hilbert, L. Serio, and R. van Weelderen	
HELIUM RECOVERY IN THE LHC CRYOGENIC SYSTEM FOLLOWING MAGNET RESISTIVE TRANSITIONS	467
M. Chorowski, B. Hilbert, L. Serio, L. Tavian, U. Wagner, and R. van Weelderen	
ANALYSIS OF THE 15 m LHC CRYO-DIPOLE RADIATION SCREEN DURING A MAGNET QUENCH	475
G. Peón and L. R. Williams	

Large Scale Systems

STATUS, OPERATION AND PERFORMANCE OF THE RHIC HELIUM REFRIGERATOR ...	483
K. C. Wu, M. Iarocci, J. Sondericker, J. Benson, Y. Farah, C. Lac, A. Morgillo, A. Nicoletti, E. Quimby, J. Rank, M. Rehak, and D. Zantopp	
TS DIAGRAM FOR ON-LINE MONITORING OF THE RHIC REFRIGERATOR	491
M. Rehak, G. Cornish, M. Iarocci, J. Sondericker, and T. Wild	

RHIC 25 kW REFRIGERATOR AND DISTRIBUTION SYSTEM, CONSTRUCTION, TESTING, AND INITIAL OPERATING EXPERIENCE	499
M. Iarocci, J. Sondericker, K. C. Wu, J. Benson, Y. Farah, C. Lac, A. Morgillo, A. Nicoletti, E. Quimby, J. Rank, M. Rehak, and A. Werner	
RING WARMUP AND HELIUM RECOVERY FOR THE RHIC ACCELERATOR: THERMAL ANALYSIS OF THE WARMUP OF A SUPERCONDUCTING MAGNET STRING	507
J. Rank, M. Iarocci, M. Rehak, and K. C. Wu	
PERFORMANCE OF RHIC 50 WATT RECOOLERS	517
A. Nicoletti and M. Iarocci	
PERFORMANCE OF THE RHIC CRYOGENIC CONTROL SYSTEM DURING THE FIRST SEXTANT TEST	523
J. Benson, Y. Farah, and D. Zantopp	
VJR/VJRR DESIGN, CONSTRUCTION, INSTALLATION, AND PERFORMANCE	531
E. C. Quimby, C. M. Lac, M. Iarocci, R. Sallash, and A. Varghese	
A 1400 LITER 1.8 K TEST FACILITY	541
T. J. Peterson, R. J. Rabehl, and C. D. Sylvester	
PERFORMANCE AND CONTROL OF A CRYOGENIC SYSTEM COOLING 1152 VLPC CHANNELS	549
T. H. Gasteyer and P. D. Wheelwright	
THERMODYNAMIC ANALYSIS AND OPERATING EXPERIENCE OF THE NUCLOTRON HELIUM REFRIGERATORS IN THE "SATELLITE" MODE	557
N. N. Agapov, H. G. Khodzhbagiyan, and A. D. Kovalenko	
EXPERIENCE IN FOUR YEARS OPERATION OF THE 2 kW-He I-REFRIGERATOR AT FZK/KARLSRUHE	565
G. Perinić	
EXPERIENCE WITH A LARGE SCALE He II REFRIGERATION SYSTEM AT TORE SUPRA .	571
B. Gravit and B. Jager	
OPERATION CHARACTERISTICS OF THE HELIUM REFRIGERATOR FOR THE LARGE HELICAL DEVICE WITH A DUMMY LOAD APPARATUS	581
R. Maekawa, T. Mito, S. Satoh, S. Yamada, A. Iwamoto, T. Baba, S. Moriuchi, K. Ooba, H. Sekiguchi, K. Nakamura, T. Fukano, H. Yamada, I. Ohtake, J. Yamamoto, and O. Motojima	
DEVELOPMENT OF A CRYOGENIC SYSTEM FOR THE LARGE HELICAL DEVICE	589
T. Mito, S. Satoh, R. Maekawa, S. Yamada, K. Takahata, N. Yanagi, S. Imagawa, K. Watanabe, H. Tamura, A. Iwamoto, T. Baba, S. Moriuchi, K. Oba, H. Sekiguchi, I. Ohtake, T. Satow, J. Yamamoto, and O. Motojima	
CRYOGENIC SYSTEM FOR TJNAF'S HALL C	597
P. D. Brindza, S. R. Lassiter, and R. R. Wines	
DESIGN OF THE FILL/TRANSFER STATION CRYOSTAT FOR THE OMEGA CRYOGENIC TARGET SYSTEM	605
C. R. Gibson, C. M. Charmin, J. V. Del Bene, E. H. Hoffmann, G. E. Besenbruch, and I. Anteby	
THE COLD NEUTRON SOURCE OF THE MUNICH RESEARCH REACTOR (FRM)	613
H. Gerstenberg, E. Krähling, D. Päthe, K. Schreckenbach, and W. Gläser	
CRYOGENIC TRANSIENT HEAT TRANSFER IN THE g-2 CRYOSTATS AT THERMAL INSULATING VACUUM LOSS	621
L. X. Jia and L. H. Gong	
SAFETY DESIGN, OPERATION, AND CONTROL OF A LIQUID HYDROGEN TARGET AT BNL	629
L. X. Jia, L. Addessi, V. Castillo, L. H. Gong, J. Leskowicz, R. Meier, G. Miglionico, and J. Scaduto	

Mechanisms and Machinery

OPERATIONAL EXPERIENCE WITH A CRYOGENIC AXIAL-CENTRIFUGAL COMPRESSOR	637
L. Decker, A. Kündig, K. Löhlein, W. Purtschert, B. Zeigler, Ph. Lebrun, L. Tavian, I. Brunovsky, and L. Tucek	
A HIGH RELIABILITY GAS-DRIVEN HELIUM CRYOGENIC CENTRIFUGAL COMPRESSOR	643
M. Bonneton, L. Tavian, G. M. Gistau-Baguer, F. Turcat, and P. Viennot	
OPERATING A TRAIN OF CRYOGENIC CENTRIFUGAL COMPRESSORS AT LOWER FLOW RATES AND CONSTANT COMPRESSION RATIO	651
G. M. Gistau-Baguer	
PREDICTING PERFORMANCE OF EXPANSION TURBINES USING DIFFERENT WORKING FLUIDS BASED ON THE ARTIFICIAL NEURAL NETWORK	657
L. Liu, Y. Li, and C. Chen	
A FEASIBILITY STUDY ON THE USE OF NEW GAS FOIL BEARINGS IN CRYOGENIC TURBOEXPANDER	661
L.-Y. Xiong, G. Wu, C.-Z. Chen, and Y.-Z. Li	
80 K TURBO COMPRESSOR SYSTEM WITHOUT LN ₂ COOLING FOR HIGH RELIABLE AND EFFICIENT HELIUM REFRIGERATOR	667
H. Asakura, N. Saji, Y. Kaneko, S. Yoshinaga, M. Mori, H. Yamaguchi, T. Nogaku, and T. Umeda	
PROGRESS REPORT OF A CRYOMECHANICAL HYBRID VACUUM PUMP PROTOTYPE ..	675
J. P. Périn, J. J. Cordier, and R. Mathes	
CONDUCTION COOLED HIGH-TEMPERATURE SUPERCONDUCTING MAGNETIC BEARING MODULE	683
H. J. Bornemann, W. Fieger, A. Weindl, A. W. Kaiser, and R. Koch	
COOL-DOWN DYNAMICS OF A CRYOSTAT WITH A CLOSED-CYCLE CRYOGENIC REFRIGERATOR	691
B. X. Zhang	
DEVELOPMENT OF 70 MW CLASS SUPERCONDUCTING GENERATORS	697
Y. Imai, K. Toyoda, K. Kimura, K. Inoue, T. Ichikawa, A. Sugawara, M. Ogawa, K. Yamaguchi, K. Suzuki, and K. Miyaika	
STUDY OF SUPERCRITICAL HELIUM CIRCULATION PUMP FOR A FORCED-FLOW COOLED MAGNET USING CICC	705
T. Kato, K. Hamada, L. Kawano, T. Shimba, K. Ootsu, H. Tsuji, and S. Shimamoto	
EXPERIMENTAL STUDY ON A THERMOACOUSTIC ENGINE WITH BRASS SCREEN STACK MATRIX	713
G. B. Chen, T. Jin, X. Bai, L. Zhao, and L. Fang	
INCREASING THE USEFUL LIFE OF QUENCH RELIEFS WITH INCONEL BELLOWS	719
W. M. Soyars	
MAGNETIC BEARING WITH MELT PROCESSED HTS	727
A. A. Kordyuk, V. V. Nemoshkalenko, and H. C. Freyhardt	

Instrumentation and Control

RECENT ADVANCES IN THE REALIZATION AND DISSEMINATION OF THE ITS-90 BELOW 83.8058 K AT NIST	733
W. L. Tew, C. W. Meyer, G. F. Strouse, and G. T. Furukawa	
CRYOGENIC THERMOMETER CALIBRATION FACILITY AT CERN	741
C. Balle, J. Casas, and J. P. Thermeau	
MINIATURE RESISTANCE THERMOMETERS BASED ON Ge FILMS ON GaAs	749
V. F. Mitin	

HIGH RESOLUTION THERMOMETRY USING THE MAGNETIC PENETRATION DEPTH OF SUPERCONDUCTING FILMS	757
C. J. Yeager, P. J. Shirron, and M. J. DiPirro	
NEUTRON IRRADIATION TESTS OF CALIBRATED CRYOGENIC SENSORS AT LOW TEMPERATURES	765
T. Junquera, J. F. Amand, J. P. Thermeau, and J. Casas-Cubillos	
EFFECTS OF HIGH INTENSITY CRYOGENIC IRRADIATION AND MAGNETIC FIELD ON TEMPERATURE SENSORS	773
Yu. P. Filippov, V. V. Golikov, E. N. Kulagin, and V. G. Shabratov	
SILICON PRESSURE SENSOR FOR IN SITU PRESSURE MEASUREMENT AT PRESSURIZED SUPERFLUID HELIUM ENVIRONMENT	781
T. Haruyama, N. Kimura, and T. Nakamoto	
DEVELOPMENT OF AN ACCURATE DOUBLE-DIAPHRAGM SAPPHIRE CRYOGENIC CAPACITIVE PRESSURE TRANSDUCER	789
F. Pavese, D. N. Astrov, P. P. M. Steur, D. Ferri, and D. Giraudi	
MEASUREMENTS OF VOID FRACTION AND FLOW RATE OF LNG FLOW	795
A. M. Arkharov, S. B. Glavatskikh, A. G. Grechko, and A. A. Zherdev	
FORCED CONVENTION COOLED THERMISTORS USED AS MAGNET LEAD FLOW SENSORS	803
A. Morgillo, M. Iarocci, A. Nicoletti, Y. Farah, and J. Sondericker	
PRECISE WIDE RANGE HEATMETERS FOR 1.5 K UP TO 80 K	811
G. Ferlin, B. Jenninger, and J-M. Rieubland	
LOW TEMPERATURE PERFORMANCE OF A SUPERCONDUCTING ANGULAR ACCELEROMETER	819
E. R. Canavan, M. V. Moody, and P. J. Shirron	
NEW TRANSFORMER FOR POWERING SUPERCONDUCTING MAGNETS	827
O. A. Shevchenko, H. J. G. Krooshoop, H. G. Knoopers, and H. H. J. ten Kate	
CRYOGENIC CONTROL SYSTEM FOR THE g-2 MUON RING	835
T. Tallerico, G. Bunce, L. X. Jia, W. Meng, C. Pai, and D. Konieczny	
APPLICATION OF INDUSTRIAL CONTROL SYSTEMS TO A LARGE SCALE CRYOGENIC SYSTEM	841
R. C. Sanders, D. H. Allspach, and R. L. Schmitt	
Cryoelectronics	
THE DESKSIDE SUPERCOMPUTER	849
J. W. Peeples	
CRYOGENICALLY COOLED OPTICAL DYNAMIC RAM	857
A. E. Johnson, E. S. Maniloff, and T. W. Mossberg	
CRYOPACKAGING FOR REAL WORLD PRODUCTS	865
G. Lehmann, J. Ramsden, J. Sochor, and G. Beeck	
PACKAGING AND INTEGRATION ISSUES FOR CRYOELECTRONIC AND SUPERCONDUCTOR MATERIALS	871
T. H. Clynne	
A FULLY FUNCTIONAL CLOSED CYCLE CRYOSYSTEM THAT USES LESS THAN ONE WATT OF REFRIGERATION AT 4.5 K, FOR A 2.5 GHz PER CHANNEL, 128 X 128 CHANNEL SUPERCONDUCTING SWITCH	881
E. L. Hershberg, T. J. Hendricks, and D. Patelzick	
Cryobiology and Medical Applications	
A REVIEW OF CRYOBIOLOGY AND CRYOSURGERY	889
J. Dobak	

A NOVEL CLOSED LOOP CRYOSURGICAL DEVICE	897
J. Dobak, M.D., X. Yu, and K. Ghaerzadeh	
A CRYOGENIC CATHETER FOR TREATING HEART ARRHYTHMIA	903
E. D. Marquardt, R. Radebaugh, and J. Dobak	
FAST JOULE-THOMSON CRYOCYCLING DEVICE FOR CRYOSURGICAL APPLICATIONS	911
B-Z. Maytal	
MAGNETOCARDIOGRAPHY AND MAGNETOENCEPHALOGRAPHY: NEW TECHNOLOGIES FOR FETAL SURVEILLANCE	919
R. T. Wakai, A. C. Leuthold, and C. B. Martin, Jr.	

Space Applications

DEVELOPMENT OF THE LONG-LIFETIME SOLID NITROGEN DEWAR FOR NICMOS	927
C. D. Miller	
PRE- AND POST-LAUNCH PERFORMANCE OF THE NICMOS DEWAR	935
C. D. Miller	
THERMAL PERFORMANCE OF THE XRS HELIUM CRYOSTAT	941
S. R. Breon, M. J. DiPirro, B. A. Warner, P. J. Shirron, and J. G. Tuttle	
SUPPRESSION OF SUPERFLUID FILM FLOW IN THE XRS HELIUM DEWAR	949
P. J. Shirron and M. J. DiPirro	
FINAL DESIGN OF THE XRS/ASTRO-E ADR	957
A. T. Serlemitsos, M. SanSebastian, and E. S. Kunes	
A HIGH T _c SUPERCONDUCTING CURRENT LEAD ASSEMBLY FOR THE XDS HELIUM CRYOSTAT.	965
J. G. Tuttle, T. P. Hait, R. F. Boyle, H. J. Muller, J. D. Hodge, and S. R. Breon	
CRYOGENIC/THERMAL SYSTEM FOR THE SIRTf OBSERVATORY	973
R. A. Hopkins, S. J. Nieczkoski, K. L. Russell, M. J. Lysek, and A. Klavins	
A SMALL LONG-LIFE DEWAR FOR EXPLORER-TYPE SPACE EXPERIMENTS	981
A. R. Urbach, K. A. Gause, and S. J. Nieczkoski	
LIFETIME ENHANCEMENT OF THE CHEX CRYOGENIC SYSTEM	989
T. S. Luchik, M. E. Larson, U. E. Israelsson, D. Pearson, D. Petrac, and S. Elliott	
DESIGN AND TESTING OF AN IMPROVED CRYOPUMP FOR THE CONFINED HELIUM EXPERIMENT	995
M. J. Lysek, U. F. Israelsson, T. C. P. Chui, M. E. Larson, D. Petrac, S. E. Elliott, D. R. Swanson, X. Qin, and J. A. Lipa	
DESIGN AND FABRICATION OF A ZERO GRAVITY LIQUID CRYOGEN COOLER USING SURFACE TENSION CONFINEMENT TECHNOLOGY	1001
G. C. Driscoll, J. F. Maguire, and P. M. Winn	
LIQUID HYDROGEN DENSIFICATION HEAT EXCHANGER	1009
G. E. McIntosh, R. J. Stochl, and T. M. Tomsik	
POST-FLIGHT ANALYSIS OF A 10 K SORPTION CRYOCOOLER	1017
R. C. Bowman, Jr., P. B. Karlmann, and S. Bard	
THE REDSTONE INTERFACE COOLING SYSTEM	1025
J. M. Lester	

Antarctica

COALS TO NEWCASTLE - CRYOGENICS IN ANTARCTICA	1031
A. W. Francis and J. Alcorta	
INVESTIGATION OF THE SELF DESTRUCTION OF A LIQUID NITROGEN CONTAINER AT SOUTH POLE STATION, ANTARCTICA	1037
A. W. Francis	

