

***Cryogenic Systems***  
***for Large Scale Superconducting Applications***  
***(NIFS symposium and JSPS-DFG Seminar)***

**1. Cryogenic Systems for Experimental Fusion Devices.**

Opening Remark (A. Iiyoshi; *NIFS*)

Cryogenic Developments for the Large Helical Device.  
(J. Yamamoto; *NIFS*)

Ten Years of Operation of the Tore Supra Cryogenic System.  
(B. Gravit, B. Jager, F. Minot; *CEA/Cadarache*)

Operation of the Nb<sub>3</sub>Sn Superconducting Toroidal Magnet System on TRIAM-1M.  
(S. Itoh, K. Nakamura, M. Sakamoto, K. Makino, E. Jotaki; *Advanced Fusion Research Center, Kyushu Univ.*)

Experience with the Large Scale Cryogenic System for JET.  
(W. Obert; *JET joint Undertaking*)

**2. Test Facilities for Large Scale Superconducting Application.**

FZK - Experiences of Cooling Large SC Systems.  
(W. Lehmann; *FZK*)

Thermomechanical Pumps for Cooling with Forced Flow of Superfluid Helium.  
(A. Hofmann; *FZK*)

21 T Superconducting Magnet System with Saturated Superfluid Helium Cooling.  
(T. Kiyoshi, M. Kosuge, F. Matsumoto, H. Nagai, A. Sato, K. Inoue, H. Maeda and H. Wada; *NRIM*)

Cryogenic System for CS Test Facility.  
(T. Kato, K. Hamada, K. Kawano, K. Matsui, T. Hiyama, T. Honda, K. Nishida, S. Sekiguchi, K. Ootsu and H. Tsuji; *JEARI*)

**3. Large Scale Cryogenic System for High Energy Physics.**

Cryogenic System for TRISTAN RF Cavities.  
(K. Hosoyama\*, K. Hara\*, A. Kabe\*, Y. Kojima\*, T. Ogitsu\*, Y. Sakamoto\*, Y. Morita\*, T. Fujita\*\* and T. Kanekiyo\*\*;  
\*KEK, \*\*Hitachi Ltd.)

The HERA Cryogenic System as an Example for a Large Scale Cryogenic System with High Availability and Reliability.  
(H. Lierl; *DESY*)

Helium Cryogenic Systems for the LEP2 and LHC Projects at CERN.  
(Ph. Lebrun; *CERN*)

Cryogenic System for the Tevatron.  
(M.G. Geynisman, B.L. Norris, J.N. Makara, J.C. Theilacker; *Fermi National Accelerator Laboratory*)

Cryogenic System for the Muon g-2 Superconducting Magnet at BNL.  
(L.X. Jia\*, M.A. Green\*\*, G. Bunce\*, J.R. Cullen\*, C. Pai\*, L. Snydstrup\* and T. Talerico\*; \*Brookhaven National Laboratory, \*\*E. O. Lawrence Berkeley National Laboratory)

#### 4a. Cryogenic Systems for Large Scale Superconducting Applications (I).

Cooling System for Wendelstein 7-X.  
(F. Schauer; *Max-Planck-Institut für Plasmaphysik*)  
Investigation of the Cooling Scheme for the LHC Superconducting Magnets.  
(B. Rousset; *CEA-Grenoble/DRFMC/SBT*)  
The Cryogenic System for the NHMFL Hybrid Magnet.  
(S.W. Van Sciver, K. Bartholomew and S.J. Welton; *NHMFL*)

#### 4b. Cryogenic Systems for Large Scale Superconducting Applications (II).

Cryogenic Design of 70MW Class Superconducting Generators.  
(T. Ichikawa; *Super-GM*)  
Cryogenics for Magnetic Levitating Train.  
(H. Nakashima, *Railway Technical Research Institute*)  
A Cryogenic System for HT-7 Tokamak.  
(Y. Bi; *Institute of Plasma Physics*)

#### 4c. Cryogenic Systems for Large Scale Superconducting Applications (III).

The Cryogenic System for the Superconducting  $e^+e^-$  Linear Collider TESLA.  
(G. Horlitz; *DESY*)  
Reference Design for the Refrigerators for a 30 km Long Superconducting Linac.  
(H. Quack, M. Kauschke, C. Haberstroh; *Technische Universität Dresden*)  
Cryogenic System of the ELBE LINAC in Dresden.  
(Ch. Haberstroh, H. Quack; *Technische Universität Dresden*)

#### 5. Large Helical Device (LHD).

Large Helical Device Project.  
(O Motojima; *NIFS*)  
Cryogenic System for the Large Helical Device.  
(T. Mito; *NIFS*)

LHD Poster Sessions at the LHD Experimental Building.

- 1) Present Status of LHD (T. Satow).
- 2) Helical Coils for LHD (S. Imagawa).
- 3) Poloidal Coils for LHD (K. Takahata).
- 4) Superconducting Current Feeder System for LHD (S. Yamada).
- 5) Coil Power Supplies for LHD and Reliability Test of OV Coil Protection System (S. Tanahashi).
- 6) Current Control System for Superconducting Coils of LHD (H. Chikaraishi).
- 7) Mechanical Test Results for Coil Packs Simulating Superconducting Coils in LHD (H. Tamura).
- 8) Fracture toughness of Structural Material for LHD (A. Nishimura).
- 9) Heat Transfer Measurements for the Stability Analyses of the Helical Coil Superconductor (A. Iwamoto).
- 10) Design and Experiments on Component Hardwares for LHD Cryogenic System (S. Satoh).
- 11) Design of Central Control System for LHD (H. Yamada).
- 12) Cryogenic Control System for LHD (T. Mito).
- 13) Test Operation of Cryogenic System with a Dummy Heat Load (R. Maekawa).
- 14) Quench Analysis of the Helical Coils for LHD (N. Yanagi).

## 6. Operation Experiences and Research Works on Large Scale Cryogenic Systems.

Operation Experience in Cryogenic Measurement Technique and Process Control from Testing S.C. Magnets within the FZK TOSKA Facility. (M. Süßer; *FZK*)

Construction and Operation of a 10 kW Class Helium Refrigerator for LHD. (S. Satoh; *NIFS*)

Cooling and Excitation Tests of a Single Inner Vertical Poloidal Coil -EXSIV. (K. Takahata; *NIFS*)

Cryogenic Mechanical Test Facilities and Test Results. (A. Nishimura; *NIFS*)

Research Works on Large Scale Cryogenic Systems at SWIP. (H. Li, M. Pu; *Southwestern Institute of Physics*)

## 7. Design and Numerical Simulation of Cryogenic Systems.

Cryogenics of the K500 Superconducting Cyclotron at VEC Center Calcutta.

(N. Bhattacharya; *KEK and Variable Energy Cyclotron Centre*)

Design of Superfluid-Cooled Cryostat for 1GHz NMR Spectrometer.

(A. Sato\*, T. Kiyoshi\*, H. Maeda\*, S. Itoh\*\* and Y. Kawate\*\*, *\*NRIM, \*\*Kobe Steel, Ltd.*)

Numerical Simulation of Countercurrent Heat Exchangers in Cryogenic Systems.

(M. Kauschke, H. Quack; *Technische Universität Dresden*)

Design Considerations for Very Large Helium Refrigeration Systems.

(K. Löhlein, A. Kündig, B. Ziegler; *Linde Kryotechnik AG*)

Closing Remark (P. Komarek; *FZK*)