

ICFA Mini-Workshop on High Field Magnets for pp Colliders

June 15-17th 2015, Shanghai Jiao Tong University, Xuhui Campus

Organizer: Institute of High Energy Physics, Chinese Academy of Sciences

Co-organizer: Shanghai Superconductor Technology Co., Ltd. (SSTC)



2015
ICFA MINI-WORKSHOP
ON HIGH FIELD MAGNETS
FOR PP COLLIDERS

Organizer
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Co-organizer
Shanghai Superconductor Technology Co., Ltd.

 中国科学院高能物理研究所
Institute of High Energy Physics, Chinese Academy of Sciences

 上海超导科技股份有限公司
Shanghai Superconductor Technology Co., Ltd.

Introduction

This workshop is motivated by the upcoming needs of the 20-T level accelerator magnets for recently proposed circular pp colliders, i.e. the Super proton proton Collider (SppC) and the Future Circular Collider (FCC). The purpose of this workshop is to review the present related technologies on high field accelerator magnets, with special emphasis on the high Jc Nb₃Sn and HTS conductors, the design study of the 20-T accelerator magnets and the fabrication methods of the high field coils and magnets. The R&D roadmap for the next years and possible collaborations between labs will be discussed, to make sure we are able to realize the 20-T dipole and quadrupole magnets in time. Any institutes or companies working on these issues are welcome to participate in this workshop, to give presentations, exchange information and to have fruitful discussions.

Main Topics

Conceptual Design Study, Advanced Superconducting Materials, Fabrication Methods, and Quench Protection Methods for 20-T level Accelerator Magnets

International Advisory Committee

Naoyuki AMEMIYA (Kyoto U., Japan)
Emanuela BARZI (FNAL, USA)
Weiren CHOU (FNAL, USA)
Ramesh GUPTA (BNL, USA)
Steve GOURLAY (LBNL, USA)
Zhenghe HAN (Tsinghua U., China)
Guangli KUANG (HMFL, China)
Vadim KASHIKHIN (FNAL, USA)
Yijie LI (SJTU, China)
Lizhen MA (IMP, China)
Toru OGITSU (KEK, Japan)
Qing QIN (IHEP, China)
GianLuca SABBI (LBNL, USA)
Jingyu TANG (IHEP, China)
Jiuqing WANG (IHEP, China)
Peter WANDERER (BNL, USA)
Guo YAN (WST, China)

Local Organization Committee

Fushan CHEN (IHEP, China)
Zhiyong HONG (SJTU & SST, China, Co-Chair)
Wen KANG (IHEP, China)
Chengshan LI (NIN, China)
Chuyao PENG (SST, China)
Timing QU (Tsinghua U., China)
Qingjin XU (IHEP, China, Co-Chair)
Guo YAN (WST, China)
Zian Zhu (IHEP, China)

Venue

Room: 306 meeting room, Haoran High-tech Mansion

Add: Haoran High-tech Mansion, Jiaotong University, Xuhui, Shanghai, 200030



General Calendar

	Time	Item	Form	Location
14/6/2015 Sun	12:00-19:00	Registration		Tianping Hotel & FX Hotel
	19:00-21:00	Welcome Reception	Light Buffet	21 st Floor, Tianping Hotel
15/6/2015 Mon	8:20-9:00	Post-registration		On-site at the venue
	9:00-12:40	Session 1 & Session 2		Room 306, Haoran High-tech Mansion, SJTU Xuhui Campus
	12:40-14:00	Lunch	Buffet	SJTU Faculty Club
	14:00-18:10	Session 3 & Session 4		Room 306, Haoran High-tech Mansion, SJTU Xuhui Campus
	18:10-20:00	Dinner	Buffet	SJTU Faculty Club
16/6/2015 Tue	9:00-12:30	Session 5 & Session 6		Room 306, Haoran High-tech Mansion, SJTU Xuhui Campus
	12:30-14:00	Lunch	Buffet	SJTU Faculty Club
	14:00-18:30	Session 7 & Session 8		Room 306, Haoran High-tech Mansion, SJTU Xuhui Campus
	19:00-21:00	Dinner	Banquet	21 st Floor, Tianping Hotel
17/6/2015 Wed	9:00-16:30	Technical Tour SSTC		SSTC

Important Notice

1. **Registration:** will mainly happen at the reception desk of Tianping Hotel and FX Hotel from 12:00-19:00 on 14 June. In case some participants are not able to register on 14 June, the registration window is also open from 8:00 to 9:00 on 15 June at the venue (Room 306 of Haoran High-tech Mansion). All documents/vouchers/gifts will be provided during the registration.
2. **FX Hotel to Venue:** considering the long walking distance (25 min) from FX Hotel to the venue, a couple of shuttle cars will be provided for the transport from FX Hotel to the venue. Participants who need the service please get to the hotel reception hall between 8:20 and 8:45, we will travel you to the venue in several times.
3. **Tianping Hotel to Venue:** as it takes only 7 min walk from Tianping Hotel to the venue but frequently 30 min by car (due to the one-way streets and the heavy traffic nearby), we strongly recommend the participants at Tianping Hotel. If you need shuttle car, please let us know.
4. **Visiting SSTC:** all the visitors will be divided into 3 groups, the first visit will happen in the morning and the other two visits will be in the afternoon. Shuttle bus will transport you from FX/Tianping hotel to SSTC. Detailed arrangement will be announced during the workshop.
5. **Meal Vouchers:** Please keep your vouchers for Lunch/Dinner and give them to the restaurant staff before having the meal.

The WiFi at the venue is: **TP-LINK_306** , password: **9999999999**

Agenda

Sunday 14 June 2015		
Registration, 15:00-19:00		
Welcome Reception, 19:00-21:00		
Monday 15 June 2015		
Session 1 – Opening Session (09:00-10:30)		
Convener: Weiren CHOU (FNAL)		
09:00-09:10	Welcome address 10'	Yifang WANG (IHEP)
09:10-09:40	CEPC-SPPC overview 30'	Qing QIN (IHEP)
09:40-10:00	Introduction of SPPC study 20'	Jingyu TANG (IHEP)
10:00-10:30	Review of SC magnets 30'	GianLuca SABBI (LBNL) /Bruce STRAUSS (DOE)
Group photo & Coffee Break(10:30-11:00)		
Session 2 – Review of Present Magnet Technology and Future Prospects (I) (11:00-12:40)		
Convener: Qing Qin (IHEP)		
11:00-11:25	Cost optimization of 100 TeV pp collider 25'	Robert PALMER (BNL)
11:25-11:50	Conductor requirements from magnet designers 25'	Dan DIETDERICH (LBNL)
11:50-12:15	Technology development through the subscale magnet program 25'	Xiaorong WANG (LBNL)
12:15-12:40	SC magnets at BNL 25'	Ramesh GUPTA (BNL)
Lunch Break (12:40-14:00)		
Session 3 –Review of Present Magnet Technology and Future Prospects (II) (14:00-16:00)		
Convener: Robert Palmer (BNL)		
14:00-14:25	SC magnets at Fermilab 25'	Tengming SHEN (Fermilab)
14:25-14:50	CCT magnet at LBNL 25'	Dan DIETDERICH (LBNL)
14:50-15:15	Quench Behaviors and Protection of 2G HTS Coils 25'	Honghai SONG (MSU)
15:15-15:40	Construction of Steady High Magnetic Field Facilities at CHMFL 25'	Yunfei TAN (CHMFL)
15:40-16:00	Fast cycling SC magnet with big bore for HIAF project 25'	Wei WU (IMP)
Coffee Break (16:00-16:30)		
Session 4 – Design Study of the 20-T Accelerator Magnets (16:30-18:10)		
Convener: Ramesh Gupta (BNL)		
16:30-16:55	SPPC magnets 25'	Qingjin XU (IHEP)
16:55-17:15	High Field Hybrid Design 20'	Ramesh GUPTA (BNL)
17:15-17:35	20-T block dipole: features and challenges 20'	Xiaorong WANG (LBNL)
17:35-17:55	Mechanical Design Study of a 20 T Common-coil Dipole for SppC 20'	Kai ZHANG (IHEP)

17:55-18:10	An Improved Coupling Loss Induced Quench Protection System	Yinan HU (IHEP)
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Tuesday 16 June 2015

Session 5 – Superconducting Materials (I) (09:00-10:40)		
Convener: Dan Dietderich (LBNL)		
09:00-09:30	Future Nb ₃ Sn conductor for 20 T Magnet 30'	Xuan PENG (Hyper Tech)
09:30-09:50	Possibilities of MgB ₂ conductors for high field applications 20'	Guo YAN (WST)
09:50-10:10	Control formation of GBs towards high field MgB ₂ 20'	Akiyasu YAMAMOTO (U. of Tokyo)
10:10-10:25	MgB ₂ development for accelerator and medical applications 15'	Xuan PENG (Hyper Tech)
10:25-10:40	Development of Nb ₃ Sn wire for high magnetic field at WST 15'	Xiaguang SUN (WST)
Coffee Break (10:40-11:00)		
Session 6 – Superconducting Materials (II) (11:00-12:30)		
Convener: Xuan Peng (Hyper Tech)		
11:00-11:30	Round-wire Bi-2212: a high-field magnet material 30'	Eric HELLSTROM (FSU)
11:30-11:50	PIT experience for Bi-2212 tape and its application 20'	Zhenghe HAN (Tsinghua U.)
11:50-12:15	Developing accelerator magnet technology based on Bi-2212 round wire: Breakthroughs, progresses, and crucial next steps 25'	Tengming SHEN (Fermilab)
12:15-12:30	Through process quality control of HTS magnets: from tapes to coils 15'	Peng SONG (Tsinghua U.)
Lunch Break (12:30-14:00)		
Session 7 – Superconducting Materials (III) (14:00-16:00)		
Convener: Eric Hellstrom (FSU)		
14:00-14:30	Progress of ReBCO Coated Conductor Program at SJTU and SSTC 30'	Yijie LI (SJTU/SSTC)
14:30-15:00	YBCO conductor development for high field applications 30'	Guilin CUI (SuperPower)
15:40-16:00	Overview of 2G-HTS wire production in SuperOx 20'	Valery PETRYKIN (SuperOx)
15:00-15:20	Flux motion and electromagnetic performance in HTS magnet 20'	Yi Li (Tsinghua U.)
15:20-15:40 Closing Remark	Introduction to Shanghai Superconductor and its Future Strategy 20'	Zhiyong HONG (SSTC)
Coffee Break (16:00-16:30)		

Session 8 - Roundtable Discussion, Conclusions and Outlook (16:30-18:30)

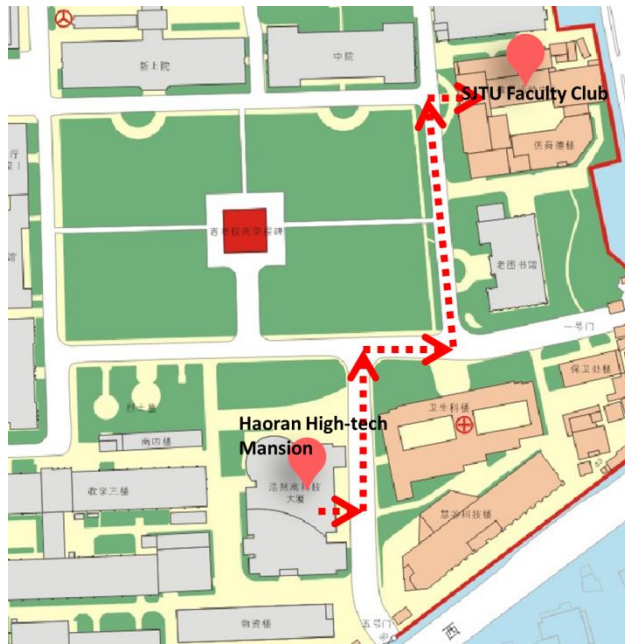
Panel members: Weiren CHOU, Dan DIETDERICH, Ramesh GUPTA, Eric HELLSTROM, Zhenghe HAN, Yijie LI, Robert PALMER, Xuan PENG, Bruce STRAUSS, John SKARITKA, Tengming SHEN, Yunfei TAN, Qingjin XU, Akiyasu YAMAMOTO, Guo YAN

Wednesday 17 June 2015

Technical Tour SSTC, 09:00-16:30

SJTU Faculty Club

For Lunch and Dinner on Jun 15th and lunch on Jun 16th



Hotel

1, Tianping Hotel:

Add: No.185 Tianping Road, Xuhui District, Shanghai 200030, China (near to the crossing of Tianping Rd. and Hengshan Rd., this info is useful when taking taxi)

Remarks: 7-8 min walk to the venue.



Exteriors:



Transport Information:

(A) From Shanghai Hongqiao Airport Terminal 1, Shanghai Hongqiao Airport Terminal 2 or Shanghai Hongqiao Railway Station:

Taxi: 45 RMB (~7.3 USD), 60 RMB (~9.5 USD), 70 RMB (~11.3 USD), respectively.

Metro: (1) Walk to Metro *Line 10*; (2) Take *Line 10* and drop at Jiaotong University Station, outbound at Exit 2; (3) Walk 970m to the hotel. This takes about 50 min.

(B) From Shanghai Pudong International Airport Terminal 1 or 2:

Taxi: 170 RMB (~27.5 USD).

Metro: (1) Walk to Metro *Line 2*; (2) Take *Line 2* to Century Avenue Station (You may need to exchange your metro on the opposite platform at Guanglan Rd. Station); (3) Transfer to *Line 9* and drop at Xujiahui Station, outbound at Exit 13; (4) Walk 530m to the hotel. This takes about 2.5 hr.

(C) From Shanghai Railway Station:

Taxi: 28 RMB (~4.5 USD).

Metro: (1) Walk to Metro *Line 1*; (2) Take *Line 1* and drop at Xujiahui Station, outbound at Exit 13; (3) Walk 530m to the hotel. This takes about 45 min.

(D) From Shanghai South Railway Station:

Taxi: 23 RMB (~3.7 USD).

Metro: (1) Walk to Metro *Line 1*; (2) Take *Line 1* and drop at Xujiahui Station, outbound at Exit 13; (3) Walk 530m to the hotel. This takes about 35 min.

2, FX Hotel:

Add: No.2701 Xietu Road, Xuhui District, Shanghai (near to the crossing of Tianyaoqiao Rd. and Xietu Rd., this info is useful when taking taxi)

Remarks: 25-30 min walk to the venue.

Map:



Exterior:



Transport:

(A) From Shanghai Hongqiao Airport Terminal 1, Shanghai Hongqiao Airport Terminal 2 and Shanghai Hongqiao Railway Station:

Taxi: 45 RMB (~7.3 USD), 60 RMB (~9.5 USD), 70 RMB (~11.3 USD), respectively.

Metro: **(1)** Walk to metro *Line 10*; **(2)** Take *Line 10* to *Hongqiao Road* station; **(3)** Transfer to *Line 4* and drop at *Shanghai Stadium* station, outbound at Exit 4; **(4)** Walk 200 m to the hotel. This takes about 50 min.

(B) From Shanghai Pudong International Airport Terminal 1 or 2:

Taxi: 165 RMB (~26.8 USD).

Metro: (1) Walk to Metro *Line 2*; (2) Take *Line 2* to Century Avenue Station (You need to exchange your train on the opposite platform at Guanglan Rd. Station); (3) Transfer to *Line 4* and drop at Shanghai Stadium Station, outbound at Exit 4; (4) Walk 250m to the hotel. This takes about 2 hr.

(C) From Shanghai Railway Station:

Taxi: 35 RMB (~5.7 USD).

Metro: (1) Walk to Metro *Line 4*; (2) Take *Line 4* and drop at Shanghai Stadium Station, outbound at Exit 4; (3) Walk 250m to the hotel. This takes about 30 min.

(D) From Shanghai South Railway Station:

Taxi: 23 RMB (3.7 USD).

Metro: (1) Walk to Metro *Line 1*; (2) Take *Line 1* to Shanghai Indoor Stadium Station; (3) Transfer to *Line 4* and drop at Shanghai Stadium Station, outbound at Exit 4; (4) Walk 250m to the hotel. This takes about 30 min.

Local Contact:

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We are always at your disposals.