

LHC Optics & Commissioning (LOC)

■ forum for LHC optics and operation oriented discussion:

→ study team rather than rigid section

→ collaboration across several sections and groups

(e.g. LEI for ions; HEI for SPS MDs; LCE for LHC parameters;

AB: BI + OP + RF; AT: MAS + MEL + MTM + CRI + VAC)

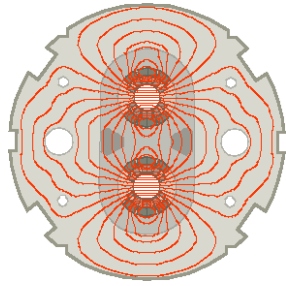
→ collaboration with external laboratories

(US-LHC; TRIUMF; BNL; FNAL, LBNL)

■ LOC mandate

■ LOC members and collaborators

■ main objectives for 2003 and who does what



LHC Optics & Commissioning (LOC)

core members:

Ralph Assmann (80%)

Stefano Redaelli (R. Assmann)

Oliver Brüning (100%)

Stephane Fartoukh (100%)

Bernard Jeanneret (100%)

Thys Risselada (100%)

Frank Schmidt (100%)

Andre Verdier (100%)

part time members:

Bruno Autin (50%)

Massimo Giovannozzi (50%)

Alessandra Lombardi (50%)

Walter Wittmer (F. Zimmermann)

Helmut Burkhardt (30%)

Werner Herr (LCE: MADX; x-ing)

John Jowett (LEI: ions; WWW)

external partners:

Igor Baichev (IHEP: loss maps)

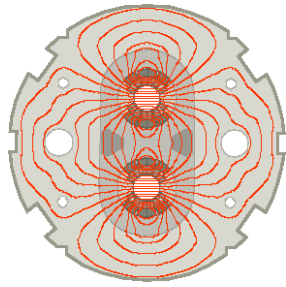
ITEP (MADX)

Angeles Faus-Golfe (Optics)

Etienne Forest (KEK: MADX)

Dorbin Kaltchev (TRIUMF:optics)

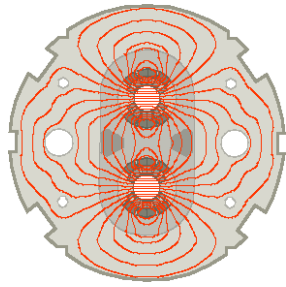
Fulvia Pilat (BNL: MADX + MDS)



LHC Optics & Commissioning (LOC)

 mandate:

- optics design and development for the LHC (including the finalization of the collimation system)
- specify the acceptable magnet field imperfections and monitor and evaluate the magnet field quality during production
- specify the acceptable geometric machine acceptance
- study commissioning and machine operation scenarios (including the specification of the LHC beam parameters)
- study operation and measurement procedures for the LHC in existing machines (MD studies for novel ideas)
- maintain and develop software tools for accelerator designs



LHC Optics & Commissioning (LOC)

■ main objectives for 2003:

1) Magnet Field Quality:

→ finalize the specification for the LHC magnet field quality
Magnet Evaluation Board, Field Quality Working Group

→ O. Bruning (DA tracking); S. Fartoukh (main dipoles+DA);

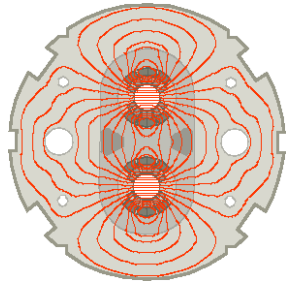
M. Giovannozzi (insertion magnets + DA); A. Lombardi (SSS + DA);

T. Risselada (DA tracking); F. Schmidt (triplet quadrupoles+DA); (A. Verdier)

2) Mechanical Acceptance and Magnet Geometry:

→ specify tolerances for the magnet geometry and evaluate the overall mechanical acceptance of the LHC
Working Group on Alignment; MEB

→ S. Fartoukh (MEB link-man); B. Jeanneret (WGA chair)



LHC Optics & Commissioning (LOC)

■ main objectives for 2003:

3) Optics Development and Maintenance:

→ finalize the optics development of the LHC Insertion Regions

LHC Collimation Project and Working Group

→ R. Assmann (project leader); I. Baichev (radiation); B. Jeanneret (losses and efficiency);
"D. Kaltchev (IR3 and IR7 optics matching); T. Risselada (IR3 and IR7 optics matching)

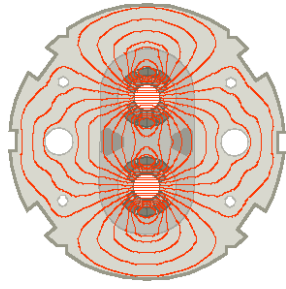
→ Insertion Region maintenance: **LHC data base + AT hardware**

→ S. Fartoukh (IR1; IR5); [J. Jowett (WWW)]; A. Lombardi (IR8);
T. Risselada (IR2 + data base); A. Verdier (IR4; IR6);

→ Special Optics:

LHC data base and Experiments

→ "A. Faus-Golfe (Roman Pot Optics in IR1)"; A. Verdier (TOTEM optics in IR5; alignment);



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■ main objectives for 2003:

4) Collimation and Machine Protection: LHC Collimation Project and WG

→ design of the LHC collimation system

→ R. Assmann (Collimation project leader); B. Jeanneret; AB-ATB

→ design of an LHC transfer line collimation system

→ [H. Burkhardt (design study)]; T. Risselada (SPS-LHC transfer-line survey + data base)

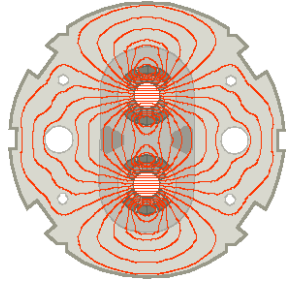
→ halo formation and efficiency studies:

→ R. Assmann (WG chair); B. Jeanneret (scattering); "D. Kaltchev (scattering)";

F. Schmidt (tools and diffusion models); [F. Zimmermann (diffusion models)]

→ loss mechanisms and failure modes:

→ "I. Baichev (radiation and loss estimates)"; B. Jeanneret (LOC link man);



LHC Optics & Commissioning (LOC)

■ main objectives for 2003:

5) LHC Operation and Commissioning:

→ functional specification of LHC base line instrumentation

BI Specification Team

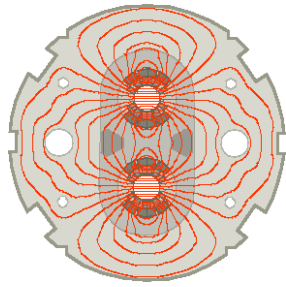
→ R. Assmann (luminosity monitor); O. Bruning (BI spec link man); [H. Burkhardt (BLM)];
S. Fartoukh (Q, coupling, Q'); B. Jeanneret (BLM)

→ LHC operation scenarios:

LHC Technical and Commissioning Committee + LHC operation Project

R. Assmann (LTC); O. Bruning (LTC secretary + LHCOP); S. Fartoukh (LTC);

[J-P Riunaud (LTC)]; [F. Ruggiero (LTC)]; A. Verdier (k-modulation); [W. Wittmer (β^* knob)]



LHC Optics & Commissioning (LOC)

■ main objectives for 2003:

6) Design Studies:

→ LHC design report: LHC base line parameters

involves all of LOC; LCE and part of LEI (ions) sections

O. Bruning (editorial board and LOC link man); [F. Ruggiero (LCE link man)]

→ LHC upgrade studies: LHC ultimate parameters

IR layout design studies; ESGARD

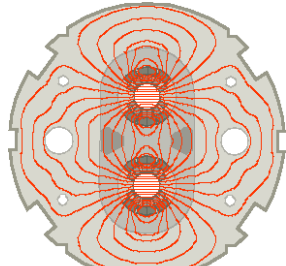
7) Machine Studies:

→ test of novel beam diagnostics tools

HEI section and other laboratories with running hadron machines

→ O. Bruning (Q'); S. Fartoukh (coupling); F. Schmidt (resonance driving terms);

[W. Wittmer (β^* knob)]; "F. Pilat (RHIC)"



LHC Optics & Commissioning (LOC)

main objectives for 2003:

8) Software Tools:

→ **MADX: collaboration over several groups and laboratories**

R. Assmann (EMIT); O. Bruning (MATCH); [H. Burkhardt (MAKETHIN)]; T. Risselada (THREADER)

F. Schmidt (C6t, TWISS; overall co-ordination); A. Verdier (TRACK, SURVEY);

[D. Brandt (IBS)]; [H. Burkhardt (MAKETHIN)]; [E. d'Amico (PLOT)];

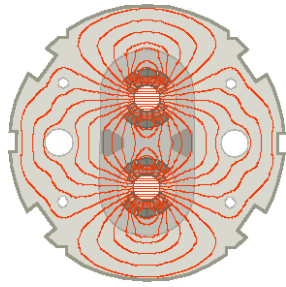
[W. Herr (ERROR + ORBIT)]; "F. PILAT (SXF)"; "ITEP (RADIATION + DAMPING)"

→ **non-linear machine modeling:**

B. Autin; F. Schmidt

9) Training and Teaching:

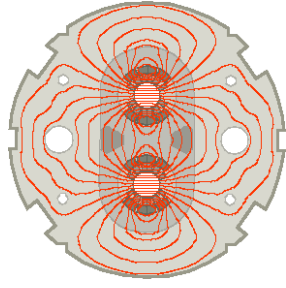
→ **CAS; CERN Summer School; CERN HST; JUAS**



LHC Optics & Commissioning (LOC)

LOC summary (CERN staff):

LOC member	main activity	percentage	other tasks
R. Assmann	collimation + commissioning scenarios	80	CLIC
O. Bruning	optics + DA + commissioning scenarios + beam diagnostics	100	
S. Fartoukh	optics + field quality MB + DA + beam diagnostics	100	
B. Jeanneret	magnet geometry + mechanical aperture + collimation	100	
T. Risselada	optics + DA + LHC data base + transfer lines	100	
F. Schmidt	MADX + DA + field quality triplet + beam diagnostics	100	
A. Verdier	optics and field quality	100	nu-fac
B. Autin	non-linear beam dynamics	50	LEI
H. Burkhardt	SPS-LHC transfer line collimation	30	HEI
M. Giovannozzi	field quality insertions + DA	50	HEI
A. Lombardi	optics + field quality SSS	50	LEI
S. Redaelli	collimation + commissioning scenarios (as of 2nd half of 2003)	100	CLIC
[W. Wittmer]	β^* knob		LCE



LHC Optics & Commissioning (LOC)

LOC summary (external staff):

Name	main activity	laboratory
I. Baichev	radiation and loss studies	IHEP
E. Forrest	MADX	KEK
A. Faus-Golfe	Roman pot optics in ATLAS	Univ. Valencia
D. Kaltchev	optics and collimation	TRIUMF
F. Pilat	MADX + machine studies	BNL
???????	MADX	ITEP