

**EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH  
ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE**

**CERN - PS DIVISION**

PS/ PA/ Note 94-31 (PPC)

**MINUTES OF THE PPC MEETING HELD ON 22.9.1994**

D. Manglunki

Geneva, Switzerland  
12 October, 1994

## Minutes of the PPC meeting held on September 22nd, 1994

### Present :

V. Agoritsas, J. Belleman, M. Bouthéon, E. Brouzet/SL, R. Cappel (Chairman), M. Chanel, G. Cyvoct, D. Dumollard, R. Garoby, G. Gelato, M. Giovanozzi, H. Haseroth, E. Jensen, S. Johnston, P. Lefèvre, D. Manglunki (Secretary), M. Martini, S. Maury, D. Möhl, J.P. Riinaud, K. Schindl, H. Schönauer, C. Steinbach, H. Ullrich, H. Umstatter, M. Vretenar, D. Warner, E. Wildner.

This PPC was devoted to the Pb ion beam

### 1. Introduction (R. Cappel)

- The schedule has been extended but one Wednesday MD has been lost due to a power cut.
- Two more Wednesday MDs should be used for Pb ion commissioning.

### 2. Status and problems of Pb ions in the Linac 3 (M. Vretenar)

- Since the 15th of June, Linac 3 has regularly delivered beam for 3-4 days/week for PSB, PS and SPS MDs.
- An absolute measurement of energy is being set up.

### 3. Status and problems of Pb ions in the PSB (H. Schönauer)

- The PSB vacuum has been improved.
- The distributor now pulses at a 1.2 seconds repetition rate.
- The nominal optics were set up on the 21st of September, during the SPS breakdown.
- There are still some provisional mendings done with putty on the vacuum chamber. It is not clear whether and when it should be replaced by welding.

### 4. Status and problems of Pb ions in the PS (D. Manglunki)

- Apart from the extracted intensity, one third below the design value, all figures concerning beam quality are better than expected.
- The stripper does not leave any measurable unstripped ion, and transmission through it seems to be greater than 90%.
- The limited number of "users"(8) and "high energy working points" (5) increased the difficulty of setting up the three cycles needed for ion commissioning while providing the operational beams.
- A strong noise induced by an RF cavity crossing ~ 4.2 MHz on the beam current transformer prevents us to determine the timing of the losses in the PS.

### 5. Discussion

- A system to filter the noise on the beam current transformer has been designed and ready for installation in the machine. Action: BD + OP.
- The MD about the optimisation of the stripper thickness will probably not take place before the beginning of the last physics run.
- LEAR will take protons during week 44, and the influence of the stray field of the E0 loop on the lead ion beam still has to be checked.

### 6. Recently published MD reports

- See attached copy.

**STATUS & PROBLEMS OF PB ION BEAM IN LINAC 3**

**1. AVAILABILITY:**

Since 15.6 beam to PS Booster, 3 to 4 days per week during 15 weeks

Down time registered in the PSB Log : 72.25 hours, corresponding to about 6% of the time dedicated to PSB

(46% storms, 10% water, 38% RF -mainly Tank 1-, 6% others)

**2. BEAM PERFORMANCE**

**3. PROBLEMS:**

- Emittance growth between exit of RFQ and exit of IH
- Beam misalignment in the ITF line (no losses, but makes life more difficult with stripping and emittance measurement)
- Need to improve some instrumentation, mainly multislit emittance measurement (easier and more automatic use)
- Absolute measurement of energy (a probe in LBS spectrometer is now operational, needs testing)
- .....

**TABLE 1**  
**Measured Performance of Linac 3**

Region of Linac 3	ITL	IIM	ITF	ITF	LBE/LBS
Ion and Charge State	Pb <sup>27+</sup>	Pb <sup>27+</sup>	Pb <sup>27+</sup>	Pb <sup>53+</sup>	Pb <sup>53+</sup>
Energy ( keV/u )	2.67	250	4280	4200	4200
Current ( $\mu$ Ae )	80	70	60	22	22
E <sub>H,n</sub> mm mrad, 4rms	0.24	0.32	1.2	1.2	1.6
E <sub>V,n</sub> mm mrad, 4rms	0.24	-0.38	1.1	1.1	1.2
$\Delta\phi$ ( deg ) 2 rms	-	13-20	2.5-4	-	-
$\Delta W$ (keV/u) 2 rms	-	5-8	23-25	-	2.5

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Ions to PS (E7)

MDION \*\* Sep 21 13:02:46

Transfo names	RING 1		RING 2		RING 3		RING 4		SUM	
ITB.TRA55	638	*****	598	*****	616	*****	562	*****	2414	0%
BI.TRA10	1001	157%	840	141%	805	131%	736	131%	3383	140%
BI.TRA20	462	46%	298	36%	357	44%	546	74%	1663	49%
INJECTION	1007	218%	771	258%	705	198%	742	136%	3224	194%
CAPTURE	441	44%	579	75%	498	71%	559	75%	2078	64%
BEF.DEBUN	453	103%	521	90%	433	87%	497	89%	1905	92%
AFT.DEBUN	414	91%	504	97%	385	89%	458	92%	1760	92%
ACCELER	361	87%	458	91%	345	90%	421	92%	1586	90%
BT.TRA	0	0%	0	0%	0	0%	0	0%	0	0%
BTP.TRA									0	0%
BTM.TRA										
BTY.TRA112										
Number of turns	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	▲▲▲ 19.0 ▼▼▼	Send Ring 3 to all rings	

Update Unfreeze Freeze All Lines Asynchronous

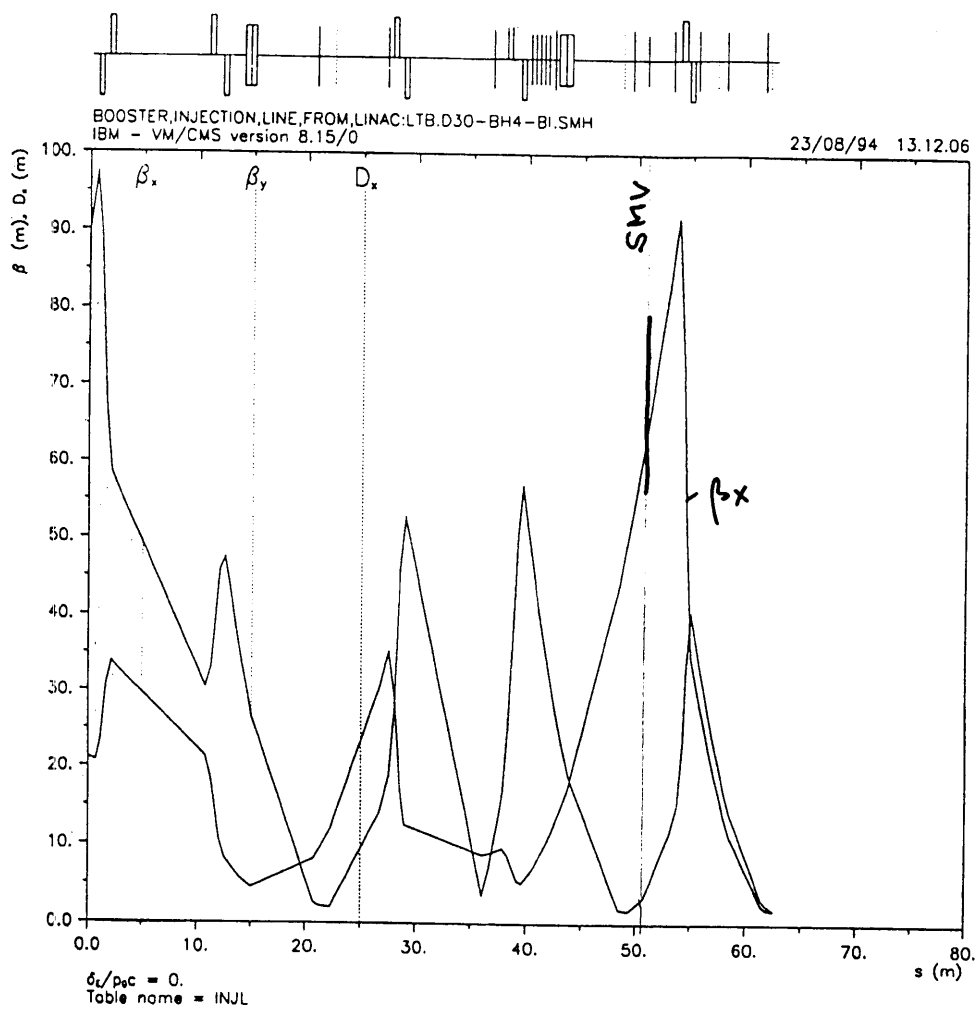
PROBLEMES "Pb PSB"

- Performances → Opération
- Setting optimisé des anneaux individuels stable
- Retrouver les variations de trajectoire avec 2 diodes/plan
- Inversion de la matrice de transfert
- Qualité des écrans signaux "ratés" PPU
- Transfert know-how RF → Op tjs interventions CU sur les accels et DSC RF
- Efficacité d'injection/transfert
- BT.TRA
- BTP.TRA
- VACUUM (intervention en octobre?)

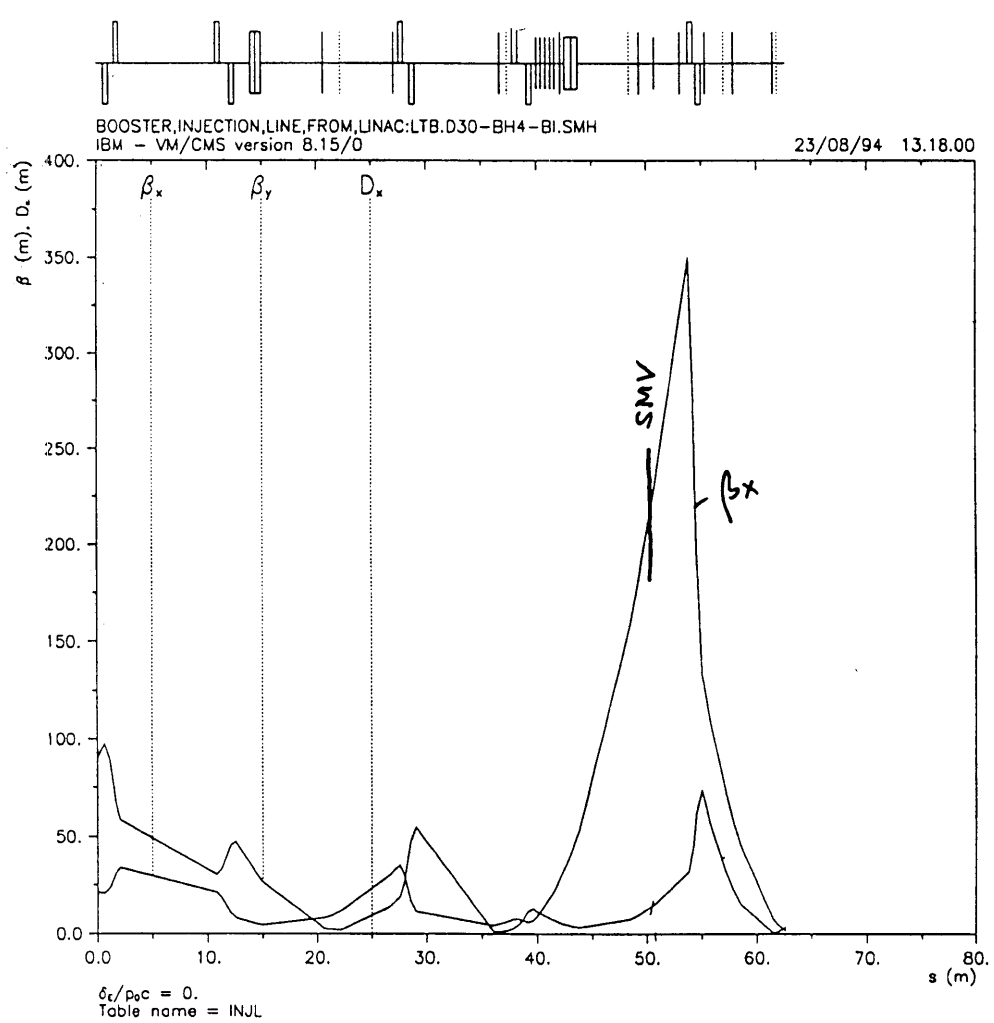
22/9/94

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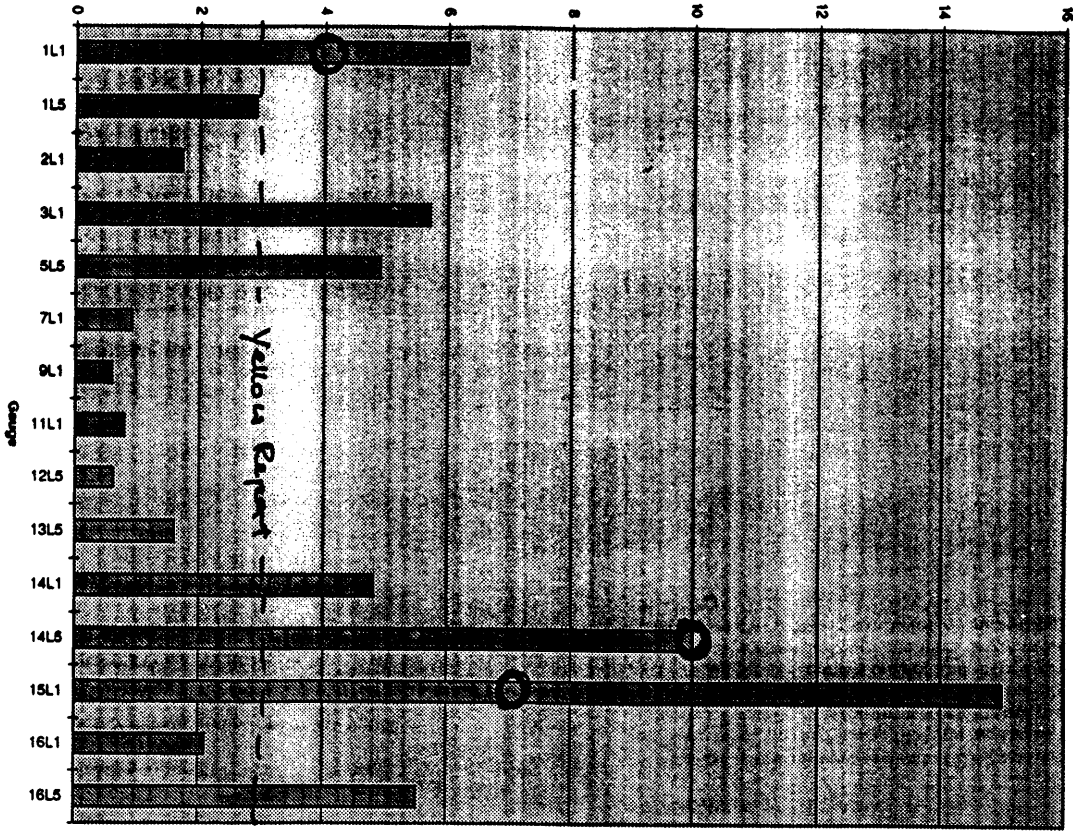
"MAD" currents



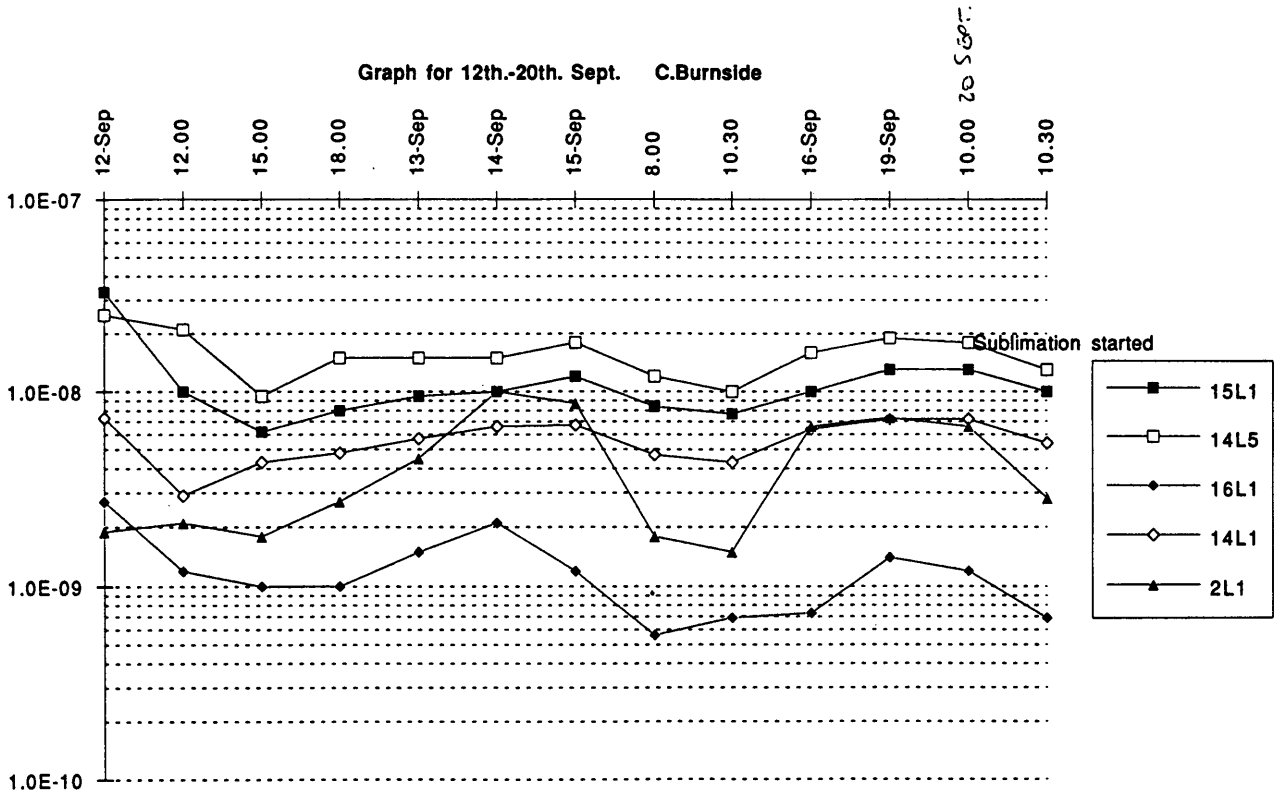
Real currents  
(provisional optics)



PSB Vacuum In 1E-9 Torr 29/8/94 13.00 h  
 O 21/9/94



Pressure Evolution Booster Chart 4



# Status and problems of Pb ions in the PS

D.Manglunki PPC 22-SEP-1994

(see PS/PA/Note 94-26 (MD) by R.Cappi)

- Beam quality: Most figures better than expected
  - ★  $\tau$  (1GeV) = 300 ms [?]
  - ★  $N_i = 1.10^8$  ions/pulse [1.5 10<sup>8</sup>]
  - ★  $\epsilon_x(2\sigma) \sim 3 \mu\text{m}$  [3.0]
  - ★  $\epsilon_y(2\sigma) \sim 1.50 \mu\text{m}$  [2.0]
  - ★  $\tau_b(4\sigma) = 7$  ns [9.0]
  - ★  $\epsilon_l(2\sigma) = 40$  meVs/u [72]
  - ★  $dp/p(2\sigma) = 0.8 \cdot 10^{-3}$  [0.8 10<sup>-3</sup>]
- Stripping:
  - ★ No partially stripped beam was observed
  - ★ Transmission > 90%
- Problems encountered:
  - ★ Power failures during last 2 MDs
  - ★ Limitations of number of users/HEWPT/...
  - ★ Complexity of ejection timings (specialist on holiday)
  - ★ Noise on internal transformer
  - ★ New SEMgrids
  - ★ MRP
- What Next?
  - ★ PSB Distributor now pulses at 1.2 seconds
  - ★ Commissioning of SPS (28/9?)
  - ★ Try and eliminate noise on instrumentation
  - ★ Optimisation of stripper thickness (MD)

**LISTE DES NOTES MD PUBLIEES EN 1994**

04.03.94	PS/OP/Note 94-19 (MD)	Summary of MD sessions on LEAR fast extraction at 105 MeV/c (13-14.12.1993)	S. Baird
08.03.94	PS/AR/Note 94-04 (MD)	Mesures sur le refroidissement stochastique de LEAR	M. Chanel
21.03.94	PS/AR/Note 94-06 (MD)	Effet de charge d'espace d'un faisceau refroidi par électrons en fonction du point de fonctionnement à LEAR	M. Chanel
29.04.94	PS/BD/Note 94-05 (MD)	PSB Q-measurement by FFT for LHC test	A. Chapman-Hatchett
22.04.94	PS/OP/Note 94-41 (MD)	Compte rendu d'études machine sur la stabilité du champ magnétique principal du PS	N. Blazianu, M. Bôle-Feysot, D. Rivalli, Ch. Steinbach, H. Ullrich
24.05.94	PS/AR/Note 94-15 (MD)	LEAR MD Report: Binched Beam Schottky Spectrum	J. Bosser
29.06.94	PS/PA Note 94-20 (MD)	MD report on the transport of fast extracted 3.5 GeV/c beam	K. Bätzner, L. Durieu
07.07.94	PS/HI/Note 94-02 (MD) PS/RF/Note 94-11 (MD)	Setting-up of Linac 2 for High Intensity	C. Hill, A. Lombardi, M. Vretenar
07.07.94	PS/HI/Note 94-04 (ME)	PSB ME-News: Introduction of PPM Mode between Cycles with low and high $B_{DOT}$	H. Fiebiger, N. Ramussen
07.07.94	PS/HI/Note 94-08 (ME)	PSB ME-News: First Injection of $Pb^{53+}$ Ions into the PSB	H. Schönauer
13.07.94	PS/RF/Note 94-34 (MD)	Compte rendu de MD PSB plomb, cycle MDION (4 & 6 .7.1994)	F. Blas, R. Garoby, G. Schneider
22.07.94	PS/HI/Note 94-09 (ME)	PSB ME-News: First Acceleration of $Pb^{53+}$ in PSB Ring 3	E. Jensen, K. Schindl
08.08.94	PS/AR/Note 94-22 (MD)	Compte rendu des MD effectués de avril à juin 1994	S. Baird, M. Chanel, R. Ley, H. Mulder
18.04.94	PS/OP/Note 94-42 (MD)	Spill Control using Extraction intensity feedback	H. Mulder
11.8.94	PS/RF/Note 94-36 (MD)	Compte Rendu de MD sur le PSB Accélération d'ions Plomb , Cycle Mdion (29 juillet 1994)	F. Blas, R. Garoby, F. Pedersen, G. Schneider



22.8.94	PS/RF/Note 94-37 (MD)	Description of PLD's Used in the Linac 3 ECR Source Controls Interface	B.J. Evans
31.8.94	PS/RF/Note 94-23 MD)	Compte rendu des MD effectués de mars à juin 94	Ed. C. Metzger
14.9.94	PS/PA Note 94-26 (MD)	PS MD Report of 29-30 Aug 94	R. Cappi
12.9.94	PS/RF/Note 94-38 (MD)	PS MD Report of 29.08.94	R. Garoby, J.P. Terrier, J.L. Vallet

## Distribution list PPC Minutes

V. Agoritsas	PS	S. Johnston	PS
B.W. Allardyce	PS	H. Koziol	PS
B. Autin	PS	K. Langbein	PS
S. Baird	PS	P. Lefèvre	PS
J. Belleman	PS	R. Ley	PS
J. Boillot	PS	J. Madsen	PS
J. Bosser	PS	D. Manglunki	PS
M. Bouthéon	PS	M. Martini	PS
E. Brouzet	SL	C. Mazeline	PS
H. Braun	PS	S. Maury	PS
R. Cappi	PS	C. Metzger	PS
F. Caspers	PS	D. Moehl	PS
M. Chanel	PS	A. Pace	PS
V. Chohan	PS	F. Pedersen	PS
G. Cyvoct	PS	F. Perriollat	PS
G. Daems	PS	J.P. Potier	PS
D. Dekkers	PS	N. Rasmussen	PS
J.P. Delahaye	PS	J. Riche	PS
D. Dumollard	PS	L. Rinolfi	PS
L. Durieu	PS	J.P. Riunaud	PS
T. Eriksson	PS	Cl. Saulnier	PS
J. Evans	PS	K. Schindl	PS
B. Frammery	PS	G. Schneider	PS
G. Fraser	DG	H. Schonauer	PS
R. Garoby	PS	E. Schulte	PS
G. Gelato	PS	T.R. Sherwood	PS
R. Giannini	PS	D. Simon	PS
M. Giovannozzi	PS	C. Steinbach	PS
J. Gruber	PS	A. Terrier	PS
S. Hancock	PS	G. Tranquille	PS
H. Haseroth	PS	H. Ullrich	PS
J.Y. Hémery	PS	H. Umstatter	PS
Ch. Hill	PS	M. Vretenar	PS
K. Hübner	DG	D. Warner	PS
E. Jensen	PS	E. Wildner-Malandain	PS