

TS M&O agreement for Detector Cooling installations

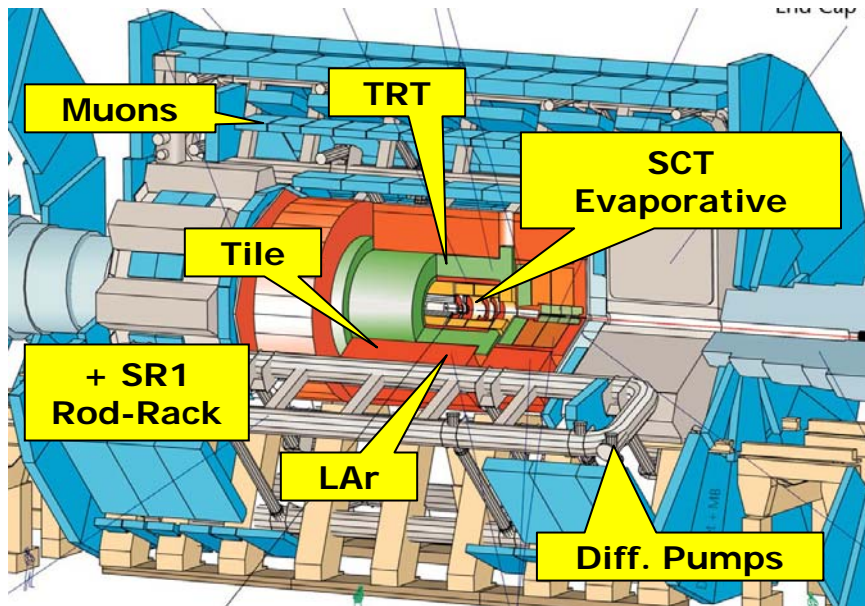
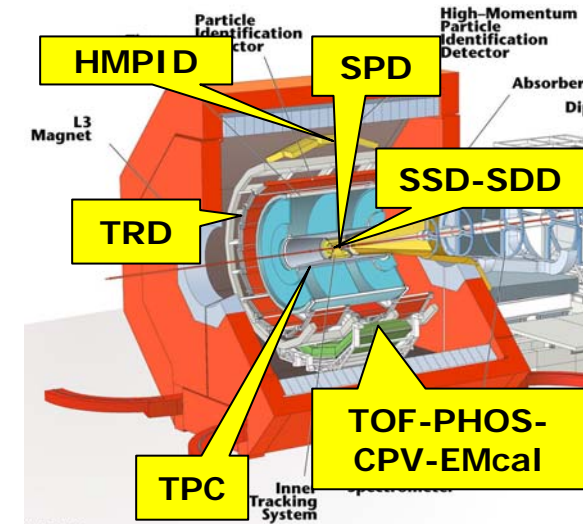
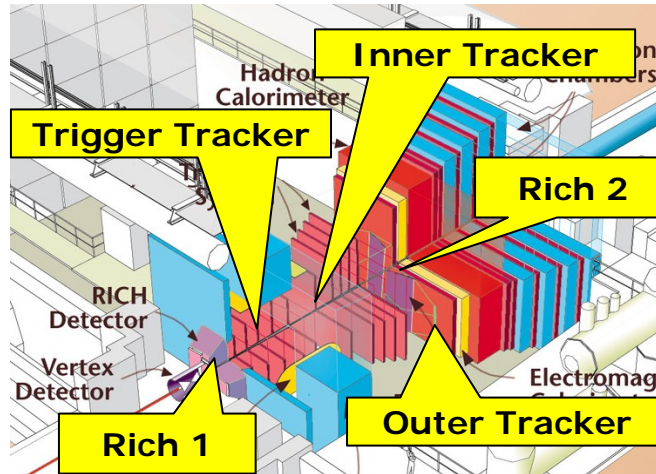
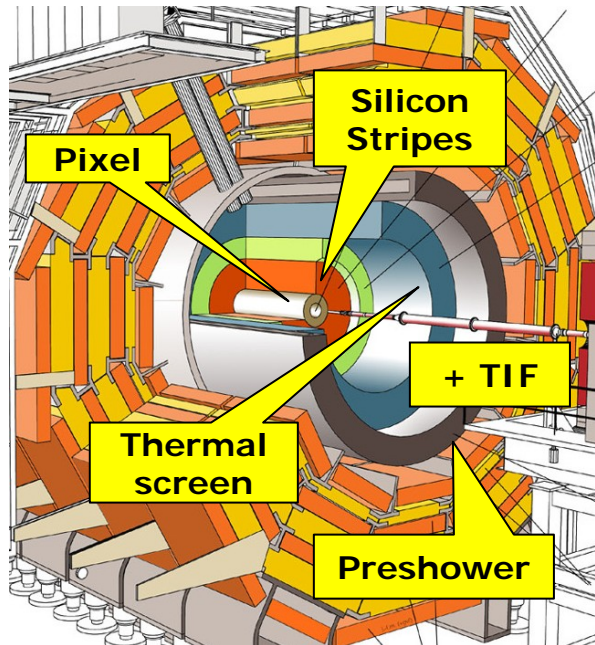
CERN LEAF Committee

2/R-030

8h30 - May 5th 2006

Michele Battistin (TS/CV/DC)

Subdetectors concerned

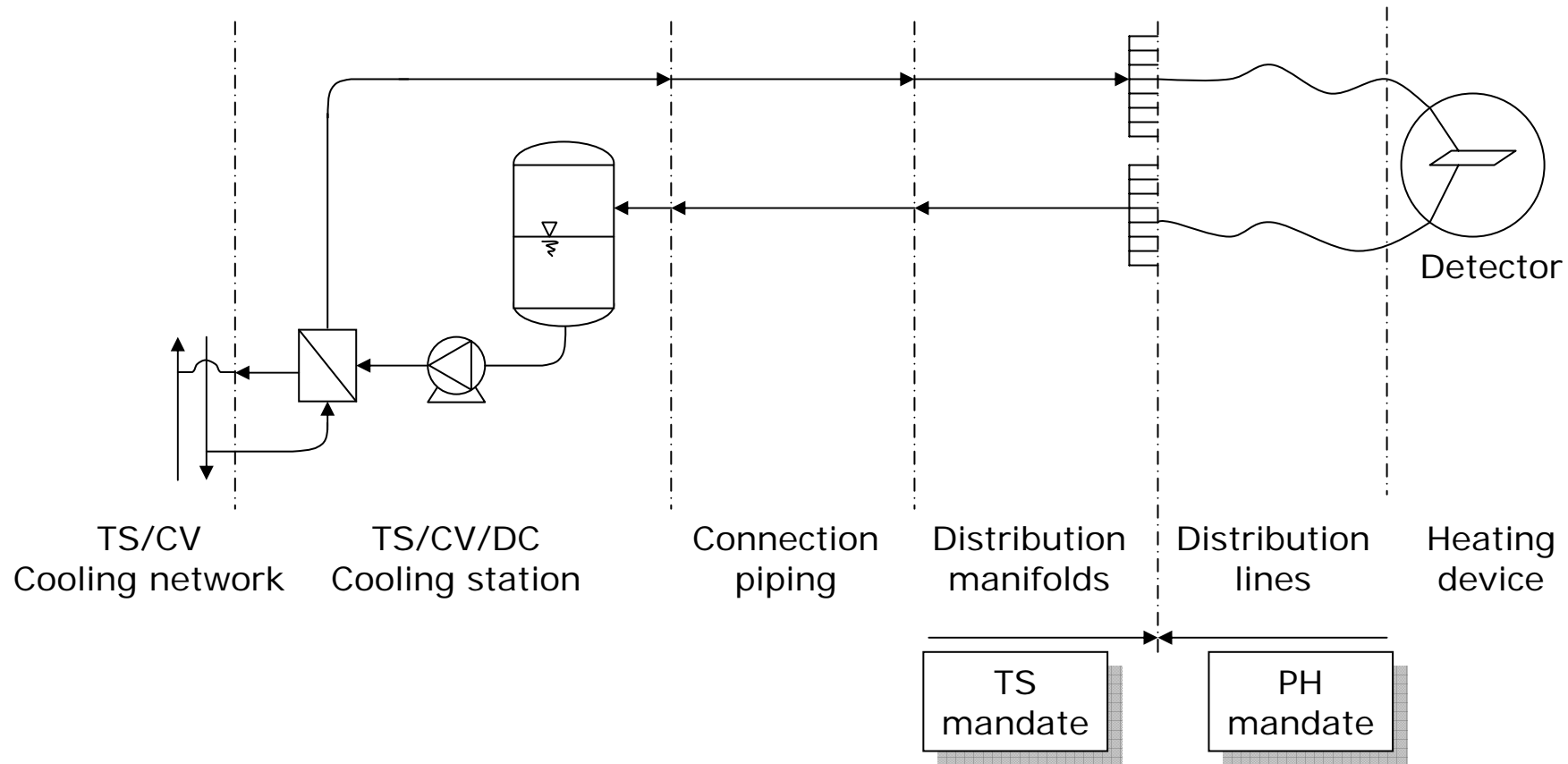


Other cooling systems:

- CMS Ecal
- Alice Phos (C_6F_{14})
- Mixed water for electronic racks
- Chilled water
- Demineralised main circuits

Are OUT of the scope of this presentation.
M&O agreement for these installations is detailed in EDMS 658953

TS-PH mandates during construction



How organize the operation phase of these systems?

Volumes and Values

	Number of units [N]	PFC units [N]	Distrib. lines [N]	Installation value* [kCHF]	Fluid value [kCHF]
CMS	9	7	220	2 450	330
ATLAS	7	3	~400	4 800	600
ALICE	7	1	~150	1 050	
LHCb	4	3	22	800	60
Total	27	14	~800	9 100	990

(*) design cost added

Service to be provided:

- Maintenance (preventive, corrective, predictive) of the installations
- Stand-by duty service during LHC operation period
- Operation, fine tuning
- PFC fluid management (quality and level control, purchase, register, etc.)

Detailed estimation of installation value

	Contract value	Material and construc.	Design cost	Installation value	Fluid value
	[kCHF]	[kCHF]	[kCHF]	[kCHF]	[kCHF]
CMS	2 450			2 450	330
ATLAS		3 900	900	4 800	600
ALICE		750	300	1 050	
LHCb	800			800	60
Total	3 250	4 650	1 200	9 100	990

Back-up slide

A dedicated team will assure the service

- ½ section leader
 - 1 engineer
 - 1 fridge expert
- ▶ financed by TS
- 1 electrical & control expert
 - 1 pipe welder
- ▶ LS on cost refund
- 1 technician (purchase, CAMMS, store)
- ▶ Staff funded by CERN-Experiment Agreement (Jul '08)

	2007	2008	2009	2010
TS refund [kCHF/year]	180	230	300	300

Cost related to manpower refund increases as the CERN-experiment agreement will phase out in the next years

Maintenance cost

- 2.67% of the installation value gives **minimum** reference for maintenance cost estimation
- Installation value gives sharing criteria
- ½ manpower - ½ material (contractor interventions) - assumed

	Installation value [kCHF]	2.67%	
		[kCHF/year] Material	[kCHF/year] Manpower
CMS	2 450	33	33
ATLAS	4 800	64	64
ALICE	1 050	14	14
LHCb	800	11	11
Total	9 100	121	121

Major spare parts (pumps, compressors, etc.) shall be considered "on top" of these amounts.

Stand by duty service

- 24 kCHF for contract amendments
- ~10 kCHF for ~50 intervention per year
- Installation value gives sharing criteria

	Installation value [kCHF]	Cost sharing [kCHF/year]
CMS	2 450	9.2
ATLAS	4 800	17.9
ALICE	1 050	3.9
LHCb	800	3.0
Total	9 100	34

A member of the ECR is supposed to intervene WITH the DC staff for safety reasons

Operation

- Basically manpower cost
- Initially mainly funded by the CERN-experiment agreement
- Installation value gives sharing criteria

	Installation value [kCHF]	Cost sharing 2007 [kCHF/year]	Cost sharing 2008 [kCHF/year]	Cost sharing 2009 [kCHF/year]	Cost sharing 2010 [kCHF/year]
CMS	2 450	16	30	48	48
ATLAS	4 800	32	58	95	95
ALICE	1 050	7	13	21	21
LHCb	800	5	10	16	16
Total	9 100	60	110	180	180

Operation: fine tuning, supervision, light modifications, evolution activities, detector support during working hours, etc.

Fluid consumption

- ~15% leak rate estimation during the first year of operation
- ~10% leak rate estimation during the following years

Fluid	Fluid value [kCHF]	15% (2007) [kCHF/year]	10% (2008) [kCHF/year]
CMS	330	50	35
ATLAS	600	90	60
ALICE	fluid already bought by the experiment		
LHCb	60	10	6
Total	990	150	101

Leak rates from SR1 cooling plant are higher today. Is that representative?

Cost evolution '07 – '10

- After 2007 fluid consumption should decrease
- After 2007 manpower refund cost should increase

	Maintenance cost [kCHF/year]	Fluid cost [kCHF/year]	Stand-by duty [kCHF/year]	Operation cost 2007 [kCHF/year]	Total cost 2007 [kCHF/year]
CMS	65	50	9.2	16	141
ATLAS	128	90	17.9	32	268
ALICE	28	-	3.9	7	39
LHCb	21	10	3.0	5	40
Total	243	150	34	60	487

	Total cost 2007 [kCHF/year]	Total cost 2008 [kCHF/year]	Total cost 2009 [kCHF/year]	Total cost 2010 [kCHF/year]
CMS	141	139	158	158
ATLAS	268	264	301	301
ALICE	39	45	53	53
LHCb	40	40	46	46
Total	487	488	558	558

Detailed Cost evolution '07-'10

	2007					2008					2009					2010				
	Alice	ATLAS	CMS	LHCb	Total	Alice	ATLAS	CMS	LHCb	Total	Alice	ATLAS	CMS	LHCb	Total	Alice	ATLAS	CMS	LHCb	Total
Installation value	1 050	4 800	2 450	800		1 050	4 800	2 450	800		1 050	4 800	2 450	800		1 050	4 800	2 450	800	
Fluid value	na	600	330	60		na	600	330	60		na	600	330	60		na	600	330	60	
Maintenance 2.67%	28	128	65	21	243	28	128	65	21	243	28	128	65	21	243	28	128	65	21	243
Fluid losses			90	49.5	9	149			60	33	6	99			60	33	6	99		
Stand-by duty	4	18	9	3	34	4	18	9	3	34	4	18	9	3	34	4	18	9	3	34
Operation	7	32	16	5	60	13	58	30	10	110	21	95	48	16	180	21	95	48	16	180
Total	39	268	140	39	485	45	264	137	40	486	53	301	156	46	556	53	301	156	46	556

Some experiment (especially CMS) suggested a larger involvement of TS in the detector cooling problems. The knowledge consolidation during these years could be saved keeping the trained resources.

Project Associates budget

CV/Detector Cooling have 10 year/man of PJAS on the “Manpower for consolidation of the technical...” program = 600 kCHF

2 Polish technicians x 3 years x 60 kCHF/year (→Aug 06) =	360 kCHF
Paola Tropea x 3 years x 48 kCHF/year (→Sep 06) =	144 kCHF
Paolo Guglielmini x 2 years x 48 kCHF/year (→Feb 06) =	96 kCHF
Total =	600 kCHF

Paolo Guglielmini (LHCb) is already “unfunded” (form Feb 06).
We would need Paola Tropea (CMS) for 1 year at least.

Back-up slide

Ressources allocation for construction

	Name	First Name	Career path	Main experiment
From CV	BATTISTIN	Michele	E	All
From EP/staff	PIMENTA	Miguel	E	Alice
From EST/staff	BONNEAU	Pierre	C	ATLAS
From EST/Ind. Service	BERRY	Stephane	B	ATLAS/Alice
From EST/Ind. Service	FERAUDET	Pierre	A	ATLAS/Alice
From CV	CORBAZ	Florian	A	ATLAS/Alice
CERN contribution to Exp	LEHTINEN	Jani	D	ATLAS/CMS
CERN contribution to Exp	HOUD	Carsten	C	ATLAS/Alice
CERN contribution to Exp	GUGLIELMINI	Paolo	"E"	LHCb
CERN contribution to Exp	TROPEA	Paola	"E"	CMS
CERN contribution to Exp	DESPET	Marian	"A"	ATLAS
CERN contribution to Exp	STRACZEC	Andrzej	"A"	ATLAS

7 cooling units realized in-house

Supply contact 800 kCHF

Supply contact 2.8 MCHF

Back-up slide