

Summary of the work-package. HFM: Superconducting High Field Magnets for higher luminosities and energies

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Outline



- **General structure**
- **Task 1 Coordination and Communication**
- **Task 2 Support studies**
- **Task 3 High field model**
- **Task 4 Very high field dipole insert**
- **Task 5 High Tc superconducting link**
- **Task 6 Short period helical superconducting undulator**
- **Timetable**

General structure



HFM: Superconducting High Field Magnets for higher luminosities and energies

- 1 management task
- 1 studies task
- 4 design – construction tasks
- 13 participant institutes: CERN, CEA-DSM-Irfu, CNRS-Grenoble, COLUMBUS, DESY, BHTS, FZK, INFN-Milano, Politechnika Wroclawska, SOTON, STFC-RAL, Tampere University of Technology and Université de Genève
- 4 (+) associated institutes: FNAL, LBNL, KEK, University of Twente, ...

Budget



Task	Coordination	total cost		EC	
		task	WP	task	WP
7: HFM			6,438,083 €		2,056,933 €
7.1: HFM Coordination & Communication	G. de Rijk/CERN, dep. F. Kircher/CEA	294,427 €		100,395 €	
7.2: Support studies	M. Chorowski/PWR	1,957,180 €		659,763 €	
7.3: Models	J.M. Rifflet/CEA	1,679,439 €		515,359 €	
7.4: Very High Field Insert	P. Tixador/CNRS Grenoble	1,368,553 €		431,600 €	
7.5: HT SC Link	A. Ballarino/CERN	599,564 €		190,716 €	
7.6: SC Undulators	J. Clarke/STFC (DL)	538,920 €		159,100 €	

- EC contribution , on average, 30% of total costs
- Total costs = direct cost + indirect cost (dependent on the institute)
- Reporting (time sheets, bills, justifications) on EC contribution *10/7 and NOT on 100% of direct costs

Budget



HFM coll. meeting, Febr 24 2009, G. de Rijk, Summary of WP

Task Name	beneficiary	pm	P direct	pm cost direct	P indirect	Consumables direct	Travel direct	M indirect	M+P direct	M+P indirect	Total P	Total M	Total cost	EC request	Min Total for reporting	EC/total	total by bank	EC request by bank
7.1: HFM Coordination & Communication	CERN	16	88,500 €	5,900 €	53,100.00 €	15,400 €	14,000 €	17,540 €	117,900.00 €	70,740 €	141,000 €	47,040 €	188,840 €	63,285 €	84,363 €	33.55%		
	CEA	11	84,900 €	5,900 €	40,887.00 €	- €	- €	- €	84,900.00 €	40,887 €	106,787 €	- €	106,787 €	37,100 €	48,487 €	35.07%	284,427 €	100,366 €
7.2: Support studies	PWR	40	152,000 €	3,900 €	81,200.00 €	90,000 €	8,000 €	58,800 €	250,000.00 €	150,000 €	243,200 €	156,800 €	400,000 €	200,000 €	288,857 €	50.00%		
	CEA	80	364,000 €	5,900 €	223,020.00 €	210,000 €	14,000 €	- €	578,000.00 €	223,020 €	577,020 €	224,000 €	801,020 €	241,000 €	321,353 €	30.09%		
	CERN	42	247,800 €	5,900 €	148,880.00 €	210,800 €	14,000 €	134,880 €	472,800.00 €	283,580 €	398,480 €	358,880 €	756,180 €	218,783 €	291,884 €	28.99%	1,357,180 €	682,733 €
7.3: Models	CEA	47	277,300 €	5,900 €	174,888.00 €	200,080 €	15,000 €	- €	482,380.00 €	174,888 €	451,998 €	216,080 €	687,078 €	205,800 €	274,533 €	30.87%		
	CERN	49	289,100 €	5,900 €	173,480.00 €	283,025 €	15,000 €	178,815 €	587,125.00 €	352,275 €	482,500 €	476,840 €	938,400 €	272,859 €	383,945 €	28.08%		
	PWR	7	26,800 €	3,900 €	15,980.00 €	15,000 €	4,000 €	11,400 €	45,800.00 €	27,360 €	42,500 €	30,400 €	72,980 €	38,500 €	48,057 €	63.03%	1,679,430 €	515,350 €
7.4: Very High Field Insert	CNRS	28	128,484 €	4,588 €	77,078.40 €	70,800 €	8,000 €	48,140 €	205,384.00 €	123,218 €	205,542 €	123,040 €	328,582 €	100,200 €	133,900 €	30.49%		
	CEA	21	123,900 €	5,900 €	78,057.00 €	50,000 €	12,800 €	- €	188,700.00 €	78,057 €	201,957 €	82,800 €	284,757 €	78,400 €	105,857 €	28.99%		
	FZK	18	123,200 €	7,700 €	97,874.40 €	120,000 €	9,000 €	- €	283,200.00 €	97,874 €	220,774 €	128,000 €	348,774 €	121,100 €	161,487 €	34.82%		
	INFN	18	106,200 €	5,900 €	83,720.00 €	13,000 €	8,000 €	11,400 €	128,200.00 €	78,120 €	188,320 €	30,400 €	200,320 €	60,180 €	80,133 €	30.00%		
	TUT	8	49,800 €	5,900 €	28,780.00 €	- €	8,000 €	3,800 €	55,800.00 €	33,380 €	78,380 €	8,800 €	88,980 €	28,700 €	35,900 €	30.01%		
	UNIGE	10	52,000 €	5,200 €	31,200.00 €	18,000 €	4,000 €	13,800 €	75,000.00 €	45,000 €	83,200 €	36,800 €	120,000 €	38,000 €	48,000 €	30.00%		
	PWR	2	7,800 €	3,900 €	4,580.00 €	- €	2,800 €	1,800 €	10,100.00 €	6,080 €	12,180 €	4,000 €	16,180 €	8,180 €	10,800 €	60.12%	1,388,583 €	431,800 €
7.5: HT SC Link	CERN	10	58,000 €	5,900 €	35,400.00 €	42,000 €	9,400 €	30,840 €	110,400.00 €	86,240 €	84,400 €	82,240 €	178,640 €	52,418 €	68,888 €	28.87%		
	COLLIMBUJ	4	23,800 €	5,900 €	4,720.00 €	44,000 €	8,000 €	10,000 €	73,800.00 €	14,720 €	28,320 €	80,000 €	88,320 €	28,300 €	58,000 €	32.04%		
	DESY	11	84,800 €	5,900 €	38,940.00 €	42,000 €	9,475 €	30,885 €	118,378.00 €	89,823 €	103,840 €	82,380 €	188,200 €	58,780 €	78,800 €	32.08%		
	BHTB	4	23,800 €	5,900 €	25,724.00 €	27,000 €	8,000 €	- €	58,800.00 €	25,724 €	48,324 €	33,000 €	82,324 €	28,000 €	58,000 €	35.23%		
	BOTON	7	41,300 €	5,900 €	24,780.00 €	- €	- €	- €	41,300.00 €	24,780 €	88,080 €	- €	88,080 €	21,300 €	28,400 €	32.23%	588,684 €	180,718 €
7.6: SC Undulators	STFC	38	212,400.00 €	5,900 €	223,020.00 €	85,000.00 €	8,800.00 €	- €	318,800.00 €	223,020.00 €	438,420.00 €	103,900.00 €	538,820.00 €	188,100 €	212,183 €	28.82%	839,820 €	188,100 €

- Up to now only the integrals over the project duration have been defined.

Task 1 Coordination and Communication



Task Leaders: Gijs de Rijk (CERN) & Francois Kircher (CEA-DSM-Irfu)

Participants: CERN, CEA-DSM-Irfu

This task is a basic requirement for each work package

- Coordination and scheduling of the WP tasks
- monitoring the work, informing the project management and participants within the JRA
- WP budget follow-up

Task 2 Support studies



Task leader : Maciej Chorowski (Wroclaw Technical University)

Participants: Wroclaw Technical University, CEA-DSM-Irfu, CERN

- Certify radiation resistance of radiation resistant coil insulation and impregnation.
- Make a heat deposition and heat removal model for the dipole Nb₃Sn model with experimental validation and determine the thermal coil design parameters for the dipole model magnet.

Task 3 High field model



Task Leader: Jean-Michel Rifflet (CEA-DSM-Ifrfu)

Participants: CEA-DSM-Irfu, CERN, Wroclaw Technical University

- Design, build and test a 1.5 m long, 100 mm aperture dipole model with a design field of 13 T using Nb₃Sn high current Rutherford cables.

Task 4 Very high field dipole insert



Task Leader: Pascal Tixador (CNRS Grenoble)

Participants: CNRS Grenoble, CEA-DSM-Irfu, FZK, INFN-Milano, Tampere University of Technology, UNIGE, Wroclaw Technical University

- Design, build and test HTS solenoid insert coils for a solenoid background magnet aiming at a field increase up to 6 T to progress on the knowledge of HTS coils, their winding and behaviour. This as in intermediate step towards a dipole insert.
- Design, build and test an HTS dipole insert coil for a dipole background magnet aiming at a field increase of about 6 T.

Task 5 High Tc superconducting link



Task Leader: Amalia Ballarino (CERN)

Participants: CERN, Columbus, DESY, BHTS, University of Southampton

- Design of HTS bus: choice of HTS material definition of thermal conditions, requirements for stabilization and quench protection, modelling of quench propagation.
- Design, realization and test of electrical joints and electrical terminations.
- Mechanical design and assembly of a 20 m long superconducting link (26 pairs of 600 A).

Task 6 Short period helical superconducting undulator



Task Leader: Jim Clarke (STFC-DL)

Participant: STFC-DL

- Design, build and test a prototype helical coil undulator magnet with 11.5 mm period, high peak magnetic field in Nb₃Sn technology.

Timetable



HFM coll. meeting, Febr 24 2009, G. de Rijk, Summary of WP

		1st YEAR				2nd YEAR				
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	
			3	6	9	12	15	18	21	24
Task 7.1	HFM Coordination and communication					M				M
Task 7.2	Support studies					M				2M
Task 7.3	High Field Model									
Task 7.4	Very high field dipole insert					M				M
Task 7.5	High Tc Superconducting Link									
Task 7.6	Short period helical superconducting undulator									
		3rd YEAR				4th YEAR				
		Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	
			27	30	33	36	39	42	45	48
Task 7.1	HFM Coordination and communication					M				DM
Task 7.2	Support studies					D		D		
Task 7.3	High Field Model					M		M		D
Task 7.4	Very high field dipole insert									D
Task 7.5	High Tc Superconducting Link				M			D		
Task 7.6	Short period helical superconducting undulator					M				D