

Task 5: High Tc superconducting link

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24th February 2009

DOW task 7.6



Task 6. Short period helical superconducting undulator

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

Task 6. Short period helical superconducting undulator

This task is focused on increasing the achievable magnetic field levels in short period magnets through the use of advanced materials (Nb₃Sn conductors) and innovative designs (helical coils). For example, single pass free electron lasers (e.g. X-FEL, FERMI@ELETTRA) could cover a wider wavelength range through field enhancement, or alternatively, operate at significantly lower electron energy. Additionally, short period magnets could be used in the production of positrons for any future lepton collider and increased magnetic field levels will increase the positron yield and also allow for savings. The first part of this task will be a design study of the undulator using an Nb₃Sn conductor. A comparison will be made with existing Nb-Ti. Following this design stage a short prototype (~300mm) will be manufactured and tested magnetically. The results from this prototype will inform the study and the design will be iterated in order to provide the strongest possible field level. This second design will then be prototyped (~500mm) and characterised. The results will be analysed and a full description of the study will be given in a final report.

DOW task 7.6



Deliverables of tasks	Description/title	Nature	Delivery month
7.6.1	Final prototype SC helical undulator measured	R	M48

Mile-stone	Description/title	Nature	Delivery month	Comment
7.1.1	1 st annual HFM review meeting	O	M12	
7.1.2	2 nd annual HFM review meeting	O	M24	
7.1.3	3 rd annual HFM review meeting	O	M36	
7.1.4	Final HFM review meeting	O	M48	
7.2.1	Methodology for the certification of radiation resistance of coil insulation material	R	M24	
7.2.2	Preliminary heat deposition model for a dipole Nb ₃ Sn model magnet	R	M12	publication on web
7.2.3	Engineering heat deposition model for a dipole Nb ₃ Sn model magnet	R	M24	publication on web
7.3.1	Dipole Nb ₃ Sn coils finished	D	M36	2 coils ready for mounting
7.3.2	Dipole Nb ₃ Sn model magnet finished	D	M42	Ready for cold test
7.4.1	HTS conductor specifications for insert coils	R	M12	
7.4.2	Two HTS solenoid insert coils	D	M24	
7.5.1	Final design report HTS link	R	M34	
7.6.1	Short prototype SC helical undulator fabricated and tested	D	M36	

budget



EuCARD - WP7 HFM - Task 7.6: SC Undulator for Positron Source

v3

Beneficiary short name ^a	Average direct monthly salary * (€)	Rate for personnel indirect costs (%)	Rate for material and travel indirect costs (%)
STFC	5,900	105	0

* To prevent rounding problems on the cost data, give the monthly salary as a multiple of 100 €

^a In alphabetic order

Beneficiary short name (all costs in €)	Person-Months	Personnel direct costs	Personnel indirect costs	Sub-contracting cost	Consumable and prototype direct costs	Travel direct costs	Material and travel indirect costs	Total direct costs	Total indirect costs	Total costs (direct +indirect)	EC requested funding ¹
STFC	36	212,400	223,020		95,000	8,500	0	315,900	223,020	538,920	159,100
0		0	0				0	0	0	0	
0		0	0				0	0	0	0	
0		0	0				0	0	0	0	
0		0	0				0	0	0	0	
0		0	0				0	0	0	0	
0		0	0				0	0	0	0	
0		0	0				0	0	0	0	
Totals:	36	212,400	223,020	0	95,000	8,500	0	315,900	223,020	538,920	159,100
FIXED TARGETS										530,500	159,100
CHECKING THE CONDITION										NOT OK	OK

¹ In principle 30% of total costs

HFM coll. meeting, Febr 24 2009, G. de Rijk, Task 5



CERN

A. Ballarino (TL)

COLUMBUS

G. Grassi (LC)

DESY

W. Zeuner (LC)

BHTS

A. Aubele (LC &
conductor)

B. Sailer (conductor)

SOTON

Y. Yang (LC)