	EUROPEAN COMMISSION RESEARCH & INNOVATION DG	Periodic Report

Project No: 206711

Project Acronym: ILC-HiGrade

Project Full Name: International Linear Collider and High Gradient Superconducting RF-Cavities

Periodic Report

Period covered: from 01/02/2010 **to** 31/01/2011

Date of preparation: 11/08/2011

Start date of project: 01/02/2008

Date of submission (SESAM): 11/08/2011

Project coordinator name:
Prof. Eckhard Elsen

Project coordinator organisation name:
STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY

Version: 1

Periodic Report

PROJECT PERIODIC REPORT

Grant Agreement number:	206711
Project acronym:	ILC-HiGrade
Project title:	International Linear Collider and High Gradient Superconducting RF-Cavities
Funding Scheme:	FP7-CP-CSA-Infra
Date of latest version of Annex I against which the assessment will be made:	27/05/2008
Period number:	3rd
Period covered - start date:	01/02/2010
Period covered - end date:	31/01/2011
Name of the scientific representative of the project's coordinator and organisation:	Prof. Eckhard Elsen STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY
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Declaration by the scientific representative of the project coordinator (1)

I, Prof. Eckhard Elsen STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY , as scientific representative of the coordinator of the project ILC-HiGrade and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

The project has achieved most of its objectives and technical goals for the period with relatively minor deviations.

The attached periodic report represents an accurate description of the work carried out in this project for this reporting period.

The public website is up to date.

To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.

All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name	Prof. Eckhard Elsen STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY
Date	11/08/2011

This declaration was visaed electronically by Eckhard ELSEN (ECAS user name nelsenec) on 11/08/2011

1. Publishable summary

Summary description of project context and objectives

A linear e+e- collider continues to be the next major project in High Energy Physics following the successful start of operations of the Large Hadron Collider (LHC) and the first presentations of physics results. A linear collider has been prominently positioned in the European Strategy for Particle Physics agreed by CERN Council, which serves as the basis for ESFRI recommendations for High Energy Physics (HEP). The initial physics results emerging from the LHC give confidence that the field will receive more guidance from the LHC by the end of 2012 - when large statistics samples become available - on the detailed design decisions for such a linear collider, in particular the energy reach of such a facility. This information is timely for the update of the European Strategy, which will be released at the end of 2012.
In the energy range from 500 to 1000 GeV a design for such a machine exists: the e+e- International Linear Collider (ILC). It is well understood today that the ILC will constitute the precision tool for the Terascale, the scale of electroweak symmetry breaking. The ILC complements the potential of the LHC, which is initially charting this unknown territory. - If a much farther leap into the Terascale is suggested by the physics results one will have to revisit the optimisation of the layout and time scales. Today a proven technology for the multi-TeV energy region does not exist. For this reason the R&D on the Compact Linear Collider (CLIC) technology has been identified as a field of intense research in the recommendations of the European Strategy for Particle Physics.
The ILC-HiGrade consortium concentrates on the rapid realisation of the International Linear Collider ILC and brings together the key players in Europe. They constitute a large fraction of the European element of the Global Design Effort (GDE) that has led to the publication of the Reference Design Report (RDR) in 2007. The report forms the basis for the Technical Design Phases I and II of the ILC, which the GDE will complete by mid-2012. The proposal for the ILC will then be presented to the global stakeholders, i.e. governments and funding agencies to seek approval. The technically driven schedule envisages start of construction as early as 2012. Project approval and start of construction is a two-stage process.
Starting in 2008, the ILC-HiGrade Consortium began to address important elements in this two-stage process with siting of the facility as one major ingredient. Currently site proposals for all three regions Japan, US and in Europe exist. Their benefits are being evaluated and the international framework in which the project will be realised will be developed. ILC-HiGrade encompasses the European side in this global endeavour. The participating laboratories and universities contribute their long-standing experience in conceiving large-scale experiments and the organisation of large collaborations to a process that establishes the global framework for an organisation that will support start of construction matching the technical timelines.
The linear accelerator sections of the ILC constitute a major cost-driver. Their design and their cost depend on the achievable accelerating gradient for the ILC. The global gradient development programme of the GDE will establish a realistic operational gradient for the ILC by employing proven preparation techniques, with European laboratories leading the effort. In the course of ILC-HiGrade, the partners are preparing 24 fully dressed cavities, which will initially serve as a technical reference for the decision on the choice of gradient and eventually as the industrialisation of the high-gradient process. While their delivery is pending important steps have been made to prepare the facilities and the instrumentation for analysis and full diagnostics. Particular achievements have been made in the reporting period as detailed below.
The timelines of this 4-year project are well aligned with those of the Global Design Effort, aimed at establishing the technical basis for proposing the ILC by mid-2012. It thus matches the timelines of the iteration on the European Strategy for the High Energy Physics. If chosen, the ILC construction could commence soon after.
From a European perspective, all crucial elements necessary to produce this outcome, both technical and political are reinforced and explicitly supported in the ILC-HiGrade project.

Description of work performed and main results

On a worldwide scale the ILC project is well on track to deliver its Technical Design Report by 2012, which is the target defined for the Global Design Effort. The Technical Design Report will describe the International Linear Collider to a level that is amenable to the detailed engineering design. Major technical hurdles will have been investigated and tested in prototypes so that actual

solutions exist. ILC-HiGrade contributes to this worldwide effort by advancing the research on the accelerating fields of the e+e- linacs. The performance of the superconducting cavities is a cost driver of the project and hence a critical component. ILC-HiGrade so far has established methods that identify the limitations in gradient. ILC-HiGrade also contributes to the global development where a significant increase in gradient has been observed over the past few years.
ILC-HiGrade has also investigated governance structures for an international project like the ILC. The basis for this investigation are existing international projects such as the LHC at CERN and ITER in Cadarache.
The siting of such a facility is driven in part by technical demands and specific site properties such as ground motion. In the end the site for a facility such as the ILC will be decided upon in a political process. ILC-HiGrade has described some of the criteria relevant for this decision process. An interim version of this report is available.

Expected final results and potential impacts

The high-gradient research pursued in this project will lead to accelerating structures that are more cost-effective. The benefit for the ILC is immediate: the total length of the facility can be adapted or better even a higher energy for the colliding beams can be achieved. The results are however farther reaching. Superconducting cavities are nowadays used in many areas where intense beams are needed in near continuous wave operation (cw-operation). Their efficiency is largely dependent on the quality of the cavities. The quality of a cavity is directly correlated with the maximum field that can be supported by the cavity. High-gradient cavities thus benefit many fields of accelerator application. Room-temperature copper-based structure cannot sustain the power for any extended period.
The impact of the International Linear Collider as a scientific instrument touches immediately on the fundamental questions of the existence of the universe and of mankind. The desire to understand the formation of the world we live in from its origin in the big-bang and the nature of the forces that govern this process originates from a curiosity that is not driven by an immediate technological application but rather has to be seen in the context of accumulating knowledge that serves the well-being of future generations. Fundamental research often has led to surprises and has facilitated "solutions" that were unthinkable before. In the end it is up to society to find the right balance between fundamental and applied research. The motivation for the International Linear Collider is fundamental research; its technological developments are already now seen to have a large impact in applied research.

Project public website address:	www.ilc-higrade.eu

2. Core of the report

Project objectives, Work progress and achievements, and project management during the period

The Project Summary Pdf document contains the core of the report.

3. Deliverables and milestones tables

Deliverables (excluding the periodic and final reports)

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex I (proj month)	Actual / Forecast delivery date	Status	Comments
1	ILC-HiGrade 1st Annual Report.zip	1.0					14	01/08/2009	Submitted	
6	Organisation of GDE Mtg, 1st and 2nd ADI Workshop	1.0	2	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	Other	PU	18	29/11/2010	Submitted	
8	Organisation of GDE Mtg 3	1.0	2	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	Other	PU	31	11/08/2011	Submitted	
7	ILC Brochure & Documentation	1.0	3	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	Report	PU	30	11/08/2011	Submitted	
3	Siting Study	1.0	5	EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH	Report	PU	24	25/11/2010	Submitted	
2	Cavity Process	1.0	6	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	24	25/11/2010	Submitted	

9	GovWG_3	1.0	6	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD	Report	PU	30	11/08/2011	Submitted	
4	Coupler Re port	1.0	7	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)	Report	PU	24	25/11/2010	Submitted	
5	Tuner Repo rt	1.0	8	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	24	25/11/2010	Submitted	

Milestones

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement date	Comments
6	MAC Report 3	2	6	31/05/2010	Yes	30/11/2010	Since 2007 the Machine Advisory Committee (MAC) has been recreated by the International Linear Collider Steering Committee as the Physics Advisory Committee (PAC). The PAC met in Valencia, Spain in May 2010 and in Eugene, Oregon, in Nov 2010
7	Governance Structures	4	6	31/07/2010	Yes	31/07/2010	
8	European Site Review	5	3	31/01/2010	Yes	31/12/2011	The European Site had been exhaustively reviewed in the Siting STudy delivered with the previous report

4. Explanation of the use of the resources

STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY

Work Package	Item description	Amount	Explanations
3	Consumable	1988.00	Printed copies of translated document "Gateway to the Universe" in various European languages.
6	Consumable	73090.38	Internally invoiced cost for construction of Optical Scanner
6	Consumable	37556.21	Machine components for construction of Optical Scanner.
6	Consumable	702.54	Small mechanical and electronic components for Optical Scanner
6	Consumable	24166.82	Precision mechanical components for Optical Scanner
1, 2, 5, 6	Personnel	465166.39	1 technician (16,6 pm), 2 Engineers (10,8 pm), 1 scientist (9,6 pm), 3 Senior scientists (37,2 pm)
6	Subcontracting	2200.00	Machining of minor mechanical components for Optical Scanner. Döring Werkzeugbau GmbH
6	Subcontracting	1158.00	Machining of minor mechanical components for Optical Scanner. Hansa Press- und Maschinenbau
	Total:	606028.34	

COMMISSARIAT A L'ENERGIE ATOMIQUE (CEA)

Work Package	Item description	Amount	Explanations
6	Personnel	54275.50	4 engineers (6,41 pm) and 4 technicians (2,53 pm)
6	Travel	1493.30	Travel to ILC-HiGrade meeting in Hamburg
6	Durable	975.00	Deprciation of power supply
	Total:	56743.8	

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Work Package	Item description	Amount	Explanations
2, 4, 5	Personnel	265029.23	3 staff members (16.4 pm)
	Total:	265029.23	

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

Work Package	Item description	Amount	Explanations
3, 5, 7	Personnel	42837.68	Engineer (5.21 pm), senior scientist (0.44 pm), research engineer (1.29 pm)
4, 7	Travel	2144.40	ILC_HiGrade Meetings in Geneva and Hamburg, PAC meeting in Valencia
	Total:	44982.08	

ISTITUTO NAZIONALE DI FISICA NUCLEARE

Work Package	Item description	Amount	Explanations
3, 4, 8	Personnel	117107.07	Scientists and engineers (total 33 pm)
8	Travel	6519.17	Cold tests at BESSY, Berlin; Tuner tests at DESY and Saclay, ILC-HiGrade Meeting and Collaboration Meeting Hamburg
8	Consumables	5250.96	Various small electronic components: low voltage piezo amplifier, DAQ module and remaining items.
	Total:	128877.20000000001	

THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD

Work Package	Item description	Amount	Explanations
2, 3, 4	Personnel	76529.31	Senior scientists (7.2 pm)
	Total:	76529.31	

5. Transnational Access DataBase

Summary of transnational access provision per installation per reporting period

Particip. num	Organisation name	Infrastructure name	Installation num	Installation name	Unit of access	Min. quantity of access to be provided in Annex I	Access provided in RP1	Access provided in RP2	Access provided in RP3	Access provided in RP4	Total access provided	Difference
											0.0	0.0

Attachments	3rd Annual Report Core.pdf
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Name of the scientific representative of the project's coordinator and organisation:	Prof. Eckhard Elsen STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY
Period covered - start date:	01/02/2010
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