

**U. S. DEPARTMENT OF ENERGY
FIELD WORK PROPOSAL**

1. WORK PROPOSAL NO.: <p align="center">2423.1</p>	2. REVISION NO.:	3. DATE PREPARED: <p align="center">03-15-07</p>	3a. CONTRACTOR NO.: <p align="center">52300</p>
4. WORK PROPOSAL TITLE: Advanced Technology and Accelerator R&D			
5. BUDGET & REPORTING CODE: KA-15-02-02	6. WORK PROPOSAL TERM: Begin: End:	7. IS THIS WORK PACKAGE INCLUDED IN THE INST. PLAN? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	7a. PRINCIPAL INVESTIGATORS: Weerts, H.
8. HEADQUARTERS/OPERATIONS OFC PROGRAM MANAGER: Staffin, R. No. 301-903-3624	11. HEADQUARTERS ORGANIZATION: High Energy Physics		14. DOE ORG. CODE: SC
9. DOE FIELD ORGANIZATION WORK PROPOSAL REVIEWER:	12. DOE FIELD ORGANIZATION: Chicago		15. DOE ORG. CODE: CH
10. CONTRACTOR WORK PROPOSAL MANAGER: Weerts, H.J. No. 630-252-8831	13. CONTRACTOR NAME: UChicago Argonne, LLC		16. CODE: 12
17. IS THIS PROPOSAL TO DO WORK THAT INCLUDES A SECURITY INTEREST? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
18. WORK PROPOSAL DESCRIPTION (Approach, anticipated benefit in 200 words or less): <p align="center">This task covers work on the design and R&D of the International Linear Collider related to the accelerator complex only. It includes design work on and bringing online an EP facility for processing SC cavities, work on the positron source, the damping ring and the controls system for the International Linear Collider (ILC). These four items are described separately below.</p>			
19. CONTRACTOR WORK PROPOSAL MANAGER: <p align="center"><i>H. Weerts</i></p> <hr/> <p align="center">SIGNATURE</p>		20. OPERATIONS OFFICE REVIEW OFFICIAL: <p align="center">03-15-07</p> <hr/> <p align="center">DATE</p>	
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21. DETAIL ATTACHMENTS: (See specific attachments.)			
<input type="checkbox"/> a. Facility requirements	<input checked="" type="checkbox"/> e. Approach	<input type="checkbox"/> i. NEPA requirements	<input type="checkbox"/> m. ES&H considerations
<input type="checkbox"/> b. Publications	<input checked="" type="checkbox"/> f. Technical progress	<input checked="" type="checkbox"/> j. Milestones	<input type="checkbox"/> n. Human/Animal Subjects
<input checked="" type="checkbox"/> c. Purpose (mandatory)	<input checked="" type="checkbox"/> g. Future accomplishments	<input type="checkbox"/> k. Deliverables	<input type="checkbox"/> o. Security requirements
<input type="checkbox"/> d. Background	<input checked="" type="checkbox"/> h. Relationships to other projects	<input type="checkbox"/> l. Performance Measures/Expectations	<input checked="" type="checkbox"/> p. Other (specify)

**WORK PROPOSAL REQUIREMENTS FOR OPERATING/EQUIPMENT
OBLIGATIONS AND COST**

CONTRACTOR NAME UChicago Argonne, LLC		WORK PROPOSAL NO. 2423.1		REVISION NO.		CONTRACTOR NO. 52300		DATE PREPARED 01/30/2007	
21. STAFFING (in staff years)		PRIOR YEARS	FY2007	FY2008	FY2009		FY2010	FY2011	TOTAL TO COMPLETE
				ESTIMATE	REQUEST	AUTHORIZED			
a. Scientific			6.9	17.4	16.6		0.0	0.0	
b. Other Direct			0.2	0.6	1.1		0.0	0.0	
c. Technical Services*			0.0	0.0	0.0		0.0	0.0	
d. Total Direct			7.1	18.0	17.7		0.0	0.0	
23. OBLIGATIONS AND COSTS (in thousands)									
a. Total Obligations			2201	5917	5857		0	0	
b. Total Costs			2151	5681	5846		0	0	
24. EQUIPMENT (in thousands)									
a. Equipment Obligations			0	0	0		0	0	
b. Equipment Costs			0	0	0		0	0	
25. MILESTONE SCHEDULE (Tasks)		FY2009 DOLLARS				PROPOSED SCHEDULE		AUTHORIZED SCHEDULE	
		PROPOSED		AUTHORIZED					
26. REPORTING REQUIREMENTS									

* Technical services staffing includes ANL support divisions' scientific effort.

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21. DETAIL ATTACHMENTS: (See specific attachments.)

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ILC Accelerator R&D**1) EP processing of SCRF cavities**

a) FY2006-2007 Accomplishments: During the last year (FY06-07) several divisions at Argonne were involved in R&D for the International Linear Collider as part of the American Regional team. The efforts are in the areas of an EP facility for processing cavities. Argonne has a processing room in place and currently the first EP system for cleaning ILC cavities has been designed. It has been reviewed by an international team of experts in Feb. 2007 and plans for processing first cavities are scheduled for July 2007.

b) FY2008-FY2009 Plans: 1) Operate the EP facility, that was designed between FNAL-ANL at Argonne and do up to 50 procedures during each year. Manpower and M&S needed are included in the request for FY2008, and details will be finalized in negotiations with the ART director. In FY09 the facility at Argonne is supposed to ramp up to 60 procedures/year and serve as the model for an industrial facility.

2) Positron Source simulations

a) FY2006-2007 Accomplishments: Conduct detailed end-to-end beam dynamic simulations and multivariate optimization from the photon production and collimation at the undulator to the polarized positron production at the target and to the damping ring for different ILC positron designs. Performing design and engineering studies for the ILC e+ target and optical matching devices.

b) FY2008-FY2009 Plans: The work outlined in FY07-08 is a multi-year effort and is expected to continue into FY08 -09 and beyond. It is anticipated that more detailed simulation effort is required for the ILC positron source studies to determine detailed hardware components and accelerator designs, e.g., the collimator design for the photon beam; engineering layout for the positron separation region; beamline magnet design for the positron transport; and the keep-alive source target and positron accumulation design.

3) Controls System Design

a) FY2006-2007 Accomplishments: This task covers controls effort in support of the GDE RDR and EDR efforts. It also covers leadership of the Americas regional effort for Global Controls and Americas Region Team WBS Level-2 Manager role for Global Systems. Up to now this has mainly been a

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managerial role, because no funding was provided in 06.

We plan to develop and demonstrate a generic diagnostic card for monitoring internal functions of large modular power supplies.

b) FY2008-FY2009 Plans: We continue development of the requirements for the ILC global control system and the development of the conceptual control system software architecture model, as well as the conceptual design efforts for the GDE EDR instrumentation system.

We continue to develop and demonstrate a generic diagnostic card for monitoring internal functions of large modular power supplies. Work is being done in collaboration with SLAC.

We will develop the precision RF phase distribution and timing systems. In particular, this will include prototyping long-distance precision phase reference distribution system and collaborating with other labs on prototyping of local precision phase reference distribution system.

It also includes evaluation of candidate techniques for implementing high availability software and to evaluate cost-benefits of applying these techniques to the ILC control system.

Evaluate the suitability of ATCA as a high-availability compliant electronics platform for the ILC accelerator controls and instrumentation systems.

Support efforts to determine appropriate techniques and tools for detecting faults and recovering from LLRF-related faults in the ILC.

Perform R&D on specific tools and techniques for implementing high availability techniques for the ILC control system and provide control systems support for Fermilab for deployment of EPICS control system at ILCTA.

4) Damping Rings.

a) FY2006-2007 Accomplishments: Argonne has been the leading contributor in the area of lattice design and its performance evaluation; we worked out the OCS lattice that had been adopted as the baseline, with the details of the injection/extraction optics, wiggler and RF sections, and exploring different momentum compaction, etc.

b) FY2008-FY2009 Plans: We have that the dynamic aperture of the OCS lattice is too tight when errors are taken into account. There are also issues with the momentum compaction, e.g., whether it should be made flexible, as was mentioned during the Beijing meeting. We mean the design of the lattice to be a combination of the lattice design combined with an evaluation of dynamic aperture since a lattice with insufficient dynamic aperture is meaningless. We are in a strong position to perform these tasks, building on our extensive work with the OCS lattice and using

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<p>ELEGANT, an open source code made more powerful recently with parallelization of single particle beam dynamics. We plan to cover lattice design, study of alternative lattices, evaluation of dynamic aperture and flexible momentum compaction.</p> <p>We also want to pursue an emittance tuning experiment with the APS ring running at 5 GeV. It occurred to us recently that the APS is in a strong position to demonstrate the vertical emittance can be 2pm if the coupling can be properly controlled. We intend to pursue the experiment in FY07 with Argonne internal funding. However, a modest funding for FY08 will be highly useful for this important task.</p> <p>General Remarks:</p> <p>In general the exact R&D activities for FY08-09 of all groups within the context of the GDE and ART, will be decided by the ART director and the R&D managers. The text gives an outline of the areas where Argonne has been and is involved. It should be noted that all the activities for ILC accelerator R&D involve effort from outside the HEP division, except for the positron simulation.</p>				