

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

1. WORK PROPOSAL NO.: <p align="center">2413.2</p>	2. REVISION NO.:	3. DATE PREPARED: <p align="center">03-15-07</p>	3a. CONTRACTOR NO.: <p align="center">53207</p>
4. WORK PROPOSAL TITLE: Double Chooz			
5. BUDGET & REPORTING CODE: KA-13-11-01-02	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: Goodman, M.
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 involves work on the design and operation of a particle physics neutrino experiment at a nuclear reactor. The physics goal is to measure the last neutrino oscillation parameter, the mixing angle <math>\theta_{13}</math>.</p>			
19. CONTRACTOR WORK PROPOSAL MANAGER:  <p align="center"><i>H. Weerts</i></p> <p align="center">03-15-07</p>		20. OPERATIONS OFFICE REVIEW OFFICIAL:  <p align="center">03-15-07</p>	
SIGNATURE		SIGNATURE	
DATE		DATE	
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. 2413.2		REVISION NO.		CONTRACTOR NO. 53207		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 .....			2.0	2.1	2.1		0.0	0.0	
b. Other Direct .....			0.0	0.0	0.0		0.0	0.0	
c. Technical Services* .....			0.0	0.0	0.0		0.0	0.0	
d. Total Direct .....			2.0	2.1	2.1		0.0	0.0	
23. OBLIGATIONS AND COSTS (in thousands)									
a. Total Obligations .....			371	418	423		0	0	
b. Total Costs .....			352	415	423		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.)				
<input type="checkbox"/> a. Facility requirements <input type="checkbox"/> e. Approach <input type="checkbox"/> i. NEPA requirements <input type="checkbox"/> m. ES&H considerations <input type="checkbox"/> b. Publications <input type="checkbox"/> f. Technical progress <input type="checkbox"/> j. Milestones <input type="checkbox"/> n. Human/Animal Subjects <input checked="" type="checkbox"/> c. Purpose (mandatory) <input type="checkbox"/> g. Future accomplishments <input type="checkbox"/> k. Deliverables <input type="checkbox"/> o. Security requirements <input type="checkbox"/> d. Background <input type="checkbox"/> h. Relationships to other projects <input type="checkbox"/> l. Performance Measures/Expectations <input type="checkbox"/> p. Other (specify)				
<p>a) <u>FY2006-2007 Accomplishments:</u> Efforts to convince the HEP community that a rapidly deployed new reactor neutrino experiment to measure the neutrino oscillation parameter <math>\theta_{13}</math> should take place have been successful. In addition to working on a proposal for the experiment at Braidwood Illinois, which did not go forward, we have taken a lead role in developing the Double Chooz Experiment, which is being built. Together with collaborators we developed a full proposal which takes into account all of the crucial issues involved in the success of such an experiment. These include: specification of the expected performance of the Double Chooz experiment as a function of time; the sensitivity to the mixing angle; the design of the detector structures and the choosing of appropriate materials with regards to a number of issues but especially radiopurity; the design and handling of the liquid scintillator with special attention to the maintenance of good optical properties over time; the photodetection system, the trigger and electronics design, calibration of the detector response and cross-calibration of the two detectors; and simulation, software, and non-proliferation activities. Hardware work at ANL on the outer veto design was completed with the testing of a prototype. That work became the basis for plans by NSF supported groups to begin to design and build an outer veto system for Double Chooz. We continued to communicate with the Alabama and Livermore/Davis groups with regard to the designs of a calibration deployment system within Double Chooz. It has been decided to start with a system that is deployed only along the z axis, and to build a more ambitious three dimensional system using an articulated arm at a later date.</p> <p>b) <u>FY2007 Plans:</u> During FY2007 we will help design and build a z-axis source calibration deployment system and continue development of the three dimensional articulated arm for calibration deployment. We will also refine simulations of a number of muon-induced backgrounds with particular emphasis on calibration strategies.</p> <p>c) <u>FY2008 Plans:</u> Installation activities at the far detector will begin during FY2008, along with development and testing of a complete data analysis package. Further understanding of the implications of various answers from Double Chooz, such as can be obtained with the GLOBES analysis package, will be undertaken.</p> <p>d) <u>FY2009 and Beyond:</u> Installation activities at the near detector will take place, along with first results from analysis of far detector data. By this time, valuable information that could be useful for the design of future experiments will be available and will need to be evaluated, to help refine the direction of world neutrino experiments.</p>				