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U.S. Department of Energy

Budget Page

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1910-1400
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11/1/04 - 10/31/05 | **SUPPLEMENT 1/21/05** | **DE-FG02-95ER40899**

ORGANIZATION
The Regents of the University of Michigan, Ann Arbor, MI 48109

Budget Page No: 1

PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR
PI: Bing Zhou, Professor **Task A**

Requested Duration: 12 (Months)

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title; A.6. show number in brackets)	DOE Funded Person-mos. CAL	ACAD	SUMR	Funds Requested by Applicant	Funds Granted by DOE
1. PI: Bing Zhou, Professor	0.00	0.00	0.00	$0	
2.	0.00	0.00	0.00	$0	
3.	0.00	0.00	0.00	$0	
4.	0.00	0.00	0.00	$0	
5.	0.00	0.00	0.00	$0	
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)	0.00	0.00	0.00	$0	
7. (0) TOTAL SENIOR PERSONNEL (1-6)	0.00	0.00	0.00	$0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	$0	
2. (0) OTHER PROFESSIONAL (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	$0	
3. (0) GRADUATE STUDENTS				$0	
4. (0) UNDERGRADUATE STUDENTS				$15,501	
5. (0) SECRETARIAL - CLERICAL				$0	
6. (0) OTHER				$0	
TOTAL SALARIES AND WAGES (A+B)				$15,501	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) estimated 28% of Total Salaries and Wages				$4,340	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				$19,841	
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM.)					
TOTAL PERMANENT EQUIPMENT				$0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS)				$0	
2. FOREIGN				$39,683	
TOTAL TRAVEL				$39,683	
F. TRAINEE/PARTICIPANT COSTS					
1. STIPENDS (Itemize levels, types + totals on budget justification page)				$0	
2. TUITION & FEES				$0	
3. TRAINEE TRAVEL				$0	
4. OTHER (fully explain on justification page)				$0	
TOTAL PARTICIPANTS (0) TOTAL COST				$0	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES Overnight packages, postage, telephone, general consumables, software				$0	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				$0	
3. CONSULTANT SERVICES				$0	
4. COMPUTER (ADPE) SERVICES				$0	
5. SUBCONTRACTS				$0	
6. OTHER Graduate Student Tuition expenses				$0	
TOTAL OTHER DIRECT COSTS				$0	
H. TOTAL DIRECT COSTS (A THROUGH G)				$59,524	
I. INDIRECT COSTS (SPECIFY RATE AND BASE) $59,524 x 26%					
TOTAL INDIRECT COSTS				$15,476	
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)				$75,000	
K. AMOUNT OF ANY REQUIRED COST SHARING FROM NON-FEDERAL SOURCES				$0	
L. TOTAL COST OF PROJECT (J+K)				$75,000	

Task A Supplemental Support Request for FY 2005

We request a total of $75,000 in supplemental support from DoE for the Michigan ATLAS Research Project in FY2005. The requested funds include $50,000 (figure includes indirect costs) support for international travel and $25,000 (figure includes fringe benefits and indirect costs) support for the *HYPNOS* cluster. The *HYPNOS* cluster will provide continued computation for the USATLAS DC2 project, for the ATLAS MDT detector calibration studies, and for emerging physics analysis work. The requested support is critical to meet our MDT Phase II institutional commitments to the ATLAS experiment.

Starting from 2004, the UM ATLAS research activities have largely shifted from Ann Arbor to CERN for ATLAS muon chamber final integration, pre-commissioning and installation. The Michigan ATLAS group has been the leading US institute for ATLAS endcap chamber Phase I and Phase II integration and commissioning at CERN. We have taken responsibilities for coordinating all US muon work for Phase I, including the design, fabrication and setup of test facilities at CERN building 184, the development of test DAQ systems (both hardware and software), the development and implementation of the chamber certification/commissioning database, in addition to the actual work of chamber commissioning. We have also taken major responsibilities for phase II chamber surface assembly and testing. Our tasks include the installation tooling design, tooling fabrication, work area layout design, assembly area setup in buildings 185 and 180 at CERN, preparation of Big-Wheel sector electronics test fixtures, development of test software, Phase II database development/implementation, and much of the actual chamber/sector commissioning.

We initiated Phase I work at CERN in January 2004 and expect to finish with the delivery of all 240 US chambers by August 2005. Phase II preparation work started in September 2004. The endcap Big-Wheel assembly will start in February 2005. Installation of the Big-Wheels in the ATLAS experiment is scheduled in early 2006. Overall, our working schedule is very tight. To fulfill US ATLAS responsibilities, a large UM team from Michigan has been resident at CERN since 2004, including faculty members, Chapman, Zhou, Neal, Research Scientists, Zhao, Ferretti, and engineers Weaverdyck and Gregory. A large number of students (4), visiting scholars (3) and postdocs (2) have also been part of our team working at CERN. In addition, multiple long-term trips to CERN were required in 2004 by Levin (4 months), Diehl (3 months), McKee, Thun and Schick (3 months) for H8 test beam work and for chamber certification work. The working scope will increase in FY2005 since we have to begin Phase II chamber installation in parallel with continuing Phase I activities. Levin will move to CERN in summer 2005 for at least one year for Phase II work. Our ability to keep these Faculty and Research Scientists present at CERN depends crucially on the requested $50,000 in supplemental travel funds. The plan to meet the overall ATLAS detector installation schedule, in turn, depends on the presence of these Michigan people.

A detailed justification for this request $50,000 is provided in the attached document.

The University of Michigan, Department of Physics, recently purchased the *HYPNOS* cluster from the Michigan Engineering School for use by the ATLAS group at Michigan. This cluster is composed of 125 nodes (250 CPU processors). While located in the Engineering School, this cluster was used for the USATLAS DC2 Project. During that time it was maintained by Engineering School computing professionals. Recently however, *HYPNOS* was moved from the

Engineering School to the Physics Department. In its new location the cost of the Hypnos cluster maintenance will be shared by the Physics Department and the ATLAS group. We request a modest amount, $25,000 in 2005 as our 50% contribution to the operation of the cluster. Our estimate is based on 4 undergraduate students working part-time assuming 10 weeks per student. The setup cost for special electric power and cooling for the cluster was covered by the Physics Department. This requested $25,000 support will ensure that the cluster remains viable for Monte Carlo data generation (ATLAS DC2 project), computation in preparation for the June 2005 ATLAS Physics Workshop in Rome, and for MDT calibration work. In addition, we have been asked by the ATLAS TDAQ community to develop strategies for handling the drift-tube space-time functions in the presence of long wire sag and B-field variations. This calibration work will include algorithm development, extensive calibration runs, and the preparation of a document for the ATLAS TDAQ group defining what special runs are needed during commissioning. Continued use of the *HYPNOS* cluster is essential for the UM ATLAS Project, particularly as we transition from the detector construction phase to the data analysis phase.

Additional $50k Travel Support Request

- Task A support 4 faculty, 5 res. scientists, 1 postdoc (4 mon), 2 Sr. techs (16 mon), 1 Project Assistant (6 mon), 3 research engineer (12.7 mon) and a res. Secretary (7 mon) with major hardware/software responsibilities on ATLAS experiment. The current Task A travel (to CERN) budget is $105k.
- Compensation to S. Goldfarb (due to exchange rate) ~15k/year
- Physicists/engineers resident at CERN in 2005:

  B. Zhou, J. Chapman, Z. Zhao, C. Ferretti, C. weaverdyck

  Standard ATLAS support for each person:$2.5k/month ($30k/year)

  Total cost for above physicists (not including Weaverdyck) $100k
- Additional sabbatical salary support to Chapman $20k
- ATLAS travel (to CERN) by D. Levin, E. Diehl, S. McKee, H. Neal, R. Thun, J. Herr in 2005 is estimated to be $40k (12 trips)
- → We need total $155k in 2005 for travel to CERN. We are short of travel funds: $50k (in fact, need to add 0.26*50k = 13k)

Major tasks at CERN: MDT Phase I and Phase II installation and commissioning → crucial year for ATLAS experiment detector work

Major responsibility on H8 test beam data analysis, and muon software coordination