

NIAC PHASE II BUDGET JUSTIFICATION

<i>Table of Proposed Work Effort</i>	
Name	Effort
PI: Christopher Walker	8.33%
Co-I: Craig Kulesa	8.33%
PM: Brian Duffy	8.33%
Specialist: Abram Young	16.67%
TBN: Graduate Research Assistant	50%

Personnel

Christopher Walker (PI) is a Professor in the Department of Astronomy at the University of Arizona. This budget includes 1 month of summer salary (8.33% effort) devoted to this project. Prof. Walker will lead the proposed effort, coordinate efforts between the Co-I institutions, and supervise the students working on the project.

Craig Kulesa (Co-I): is currently an Associate Astronomer in Steward Observatory at the University of Arizona. Kulesa will contribute 1 month (8.33% effort) to this project. He will supervise the development of the Instrument Module.

Brian Duffy (PM) is currently a Project Manager in Steward Observatory at the University of Arizona. Duffy will contribute 1 month (8.33% effort) to this project, providing project management support. Management tasks are essential for the completion of the project objectives. These management tasks include but not restricted to: coordination with Steward Observatory management; local coordination of tasks and resources; documentation and planning generation; financial tracking; purchasing.

Abram Young (Specialist/Technical Research) is currently a Specialist, Technical/Research at the University of Arizona. Young will contribute 2 months (16.67% effort) to this project, providing technical expertise in the fabrication and testing of the Instrument Module.

TBD (Graduate Research Assistant): This student will contribute 4.5 mo/year (50% time during the academic year) to the project.

TBD (Undergraduate Student Assistant): This student will contribute 2.6 months/year (25 hours/wk x 20 weeks) to this project.

Direct Labor: We request funding for 1 months summer for PI Christopher Walker, Co-I Craig Kulesa, and Project Manager Brian Duffy, and 2 months for Specialist, Technical/Research Abram Young, including fringe benefits. We also request support for a graduate research student and an undergraduate research student for the life of the project, including fringe benefits.

Operations, Fabricated Equipment: In NIAC Phase II the UA will fabricate a prototype LBR Instrument Unit (IU). We request funds for costs associated with the fabrication of this instrument. We also request funding for research supplies and work-flow/data capture and telecommunications expenses required for the conduction of this investigation inclusive of the material costs of creating, replicating, backing up (archiving), distributing and presenting all project related documentation, memoranda, technical reports, analysis, summaries, etc. directly related to this project.

Publication costs: Funds are requested for 5 pages of publication in a peer-reviewed scientific journal.

Travel: We request support for travel. The only travel budgeted for the UA is the mandatory trips to the NIAC Symposium in 2014 and 2015. Travel costs include roundtrip airfare, lodging, per diem, and ground transportation.

Indirect Costs: Indirect costs are applied to all salaries, fringe benefits, materials and supplies, travel and other direct costs except capital equipment, 50% of graduate student fringe which is tuition remission, and all but the first \$25,000 of each subcontract.

Required Facilities and Equipment: This work relies on the use of existing equipment and facilities at the University of Arizona.

BUDGET DETAILS

Here we propose for funding continued development of the Large Balloon Reflector (LBR) under the NIAC Phase II program. LBR will provide an unprecedented view of the Universe at THz frequencies.

This Budget Element explains the total cost the University of Arizona (UA) is expected to incur during the 1 year period of performance of this project (August 1, 2014 – July 31, 2015). The estimates include all labor costs, fabrication, research materials & services, publication costs, travel, and indirect (F&A) charges.

The UA budget will be one element in a larger budget to be submitted to the NASA ROSES-2014 NIAC Phase II Announcement of Opportunity (AO). The total project cost is approximately \$500K. This proposal is being submitted as a *Multiple-Institution* proposal with the University of Arizona acting as the lead institution.

As instructed by the ROSES AO each of the Co-Investigator institutions will be requesting separate awards by independently submitting their institutional budgets and task statements. The Principal Investigator, Dr. Christopher Walker, is a UA faculty member.

The budget was calculated using 2014 dollars.

DIRECT LABOR

Summary

The labor hours applied to the research in the period specified is 2,109 labor hours. This averages out to an average of 1.01 FTE per year for the period of performance (based on 2088 hr work year).

Table B1: Annual Labor Breakdown

Year	2014	2015	Total FTE
Faculty & Science	0.1667		0.167
Technical Personnel	0.1667		0.167
Management	0.083		0.083
Graduate Student	0.25	0.25	0.50
Undergraduate	0.12	0.12	0.24

Layout

The UA budget uses calendar years (Jan-Dec) as the time ordinance and has been divided into the basic categories of: 1) Labor; 2) Travel; 4) Operations; 5) Indirect costs (F&A). The budget details start with the direct labor calculations for all participants that are to be directly compensated. The direct labor is calculated using the base hourly wages and the level of effort (number of hours) of each individual. The detailed budget includes the starting hourly wages (based upon April 2014 values). Year 1 direct labor is calculated using this wage. The grand total of the direct labor is the sum of all wages with the benefits.

UA Academic and Summer Terms

The Faculty and Student employee year is broken into the academic and the summer terms.

The academic term is 9 months, or 39 weeks in duration. The summer term is 3 months or 13 weeks in duration.

UA Faculty and Student Academic and Summer Hours and Rates

Faculty members are allowed a total of 464 hours of compensation during the summer term and 1600 hours during the Academic term. The faculty summer rate is calculated using 155 hours per month. The faculty hourly rate is calculated using the following formula: $Rate = (Academic\ Salary) * .00072$.

Graduate students are allowed to work a total of 800 hours (89 hrs/month) during the academic term and 464 hours (155 hrs/month) during the summer term. The hourly rate is calculated using the formula: $Rate = (Academic\ Salary) * .00072$.

UA Appointed Personnel and Classified Staff Hours

Appointed and Classified staff hourly rates are calculated using a 2088-hour work year or approximately a 174-hour work month.

UA Project Management Support for this Project

The project management effort will include detailed financial tracking as well as project requirements and goal tracking. The effort for these duties is over and above the typical departmental duties provided.

Fringe Benefits Rates

The benefits rates are listed in Table B2. The dollar value is calculated by multiplying the benefits rate to the wages earnings for the specified period.

Table B2: Benefits Schedule

Employee Type	July 2014 and beyond
Faculty & Appointed Personnel	28.6%
Classified Staff	47.80%
Graduate Students	63.3% (50% of which is IDC exempt)
Undergrad Student	2.1% IDC

Benefits \$ = Hours x Hourly Rate x Benefit rate

PERSONNEL	Annual	Labor		Year 1A		Year 1B	
Senior Personnel	Salary	Rate	Hours	Subtotal	Hours	Subtotal	Total Year 1
PI, Christopher Walker	\$92,582	\$ 66.66	155	\$ 10,332	-	\$ -	\$ 10,332
Co-PI, Craig Kulesa, Associate Astronomer	\$58,131	\$ 27.84	174	\$ 4,844	-	\$ -	\$ 4,844
Senior Personnel Subtotal			329	\$ 15,176	-	\$ -	\$ 15,176
Appointed Personnel							
Brian Duffy (PM)	\$85,000	\$ 40.71	174	\$ 7,084	-	\$ -	\$ 7,084
Abram Young, Specialist, Technical/Research	\$72,800	\$ 34.87	348	\$ 12,135	-	\$ -	\$ 12,135
Appointed Personnel Subtotal			522	\$ 19,219	-	\$ -	\$ 19,219
Undergraduate Student							
Undergraduate Student		\$ 15.00	458	\$ 6,870	42	\$ 630	\$ 7,500
Undergraduate Student Subtotal			458	\$ 6,870	42	\$ 630	\$ 7,500
Graduate Students							
Graduate Research Assistant - AY (9-months) @ 50% FTE	\$36,177	\$ 22.61	800	\$ 18,088	-	\$ -	\$ 18,088
Graduate Students Subtotal			800	\$ 18,088	-	\$ -	\$ 18,088
LABOR SUBTOTAL			2,109	\$ 59,353	42	\$ 630	\$ 59,983
FRINGE BENEFITS - Rates effective 7/1/14 and beyond							
Faculty and Appointed Personnel @ 28.6%				\$ 9,837		\$ -	\$ 9,837
Undergraduate Student @ 2.1%				\$ 144		\$ 13	\$ 157
Graduate Students @ 63.3% (50% IDC exempt)				\$ 11,450		\$ -	\$ 11,450
FRINGE BENEFITS SUBTOTAL				\$ 21,431		\$ 13	\$ 21,444
PERSONNEL LABOR + FRINGE BENEFITS TOTAL				\$ 80,784		\$ 643	\$ 81,427

SUBCONTRACTS

No subcontracts included in this proposal.

DIRECT FUNDING

As approved by the NIAC Program Manager, each of the Co-Investigator institutions will be requesting separate awards by independently submitting their institutional budgets and task statements. We attach these as part of our budget justification.

EQUIPMENT

No Capital Equipment is planned for purchase by the UA in NIAC Phase II.

FABRICATED EQUIPMENT

In NIAC Phase II the UA will fabricate a prototype LBR Instrument Unit (IU). The costs associated with the IU are listed in Table B.3.

Table B3: NIAC Phase II Fabricated Equipment: Instrument Unit (IU)

Item Name	Quantity	Price/unit	Total price
Stepper drivers	50	7	350
Steppers (retail)	50	75	3750
Silicone/urethane/latex	4	100	400
Custom electronics board	5	20	100
Misc electronics components	5	20	100
Mold machining	1	1000	1000
Structural sheet goods	10	10	100
Stepper controller	6	20	120
Raspberry pi	1	40	40
Reflector material	1	200	200
Instrument Computer	2	1000	2000
Mount Machining			5000
		Total	13,160

TRAVEL

The only travel budgeted for the UA is the mandatory trips to the NIAC Symposium in 2014 and 2015. The cost estimate for the basic trip is described in detail in Table B4.

Table B4: Travel

Travel	2014 (1), 2015 (1)
<i>Destination</i>	<i>2- NIAC Meetings</i>
Airfare	2 x 450
Lodging	2 x 315
Per diem	2 x 168
Ground transport	2 x 300
Per person totals	\$2,466

SUPPLIES, MATERIALS, & OPS

Research Supplies and Services

All supplies described in this budget are charged at the indirect rates described below. We request funding for shipping (**\$500**), research supplies and work-flow/data capture (**\$3000**), and telecommunication expenses (**\$150**) required for the conduction of this investigation inclusive of the material costs of creating, replicating, backing up (archiving), distributing and presenting all project

related documentation, memoranda, technical reports, analysis, summaries, etc. under PI Christopher Walker's responsibility . These costs were estimated based on historical usage for projects of this size and scope of work.

Publication Fees

The main product of the scientific investigation is the publication of journal papers. Estimates for publication fees have been included within the budget. The calculations are based upon the following assumptions: 1) Publication of four UA authored journal paper is expected (these papers are independent of Co-Institutions publications efforts); 2) Journal papers will be approximately 10 pages in length; 3) Journal page fees were estimated from the *Astrophysical Journal Letters* charges (\$150 per page, 2007 dollars), for a total of **\$750**.

INDIRECT COSTS

University indirect costs (Facilities & Administrative) apply to the subtotal of: 1) Direct Labor (including benefits); 2) Travel; 3) Supplies and materials (including equipment items costing under \$5000). The University of Arizona defines capital equipment as equipment items costing \$5000 or above.

Indirect Cost Rates

The following table describes the University's indirect rates for the period of performance of this proposal.

Table B6: UA Indirect Cost Schedule

On-Campus Research Rates	
7/1/14 - 6/30/15	52.50%
7/1/15 - 6/30/16	53%
7/1/16 - 6/30/17	53.5%

The total estimated indirect charges for this period of the program is **\$48,521**

BUDGET PREPARATION

The UA Cost Element summary was
Large Balloon Reflector (LBR): NIAC Phase II
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Prepared by:
Program Manager
Steward Observatory
933 North Cherry Ave.
Tucson, AZ 85721
(520) 621-6916
(520) 621-9843 (FAX)

Reviewed by:
Director, Sponsored Projects
University of Arizona
PO Box 210158
Tucson, AZ 85721-0158
(520) 626-6000
(520) 626-4130 (FAX)