Budgets for Reseach Projects

Dániel Apai
Steward Observatory and Lunar and Planetary Laboratory, University of Arizona
and the
Earths in Other Solar Systems Team

Importance of Learning to Plan Projects and Writing Proposals

Key Goals:

1) Identify the projects that will lead you where you want to go
2) Get funding for the projects you want to work on

Essential component of a career in science

Completing (defining) projects the key PhD requirements

Defining projects, securing resources, and completing them: required for individual investigators

Postdoctoral fellowship: Self-guided research project

In the US, tenure-track jobs are most common (professor/astronomer); securing grants and publishing original, high-impact papers are often among of the most important/challenging tasks

European countries follow suit: Switzerland, Germany, Finland, etc. changing systems
Increasing fraction of funds allocated competitively

ERC and similar programs providing funding for research groups are growing in importance

Daniel Apai
THE UNIVERSITY OF ARIZONA COLLEGE OF SCIENCE
Astronomy & Steward Observatory

Large fraction of research projects not successful: 20–40%

Large fraction of research proposals fail: 75–95%

von Hippel et al. (2015) estimate 6-7% success rate for projects proposed in astronomy by new investigators


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NATURE | NEWS

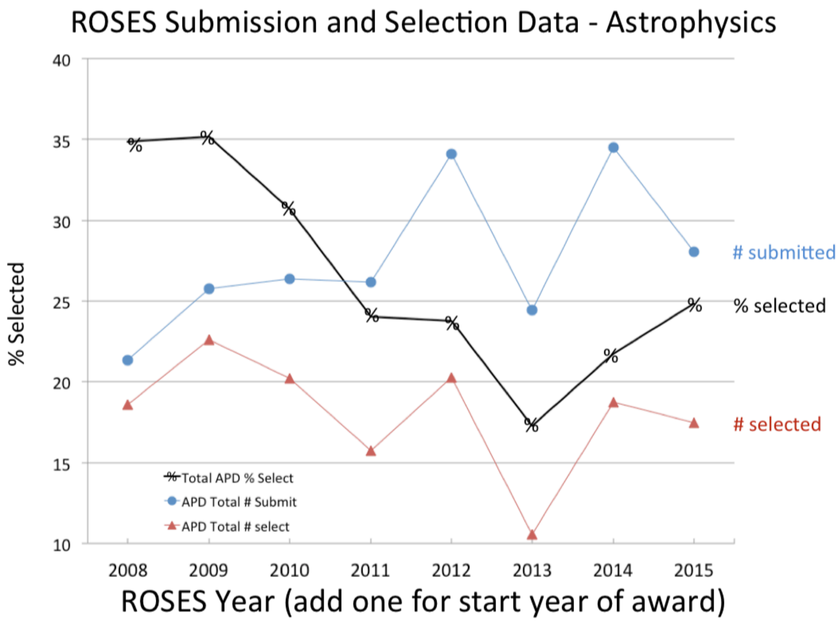
US astronomers stuck in grant-rejection cycle

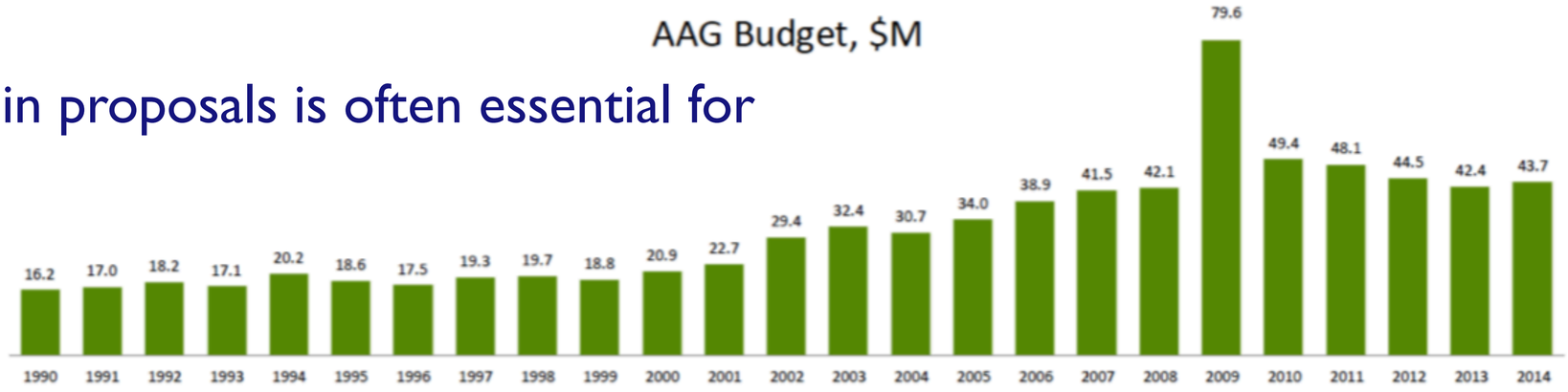
The plummeting success rates in grant applications in the last decade are linked to flat budgets and more resubmitted proposals.

Chris Cesare

23 October 2015

A higher-than-average success rate in proposals is often essential for most research/faculty positions





Planning the Budget

"Budget": Carefully crafted financial plan that follows federal, state, institutional, and sponsor guideline

Important part of proposals (e.g., feasibility, costs/resources realistic?)

Weak budget will sink an excellent proposal (non-compliance, issues)

Institutions provide professional support (business office) and
often have multi-stage approval process

Complex projects will often take long time to budget
(Respect the BO staff)

Multiple institutions:

Each institution requires its own budget, approved internally!

PI's institutional budget

Departmental Approval

Institution-level approval

Example: HST Budgets and Financial Review

Typically 1,000–1,100 submissions per cycle; ~110 successful proposals. ~$20-27M in funding

Phase I Science Proposal:	Reviewed by Panels, Recommend by TAC, Approved by Director
Phase II Budget Proposal	Reviewed by FRC, Recommendation by Director, Approved by HST Mission Office at GSFC
	Proposers receive letter with very limited budget revision instructions and new total dollar value
	Revised budget to meet dollar amount
	Award

Grants Administration Office
3700 San Martin Drive
Baltimore, MD 21218
(410) 338-4200
Fax (410) 338-4211

December 12, 2011

Dr. Leslie P. Tolbert
V.P. for Research, Graduate Studies, & Economic Development
The Arizona Board of Regents for and on behalf of the University of Arizona
P. O. Box 3308
Tucson, AZ 85722-3308

Dear Dr. Tolbert:

I am pleased to inform you that a grant of $155,000 is awarded to the The Arizona Board of Regents for and on behalf of the University of Arizona by the Space Telescope Science Institute, AURA. This grant is for support of the project entitled "Physics and Chemistry of Condensate Clouds across the L/T Transition - A SNAP Spectral Mapping Survey," under the direction of Prof. Daniel Apai.

The identifying number for this grant is HST-GO-12550.01-A and should be used in all correspondence with the Institute.

The formal Grant Award Document is enclosed with this letter.

Sincerely yours,

Paula Sessa, Manager
Grants Administration Office

Enclosure

cc: Prof. Daniel Apai
Ms. Catalina Diaz-Silva
Ms. Mary Gerrow
Rose Griffin
Mr. Douglas Hilyard
Jessica Peck
Ms. Lori Ann M. Schultz
Karen Smith

HST Budget Proposal Structure

Template

Table of Effort

Program abstract (goals)

Technical summary

Detailed scope

Budget Narrative / Budget Justification

- Salaries,
- Equipment/material,
- Travel,
- Conferences, publication charges, Communications
- Other costs

Overheads, Benefits

Detailed budget summary (spreadsheet)

Program #: GO-15301
Principal Investigator: Apai (US Admin PI)

REQUIRED - BUDGET NARRATIVE TEMPLATE

The narrative may be generated in any software, but needs to be uploaded into STGMS in PDF format. Delete the instructions in each section prior to submitting the narrative.

Administrative Principal Investigators – Complete Sections I – V

Co-Investigators – Complete Sections IV - V

Incomplete information may result in a reduction of funding allocated to your program.

I. **Summary of contribution of all investigators (listed on the accepted program) -** *Clearly describe the contribution of each Investigator (funded and non-funded, U.S. and foreign).*

Investigator	Personnel Type (e.g.Faculty, Postdoc, Grad Student, etc.)	Institution	Description of scientific involvement	Labor Funding requested Yes or No	% Effort *
Daniel Apai (US Admin PI)	*Faculty*	*Univ. Arizona*	*US Project management, advises on WFC3 grism spectral extraction and ramp effect correction; contribution to the analysis and astrophysical interpretation; significantly contributes to the interpretation of cloud cover; contributes to manuscript*	***Yes***	***4.6% (total of 5 weeks)***
Yifan Zhou (Co-I)	*Grad Student*	*Univ. Arizona*	*Leads WFC3 grism spectral extraction, ramp effect correction; contributes to the data analysis and interpretation; contributes to the manuscript*	***Yes***	***7.4% (total of 2 months)***
D. Angerhausen	*Postdoc.*	*Univ. Bern*	*Contributes to interpretation and Manuscript preparation; will attempt independent data reduction*	***No***	***7.4% (total of 2 months)***
J. Bouwman	*Postdoc.*	*MPIA*	*Contributes to interpretation and Manuscript preparation*	***No***	***1%***
L. Carone, PI	*Postdoc*	*MPIA*	*Project management, lead author on the refereed publication, leads the interpretation; leads atmospheric modeling effort.*	***No***	***40% (10 months)***
L. Decin	*Faculty*	*KU Leuven*	*Contributes to interpretation and Manuscript preparation*	***No***	***1%***

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Detailed budget summary (spreadsheet)

II. Program abstract *(as listed in Phase II files)*

WASP-117b is an unique exoplanet as it's elliptical orbit causes the temperature of the atmosphere to cross the 970 K temperature boundary, which separates the disequilibrium and equilibrium chemistry regime. Due to the long orbital period (10.022 days) compared to chemistry and dynamical time scales and due to the orbital orientation, we can expect the planet to be well in the disequilibrium chemistry temperature regime (Teff <970 K) during transit, which is identifiable by the under-abundance of methane compared to predictions with equilibrium chemistry.

To characterize the atmosphere of WASP-117b, we thus propose to observe its primary transit with HST/WFC3. It is the only instrument currently available with sufficient stability to cover the 6 hour long, relatively deep (0.75%) transit over a quiet, bright (mv=10.14) host star and to obtain accurate transit spectroscopy to constrain methane-content in the atmosphere of WASP-117b.

Two important science objectives can thus be fulfilled with only one HST measurement: a) Determining if the planet's atmosphere is in chemical equilibrium or not and b) Constraining the effective temperature, albedo and cloud coverage. Since the planet is expected to spend several days each in the disequilibrium and equilibrium chemistry regime over the course of one orbit, HST observations will also provide a vital first input for planning future phase resolved JWST observations. The latter will allow to investigate atmosphere and cloud composition changes as WASP-117b switches in between chemical regimes.

III. Technical Program Summary - *Provide a single paragraph summary of the data sets being collected in this program and major aspects of the data analysis for which funding is being requested.*

We will reduce, analyze, and interpret an unusually long sequence of orbits for the hot Jupiter WASP-117b, which is on a highly eccentric orbit. The highly eccentric orbit allows us to explore how the planet's atmosphere reacts to the greatly varying irradiation, constraining both atmospheric circulation, cloud cover, and atmospheric chemistry.

Daniel Apai
THE UNIVERSITY OF ARIZONA COLLEGE OF SCIENCE
Astronomy & Steward Observatory

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Overheads, Benefits

Detailed budget summary (spreadsheet)

ORGANIZATION	*Arizona Board of Regents, The University of Arizona*
DEPARTMENT/UNIT	*Department of Astronomy/Steward Observatory*
SPONSOR	*Space Telescope Science Institute (GO-15301)*
PROJECT TITLE	*Now You See Me - The WASP-117b version*
PI:	*Apai, Daniel (and Admin PI)*
PERFORMANCE PERIOD	*January 1, 2018 - December 31, 2019*

	YEAR 1			YEAR 2			
PERSONNEL	Labor Rate	Labor Hrs.	Subtotal	Labor Rate	Labor Hrs.	Subtotal	**CUMMULATIVE TOTALS**
Senior Personnel							
Apai, Daniel (PI) - (5 weeks) Academic	$ 58.27	120	$ 6,993	$ 60.02	80	$ 4,802	$ 11,795
Graduate Assistants							
Zhou, Yifan (Co-I)-summer (2mos) @ full time	$ 29.44	160	$ 4,710	$ 30.32	160	$ 4,852	$ 9,562
LABOR SUBTOTAL:		**280**	**$ 11,703**		**240**	**$ 9,654**	**$ 21,357**
FRINGE BENEFITS (ERE) - Rates effective 7/1/17 and beyond	**YEAR 1**			**YEAR 2**			
Employee Full-Benefit	32.00%		$ 2,238	32.00%		$ 1,537	$ 3,775
Graduate Assistants	13.00%		$ 612	13.00%		$ 631	$ 1,243
FRINGE BENEFITS (ERE) SUBTOTAL:			**$ 2,850**			**$ 2,168**	**$ 5,018**
LABOR + ERE TOTAL			**$ 14,553**			**$ 11,822**	**$ 26,375**
OPERATIONS/OTHER DIRECT COSTS	**YEAR 1**			**YEAR 2**			
Non-Capital Computing Equipment			$ -			$ -	$ -
Publication Costs			$ -			$ -	$ -
Conference Registration Fees			$ -			$ -	$ -
Other			$ -			$ -	$ -
Graduate Student Tuition Remission			$ -			$ -	$ -
SUBTOTAL OPERATIONS/OTHER DIRECT COST:			**$ -**			**$ -**	**$ -**
TRAVEL	**YEAR 1**			**YEAR 2**			
Yifan Zhou - MPIA Heidelberg to work with the PI and the core team/7 days		Domestic	International		Domestic	International	
Airfare: Average price for RT Tucson/Frankfurt $1,300		$ -	$ 1,300		$ -	$ -	**$ 1,300**
Lodging: Heidelberg lodging per Diem $194		$ -	$ 1,358		$ -	$ -	**$ 1,358**
Lodging: Max Per Diem for meals and incidentals $117 per day:		$ -	$ 819		$ -	$ -	**$ 819**
(Frankfurt airport/Heidelberg 70EU ($80) RT/Tucson/airport $50 RT:		$ -	$ 120		$ -	$ -	**$ 120**
TOTAL PER TRIP:		$ -	$ 3,597		$ -	$ -	
TRAVEL TOTAL:		**$**	**3,597**		**$**	**-**	**$ 3,597**
CAPITAL EQUIPMENT	**YEAR 1**			**YEAR 2**			
			$ -			$ -	$ -
			$ -			$ -	$ -
SUBTOTAL CAPITAL EQUIPMENT:			**$ -**			**$ -**	**$ -**
SUBAWARDS	**YEAR 1**			**YEAR 2**			
			$ -			$ -	$ -
			$ -			$ -	$ -
SUBTOTAL SUBAWARDS:			**$ -**			**$ -**	**$ -**
	YEAR 1			**YEAR 2**			
DIRECT COSTS			**$ 18,150**			**$ 11,822**	**$ 29,972**
Less Tuition Remission			$ -			$ -	$ -
Other Exclusions			$ -			$ -	$ -
Subaward 25K Add In			$ -			$ -	$ -
MTDC			**$ 18,150**			**$ 11,822**	**$ 29,972**
INDIRECT COSTS (53.5% Effective 7/1/16 and beyond)			$ 9,710			$ 6,325	$ 16,035
TOTAL PROJECT COSTS			**$ 27,860**			**$ 18,147**	**$ 46,007**

Review Panel and Process

Financial Review Committee:

~10-12 members (experienced scientists from HST user community)
Chair from HST
Observers from NASA, NASA GSFC HST Mission Office, STScI Director's Office
Support staff from STScI / GSFC
COI forms, AURA Code of Conduct, Multiple observers, written records/comments

Three meetings each year: One in-person (Sep, Baltimore) and two online

Is the budget (financial plan) correct, well-justified, compliant?
Are the costs as low as possible without increasing risks?

Phase I Science Proposal is the key reference document for the financial plan

Typical duration: 2 years

Volunteers (no compensation); about 12 days of work per year (including travel)
Three days at STScI
Each reviewer reads and evaluates about 30-40 proposals
Primary, secondary reviewers
Panel discussion, consensus
Revised budget and instructions. Large cuts are very common.

Thought Process:
- Triage?
- Assess major tasks, complexity, team experience, management plan, risks
- Assess requested level of human resources
  - Is the level appropriate (and as low as possible) for Phase I science goals?
- Assess other requests (travels, hardware, supporting observations?
  - Is each item well justified (linked to project goals) and reasonably priced?

Is there anything that can be cut without risking the project's success?

Tips for Avoiding Common Mistakes – Keep in Mind:

Start early: responsibilities during Phase 1, budgeting well ahead of Phase 2 deadline

The purpose of the funding for HST's Data Analysis program is not community support. (Not NSF!)

NASA only funds US investigators; can't hire your foreign CoIs from grant

Personnel only funded for required effort

Travels, computers etc. must be directly related to the project's needs

A variety of items should be provided from institutional overhead

Every single item must be justified. Plan wisely, but do not pad budget

Supplementary funding is a possibility!

Joint affiliation can be a concern

Funding shows up when data is collected, comes in installments

Unused funds must be returned

Reporting/monitoring process: Investigators / Institutions are audited

Example:
In each of Years 1 and 2 we request funding for an international conference travel (cost $3,200).

Problems:
1) Why is the conference travel required to achieve the project goals?
2) Who is/are traveling, where, and for how long? (Details missing)
3) Is the cost for one or two travels?

ii. Foreign Travel

We request *a single travel* to the PI's institution (MPIA Heidelberg) for a hand-over of the reduced and calibrated data to the PI's team and to assist at the beginning of the scientific interpretation. The primary purpose of this visit is to ensure that questions related to the random (point-by-point) and any residuals systematic uncertainties, and other limitations related to the data are fully understood and considered during the scientific interpretation.

Total = $3597. Airfare $1300; Hotel $1358 total for 7 nights, M&IE $117 /day for 7 days, Ground Transportation $120.

Costs are obtained using current State of Arizona Lodging and Meal Rates, online estimates for airfare and historical costs for parking and ground transportation

Benefits, tuition, indirect costs, per diem — Established through federal review process

UA IDC (indirect costs): 53.1%

Benefits (depending on job category) ~23-27%

Graduate students:
- Not employees (degree seeking)
- Tuition remission (if appointed at 0.5 FTE or higher)
- Contribution to health insurance, FML, benefits

Guess the total project costs

Laptop	~3.4 K	
Graduate student 3 years	~ $245 K	(Same salary)
Postdoc 3 years	~$240K–320K	(Significant range)

Example: Grad student 4 weeks, assistant professor 3 weeks, 1 travel to Europe: $46K

Most projects cannot fund a student or a postdoc for 3 years – typical level is ~1-1.5 years

Good Luck!