

Strategic University Research Partnership Director's Research and Development Fund Proposal FY 2008

1. Proposal Title		Assigned Proposal No. (SURP use only)	
Dartmouth Greencube			
2. JPL Principal Investigator		3a. Co-Investigator(s)	
(First/Last) Anthony J. Mannucci		(First/Last) Kristina Lynch	
JPL Org. No.: 335G		University Name or JPL Org. No.: Trustees of Dartmouth College	Department: Physics and Astronomy
3b. If this proposal is submitted in conjunction with proposals from other SURP Partners, identify below:		(First/Last)	
University:		University Name or JPL Org. No.:	Department:
Co-Investigator(s):		(First/Last)	
Proposal Title:		University Name or JPL Org. No.:	Department:
4. Budget (mark one)		5. Student participant(s) name and email (Enter "TBD" and note level if participation is projected)	
XX New Proposal: FY08: \$25K _____ Renewal Proposal: FY08: \$ _____		(First/Last) Parker Fagrelus E-mail address: parker.fagrelus@dartmouth.edu	<input type="checkbox"/> Postdoc <input type="checkbox"/> Grad <input checked="" type="checkbox"/> Undergrad <input type="checkbox"/> Other
		(First/Last) Phillip Bracikowski E-mail address: phillip.bracikowski@dartmouth.edu	<input type="checkbox"/> Postdoc <input type="checkbox"/> Grad <input checked="" type="checkbox"/> Undergrad <input type="checkbox"/> Other
		(First/Last) M. Umair Siddiqui E-mail address: m.umair.siddiqui@dartmouth.edu	<input type="checkbox"/> Postdoc <input type="checkbox"/> Grad <input checked="" type="checkbox"/> Undergrad <input type="checkbox"/> Other
Primary	Secondary	6. Identify ONE Primary Topic Area to which your proposal applies, and any Secondary Areas (if applicable)	
		1. To Advance Solar System Exploration in New Directions: To Understand Planetary Formation and Evolutionary Pathways, and to Seek, Discover and Inventory the Organic Materials in the Solar System and Elucidate Their Origins	
		2. Determining the Geometry and Structure of our Universe	
		3. Characterizing Exoplanets Where Life Could Exist	
		4. An Integrated Earth System Science Information System for Research and Applications	
		5. Achieving Breakthrough Increases in Interplanetary Communications (100 – 1000 times current capabilities)	
		6. Enabling Robotic Missions to Scientifically-Interesting Extreme Environments	
		7. Enabling Autonomous Human Missions to the Moon and Mars	
		8. Fractionated, Distributed, Repairable, Reconfigurable, Reusable Missions	
		9. Large, Strong, Lightweight, Precise, Dynamically Stable, Deployable Structures	
		Champion	
		Arthur L. Lane – (818) 354-2725 Arthur.L.Lane@jpl.nasa.gov Sabrina Feldman – (818) 393-2327 Sabrina.Feldman@jpl.nasa.gov	
		Michael D. Seiffert – (818) 393-5252 Michael.D.Seiffert@jpl.nasa.gov	
		Stephen Unwin - (818) 354-5066 Stephen.C.Unwin@jpl.nasa.gov	
		Yi Chao – (818) 354-8168 Yi.Chao@jpl.nasa.gov	
		Chad Edwards – (818) 354-4408 Charles.D.Edwards@jpl.nasa.gov	
		Elizabeth A. Kolawa – (818) 393-2593 Elizabeth.A.Kolawa@jpl.nasa.gov	
		Andrew H. Mishkin – (818) 354-0986 Andrew.A.Mishkin@jpl.nasa.gov	
		Michel.D.Ingham – (818) 393-6426 Michel.D.Ingham@jpl.nasa.gov	
		John Hong – (818) 354-0720 John.H.Hong@jpl.nasa.gov	

xxx	10. Develop and Nurture the Next Generation of "Rocket Scientists"	Ross Jones - (818) 354-7769 Ross.M.Jones@jpl.nasa.gov Adrian Ponce - 818 354-8196 Adrian.Ponce@jpl.nasa.gov
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7a. General Objectives. Clearly and concisely state the proposal objectives, goals and expected deliverables and/or products of the proposed work.

The undergraduates in our lab are currently involved in building a cubesat-like prototype spacecraft which we plan to launch from a balloon at the end of this academic year. This is the first prototype for a small spacecraft design which has applications both for our auroral sounding rocket lab, and for Prof R Millan's balloon research group. For our rocket lab, we are interested in, and have some seed money from JPL for the development of, a sounding rocket proposal involving the release of approximately 8 small subpayloads from a main payload sounding rocket to be flown from Poker Flat Alaska. This mission would be for the investigation of the k-spectrum of density irregularities in the auroral ionosphere. The cubesat project the students are working on would be launched first from a fairly low-altitude balloon as an infrastructure test; secondly from a student launch rocket from Wallops, and only thirdly as a prototype for the small spacecraft needed for the Poker launch.

The payload they are developing will be capable of collecting and transmitting data from a GPS, a vector magnetometer, and a third probe. For the preliminary infrastructure flights, this third probe will be a simple thermocouple. For the science flights, this probe will be a plasma density probe. The students this winter will be working with our engineering staff to develop the electronics needed to sample and telemeter the data from these three instruments, using ham radio communications and a "burster" balloon.

7b. Quantitative Objectives. Discuss quantitative improvements in capability expected in your results; compare with current capabilities both within JPL and outside of JPL.

The development and balloon flight of this prototype payload will be the first iteration of a planned sequence that should take us to a full science sounding rocket flight of a number of small subpayloads. It also provides a valuable training ground for the undergraduates interested in spacecraft systems design.

8. Approach: Describe how you plan to achieve your objectives. Identify specific tasks and milestones that will be accomplished.

During this fall term, the students are working on the definition of the payload and its instrumentation. One of the students has already built a cubesat (3U) container which will be modified as needed to hold the payload.

During the winter term Ms Fagrelis and Mr Bracikowski will work with our engineering staff to develop the computer board needed for sampling and logging the data, based on expansions of existing circuitry from our rocket lab. Mr Siddiqui will work on balloon trajectories and FAA regulations, and Mr Bracikowski is working on the communications system.

The intent is that by the end of the spring term, we will be able to launch the payload on a "burster" balloon, with the guidance of Prof R Millan, whose research group at Dartmouth concentrates on balloon-borne studies. Based on the performance of this first prototype, we will plan for next year's effort, which will be a version that can be flown from a NASA student sounding rocket.

9. For Approved Renewal Proposals Only: Discuss specific accomplishments achieved in prior years and why further work is required.

10. Describe the innovative features of this proposal. Specify whether the proposed work will result in an evolutionary or revolutionary advance(s).

As an education oriented proposal, our goal is to advance the training of students towards learning about and understanding flight hardware and preparing students for careers in space systems and science. The proposed work will advance these important goals.

11a. Contribution of External investigators: List and describe specific tasks, responsibilities and time periods for the tasks that are being done by the external investigators and any special resources or facilities from their institute that will be used for this work. External co-PIs need to describe what they will bring to the proposal for facilities and what will be used at JPL. The subsequent proposal may be used as the Statement of Work for the CO-I in a JPL subcontract.

All the items listed in sections 7 and 8 will be done at Dartmouth, under the auspices of Prof Lynch's rocket lab and Prof Millan's balloon lab. Engineering mentorship will be provided by Dr Kevin Rhoads, Mr David McGaw, and Mr David Collins, who are all engineers in our groups. We look to JPL for future suggestions about possible subsystems for the payloads.

11b. Partner contract administrator contact information: Name of Contract Administrator, address, phone number and email.

Trustees of Dartmouth College
Office of Sponsored Projects
11 Rope Ferry Road #6210
Hanover, NH 03755-1404

Sponsored.Projects@Dartmouth.Edu 603-646-3007

12. Significance and impact of results on JPL missions and programs. How does this effort contribute to accomplishing the strategic challenge?

This proposal addresses JPL's interests in enhancing student preparation for a professional career in space systems/science at JPL or elsewhere. The students will gain experience with instruments of particular interest to JPL, such as GPS and magnetometers.

13. Has the proposal been submitted elsewhere? If yes, specify.

No.

14. Leverage from other funded activities at the partner institution. How does this activity align with existing research at this university?

The project is an off-spring of existing work at the Lynch rocket lab and the Millan balloon lab.

15. Plans for follow-on funding (e.g. Government Agencies and prospective Calls for Proposals).

We plan to submit a scientific sounding rocket proposal to NASA/LCAS, potentially jointly with JPL, as described above.

16. Budget - Please fill out the budget sheet below. Contact your Section Administrator or Business Administration Manager for current FY08 rates and assistance in filling out the form.

Budget Sheet

Category	AT JPL	AT EXTERNAL INSTITUTION(S)
DIRECT COST		
1. Salaries (Itemize) (<i>Only "itemize" the person names or job classifications and the number of hours for each. You can show one total \$ salary figure for labor.</i>)	\$1,350 – 18hrs – Tony Mannucci	\$10,000
2. Labor Fringe Rates - Employee Benefits	\$650	
3. Cat A Labor (Itemize) (<i>Only "itemize" the person names or job classifications and the number of hours for each. You can show one total \$ figure for labor.</i>)	0	
4. Procurements –Equipment, Materials and Supplies (Itemize). JPL - Do not list the contracts for outside collaborators. This total is on line #12 on the external collaborator column.	0	\$2,559
5. Procurements – Subcontracts (Itemize) (<i>PS – contracts other than with collaborators</i>)	0	0
6. Services – (Itemize) (<i>JPL be sure to include in-house services at JPL</i>)	0	0
7. Domestic Travel (<i>only as a research cost; and domestic conference travel is allowed up to a maximum 5% of the total budget</i>) Itemize with what and where the travel is required.	0	Travel to Spring AGU, Ft. Lauderdale, Florida, May 2008, one student \$1,200
8. Other (Itemize) (<i>Chargebacks, etc.</i>)	\$150	0
9. Total Direct Costs (total of dollars 1 through 8)	\$2,150	\$13,759
10. ALLOCATED DIRECT COSTS (ADC)	\$850	
ADC FY08 - See Section Administrator or Business Administration Manager for current rates. ADC costs are calculated on the JPL's total direct costs Item #9 and the external institution(s) budget item #12.		
ADC at JPL consisting of: a. Labor ADC b. RSA Contract ADC c. Other Contracts ADC d. Purchase Orders e. General ADC Enter total on Item #10	0	
11. Overhead -external Institution		\$8,241
12. Individual Budget: (<i>JPL add Item #9 Direct Cost and #10 ADC costs for total JPL budget</i>) <i>External Institution add Item #9 and Item #11 Overhead for total)</i>	\$3,000 \$22,000	\$22,000
13. Combined Budget: (<i>JPL Budget plus External Institution Budget</i>)	\$25,000	

Figures, Graphics, Tables, etc.

(Please do not use "text-wrapping" when incorporating graphics at the end of the report.)

Signatures

NOTE: Proposal forms without **all signatures in sections 17-20 below** are considered incomplete submissions and cannot be processed by the SURP office.

JPL	University
<p>17. Principal Investigator</p> <p>Name: _____</p> <p>Signature: _____ Date: _____</p>	<p>18. Co-Investigator</p> <p>Name: _____</p> <p>Signature: <u><i>K. L. K.</i></u> Date: _____</p>
<p>19. JPL Division Manager</p> <p>Name: _____</p> <p>Organization Number: _____</p> <p>Signature: _____ Date: _____</p>	<p>20. University representative with signature authority</p> <p>Name: <u>Shea McGovern</u></p> <p>Title: <u>Assistant Director, Sponsored Projects</u></p> <p>Signature: <u><i>Shea McGovern</i></u> Date: <u>11/29/07</u></p>

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Final approval and award authorization:	
<p>JPL Chief Scientist:</p> <p>_____</p> <p>Dr. Daniel J. McCleese Date</p>	<p>JPL Chief Technologist:</p> <p>_____</p> <p>Dr. Paul E. Dimotakis Date</p>