Final Performance Report
NAG5- 11024

Date: December 23, 2002

PI: Ronald J. Allen, Space Telescope Science Institute

NASA Grant No: NAG5- 11024

Title: *Study of the Imaging Capabilities of SPIRIT/SPECS Concept Interferometers*

STScI Project No: J0332

Performance Pd: 06/15/001-06/14/03

STScI Grant Administrator:

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Summary of Project Activities - NAG5-11024

Introduction:

Several new space science mission concepts under development at NASA-GSFC for astronomy are intended to carry out synthetic imaging using Michelson interferometers or direct (Fizeau) imaging with sparse apertures. Examples of these mission concepts include the Stellar Imager (SI), the Space Infrared Interferometric Telescope (SPIRIT), the Submillimeter Probe of the Evolution of Cosmic Structure (SPECS), and the Fourier-Kelvin Stellar Interferometer (FKSI).

We have been developing computer-based simulators for these missions. These simulators are aimed at providing a quantitative evaluation of the imaging capabilities of the mission by modeling the performance on different realistic targets in terms of sensitivity, angular resolution, and dynamic range. Both Fizeau and Michelson modes of operation can be considered. Our work is based on adapting a computer simulator called imSIM which was initially written for the Space Interferometer Mission in order to simulate the imaging mode of new missions such as those listed.

This report covers the activities we have undertaken to provide a preliminary version of a simulator for the SPIRIT mission concept.

Work Accomplished:

Our work started in earnest in January 2002. During the period of this grant we have successfully modified the SIM imaging simulator to provide a basic capability for SPIRIT. The major change we have made in the SIM code was to adapt it to simulate the Fizeau (or sparse-aperture) imaging mode. The SPIRIT mission design has been evolving, and while the simulator is quite complete in terms of the general capabilities it inherited from the SIM code (e.g. addition of noise, methods of data restoration, output file saving, etc.), only a small amount of the current delivery is specific to SPIRIT. A working version of "SPECsim" was demonstrated to Dr. Leisawitz in early May 2002, and a number of desirable enhancements were identified.

We have completed the work possible under the funding envelope provided to us as of the fall of 2002.

Possible Future Work:

An effort is underway at GSFC to provide high-fidelity input models for our simulator. As soon as these have sufficiently advanced we are prepared to pick up our work in support of SPIRIT again, running the simulator for a range of suitable targets. Also, if the resources can be made available we would be interested in adding SPIRIT-specific functions into the simulator, such as a wide-field Michelson imaging mode and the "on-the-fly" method of data acquisition.

FEDERAL CASH TRANSACTIONS REPORT

(See instructions on the back. If report is for more than one grant or assistance agreement, attach completed Standard Form 272A.)

OMB APPROVAL NO. 0348-0003

1. Federal sponsoring agency and organizational element to which this report is submitted
NASA Goddard Space Flight Center
Accounting Branch Code 151-2
Greenbelt, MD 20771

2. RECIPIENT ORGANIZATION

Name: Space Telescope Science Institute

Number and Street: 3700 San Martin Drive

City, State and ZIP Code: Baltimore, MD 21218

4. Federal grant or other identification number	5. Recipient's account number or identifying number
NAG5-11024	J0332
6. Letter of credit number	7. Last payment voucher number
80005122	n/a
Give total number for this period	
8. Payment Vouchers credited to your account	9. Treasury checks received *(whether or not deposited)*

3. FEDERAL EMPLOYER IDENTIFICATION NO. ► 86-0138043

10. PERIOD COVERED BY THIS REPORT

FROM *(month, day, year)* 6/15/01 — **TO** *(month, day, year)* 2/24/2003

11. STATUS OF FEDERAL CASH

(See specific instructions on the back)

a. Cash on hand beginning of reporting period	$ 0.00
b. Letter of credit withdrawls	18,829.48
c. Treasury check payments	0.00
d. Total receipts *(Sum of lines b and c)*	18,829.48
e. Total cash available *(Sum of lines a and d)*	18,829.48
f. Gross disbursements	18,829.48
g. Federal share of program income	
h. Net disbursements *(Line f minus line g)*	18,829.48
i. Adjustments of prior periods	0.00
j. Cash on hand end of period	$ 0.00

12. THE AMOUNT SHOWN ON LINE 11j, ABOVE, REPRESENTS CASH REQUIREMENTS FOR THE ENSUING _____ *Days*

13. OTHER INFORMATION

a. Interest income	$
b. Advances to subgrantees or subcontractors	$

14. REMARKS *(Attach additional sheets of plain paper, if more space is required)*

Total award amount $18,836.00
FINAl 272 report for J0332

15. CERIFICATION

I certify to the best of my knowledge and belief that this report is true in all respects and that all disbursements have been made for the purpose and conditions of the grant or agreement.

AUTHORIZED CERTIFYING OFFICIAL

SIGNATURE

DATE REPORT SUBMITTED 02/24/2003

TYPED OR PRINTED NAME AND TITLE
Amy Garrett Power
Accountant
apower@stsci.edu

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THIS SPACE FOR AGENCY USE

Space Telescope Science Institute
Final Property/Inventory Report for Grant Number
NAG5 – 11024
STScI Project No.: J0332
As of 06/14/03
For dollar values greater than 5,000.00 and less than 100,000,000.00

Negative Report

NASA GRANTEE
NEW TECHNOLOGY SUMMARY REPORT

NASA requires each research grantee, research contractor, and research subcontractor to report new technology to the NASA Commercial Technology Office. For that purpose, the following reports and corresponding schedules are provided:

Title of Report	Form Number	Timetable
New Technology Disclosure	NASA Form 1679	The grantee discloses *each* discovery of new technology individually, at the time of its discovery
NASA Grantee New Technology Summary Report (checkmarked "Interim")	NASA C-3043	For multi-year grants, the grantee summarizes the previous year's disclosures on an annual basis. The first Interim New Technology Summary Report is due exactly 12 months from the effective date of the grant. Future reports are due annually, thereafter.
NASA Grantee New Technology Summary Report (checkmarked "Final")	NASA C-3043	The grantee submits a cumulative summary of all disclosed technologies. The Final New Technology Summary Report is submitted immediately following the grant's technical period of performance.

Grantee Name: Dr. Ronald J. Allen

Grantee Address: Space Telescope Science Institute

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Telephone No.: (410) 338-4586

NASA Grant No: NAG5-11024 Grant Completion Date: 12/23/02

NASA GM: Shiela D. Dezio Report Submitted by: Jeannine N. Luers

New technology should be reported whether or not it is or may be patentable.

Large business contractors and subcontractors must disclose all reportable items to NASA. Reportable items as used in NASA contracts (or subcontracts) with large businesses means any invention, discovery, improvement, or innovation, whether or not patentable, conceived or first actually reduced to practice in the performance of work under a NASA contract (or subcontract). Reportable items include, but are not limited to, new processes, machines, manufactures, and compositions of matter, and improvements to, or new applications of, existing processes, machines, manufactures, and compositions of matter. Reportable items also include new computer programs, and improvements to, or new applications of, existing computer programs, whether or not copyrightable.

Small business, nonprofit organization, and college and university contractors and subcontractors must disclose all subject inventions to NASA. Subject inventions as used in NASA contracts (or subcontracts) with other than large businesses means any invention or discovery which is or may be patentable and is conceived or first actually reduced to practice in the performance of work under a NASA contract (or subcontract). Subject inventions include any new process, machine, manufacture, or composition of matter, including software, and improvements to, or new applications of, existing processes, machines, manufactures, and compositions of matter, including software.

Subject to approval by contractors (or subcontractors) who retain or obtain title to subject inventions or reportable items, all such reported items are evaluated for publication in NASA Tech Briefs. If an item is published in NASA Tech Briefs, the innovator receives a monetary award from NASA.

NASA GRANTEE
NEW TECHNOLOGY SUMMARY REPORT

General Information

1. Type of Report: ☐ Interim X Final Reporting Period: 06/15/01 – 12/23/02

2. Size of Business: ☐ Large ☐ Small ☐ College/ University X Nonprofit Organization

3. Have any reportable items or subject inventions resulted from work performed under this contract during this reporting period? ☐ Yes X No

4. Are New Technology Items being disclosed (NF 1679 or equivalent) with this Summary Report? ☐ Yes X No

- **New Technology Items**

Please provide the title(s) of all new and previously disclosed new technology items conceived or first reduced to practice under this grant. Use a separate piece of paper if additional space is required.

Title	Internal Docket Number	Patentable Item	Patent Appl. Filed	Patent Appl. Not Filed
• NONE		☐	☐	☐
•		☐	☐	☐
•		☐	☐	☐
•		☐	☐	☐

- **Grant Subcontractors**

Please complete the following section listing all research subcontractors participating to date. Include each subcontractor's name, address, contact person, telephone number, and the subcontract award date. Use a separate piece of paper if additional space is required.

NONE

Date of Award:

Date of Award:

Date of Award:

Date of Award:

- **Certification**

I certify that active and effective procedures ensuring prompt identification and timely disclosures of reportable new technology items have been followed. Furthermore, I certify that all new technology items required to be disclosed and conceived during the period identified on this form have been disclosed to NASA.

Jeannine N. Luers
Sponsored Programs Administrator I
Name and Title of Authorized Official

Signature and Date