

Final Technical Report
NAG5-6236

Date: November 5, 2001

PI: Dr. Megan Donahue, Space Telescope Science Institute

NASA Grant No: NAG5-6236

Title: *An X-Ray Luminous, Distant ($z=0.78$) Cluster of Galaxies*

STScI Project No: J0567

Performance Pd: 08/15/01-08/14/01

STScI Grant Administrator: Jeannine N. Luers
Space Telescope Science Institute
Sponsored Programs
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This granted funded ASCA studies of the most X-ray luminous clusters of galaxies in the Extended Medium Sensitivity Survey. These studies leveraged further observations with Chandra and sparked a new collaboration between the PI and John Carlstrom's Sunyaev-Zel'dovich team. The major scientific results due largely or in part from these observations: the first $z=0.5-0.8$ cluster temperature function, constraints on cluster evolution which showed definitively that the density of the universe divided by the critical density, Ω_m , could not be 1.0, constraints on cluster evolution limiting Ω_m to 0.2-0.5, independent of λ , the first detections of intracluster iron in a $z>0.6$ cluster of galaxies. These results are independent of the supernova and cosmological microwave background results, and provide independent constraint on cosmological parameters.

The following refereed papers were written, partially supported by this grant:

Reese, E. D., Mohr, Joseph J., Carlstrom, John E., Joy, Marshall, Grego, Laura, Holder, Gilbert P., Holzapfel, William L., Hughes, John P., Patel, Sandeep K., Donahue, Megan 2000 ApJ, 533, 38. "Sunyaev-Zeldovich Effect-derived Distances to the High-Redshift Clusters MS 0451.6-0305 and CL 0016+16"

Donahue, M., Voit, G. M., Scharf, C. A., Gioia, I. M., Mullis, C. R., Hughes, J. P., Stocke, J. T. 1999, ApJ, 527, 525. "The Second Most Distant Cluster of Galaxies in the Extended Medium Sensitivity Survey" and a assessment of the Lx-Tx relation and its evolution.

Donahue, M. & Voit G. M. 1999, ApJ, 523, L137. " Ω_m from the Temperature-Redshift Distribution of EMSS Clusters of Galaxies"

Donahue, M., Voit, G. M., Gioia, I. M., Luppino, G. Hughes, J. P., Stocke, J. T. 1998, ApJ, 502, 550. "A Very Hot, High-Redshift Cluster of Galaxies: More Trouble for $\Omega=1$ "

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 NAG5-6236	5. Recipient's account number or identifying number J0567
6. Letter of credit number 80005122	7. Last payment voucher number n/a

Give total number for this period

8. Payment Vouchers credited to your account	9. Treasury checks received (whether or not deposited)
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10. PERIOD COVERED BY THIS REPORT

3. FEDERAL EMPLOYER IDENTIFICATION NO.

86-0138043

FROM (month, day, year) 8/15/1997	TO (month, day, year) 8/14/2001
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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 withdrawals	11,402.83
	c. Treasury check payments	0.00
	d. Total receipts (Sum of lines b and c)	11,402.83
	e. Total cash available (Sum of lines a and d)	11,402.83
	f. Gross disbursements	11,402.83
	g. Federal share of program income	
	h. Net disbursements (Line f minus line g)	11,402.83
	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

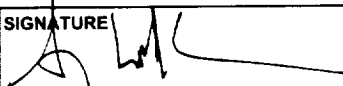
a. Interest income	\$
b. Advances to subgrantees or subcontractors	\$

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

Total award amount \$12,187.00
 FINAI 272 report for J0567

15.

CERTIFICATION

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	SIGNATURE 	DATE REPORT SUBMITTED 02/20/2003
	CERTIFYING OFFICIAL	TYPED OR PRINTED NAME AND TITLE Amy Garrett Power Accountant apower@stsci.edu	TELEPHONE (Area Code, Number, Extension) 410-338-4801

THIS SPACE FOR AGENCY USE

Space Telescope Science Institute
Final Property/Inventory Report for Contract – Grant Number
NAG5 – 6236

STScI Project No.: J0567

As of 12/14/2001

For dollar values greater than 5,000.00 and less than 100,000,000.00

Quantity: 1
Item: Sparc Ultra 10 with Keyboard
Model Number: 600-5694-01
Actual Cost: \$5,944.00

Quantity: 1
Item: Monitor, 21”
Model Number: GDM501PT
Actual Cost: \$1,076.00

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:

<u>Title of Report</u>	<u>Form Number</u>	<u>Timetable</u>
New Technology Disclosure	NASA Form 1679	The grantee discloses <i>each</i> 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: Space Telescope Science Institute

Grantee Address: 3700 San Martin Drive, Baltimore, MD 21218

Telephone No.: 410.338.4586

NASA Grant No: NAG5-6236 Grant Completion Date: 08/14/01

NASA GM: Winifred R. Otten Report Submitted by: Joy Hayes McQuay

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 Final Reporting Period: _____
2. Size of Business: Large Small College/ University Nonprofit Organization
3. Have any reportable items or subject inventions resulted from work performed under this contract during this reporting period? Yes No
4. Are New Technology Items being disclosed (NF 1679 or equivalent) with this Summary Report?
 Yes 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.

<u>Title</u>	<u>Internal Docket Number</u>	<u>Patentable Item</u>	<u>Patent Appl. Filed</u>	<u>Patent Appl. Not Filed</u>
• NONE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• _____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• _____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• _____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

• **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.

Date of Award: _____

Date of Award: _____

Date of Award: _____

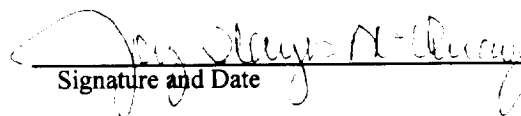
Date of Award: _____

• **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.

Joy Hayes McQuay

Sponsored Programs Administrator I
Name and Title of Authorized Official


Signature and Date