



50 YEARS OF ASTROPHYSICS
GIOVANNI FAZIO



FLYING BLIND WITH DETERMINATION

GEORGE NYSTROM
AND
FRANK LICATA

27 MAY 2009

FLYING BLIND WITH
DETERMINATION

G. NYSTROM/F. LICATA



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



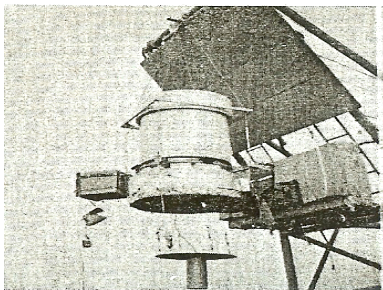
- **THE EARLY YEARS (1962-3)**



Henry Helmken joins Giovanni's balloon program to search for Cosmic Radiation using a spark chamber excited by Gamma rays.

HENRY IS THAT A BUG IN THERE?

Posters are available in the hall documenting his work on this program.



PAYLOAD READY FOR LAUNCH



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



GAMMA RAY BALLOON EXPERIMENT

GROUND STATION –MAY 1966

27 MAY 2009

FLYING BLIND WITH
DETERMINATION

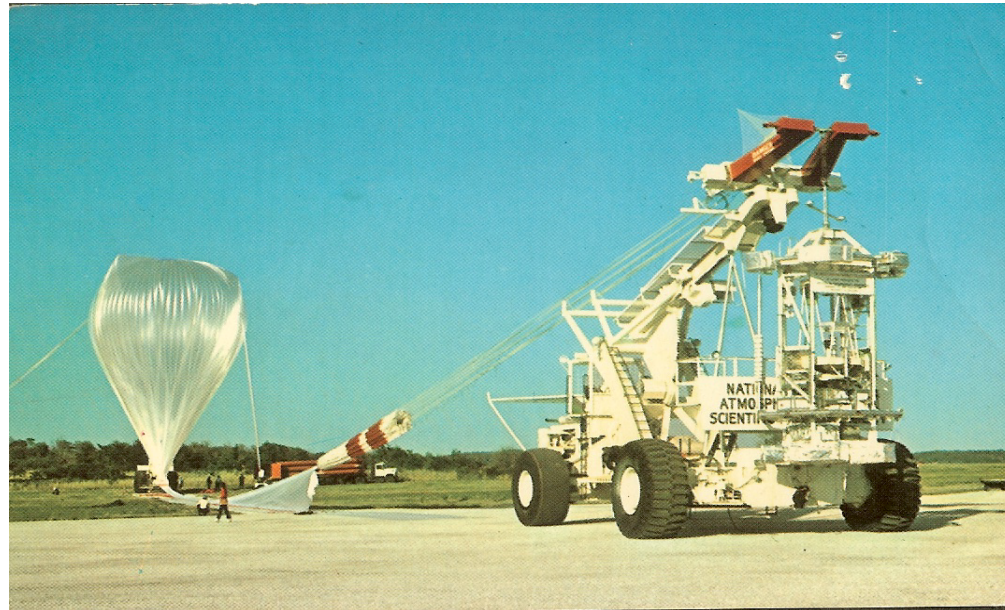
G. NYSTROM/F. LICATA



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



1 METER BALLOON BORNE TELESCOPE READY FOR LAUNCH, PALESTINE, TEXAS



SCIENCE TOPICS: ORIGIN AND EVOLUTION OF STARS, INTERSTELLAR
MEDIUM, GALACTIC NUCLEI, SOLAR SYSTEM AND ATMOSPHERIC SCIENCES

27 MAY 2009

FLYING BLIND WITH
DETERMINATION

G. NYSTROM/F. LICATA



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



INSTRUMENT DEVELOPMENT TEAM

N. HAZEN-MECHANICAL AND OVERALL DESIGN
S. DIAMOND- ELECTRONICS
E. THOMPSON- ELECTRICAL ASSEMBLY
C. HUGHES-MECHANICAL ASSEMBLY
V. KUOSMANEN-DESIGN, DRAFTING

TEAM FLIGHT OPERATIONS

G. NYSTROM-MECHANICS AND MANAGEMENT
F. LICATA- ELECTRICAL SYSTEMS
D. GRAVELINE-MECHANICAL TECHNICAN
V. KUOSMANEN-MECHANICS
R. SCOVILL-ELECTRICAL TECHNICAN



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



-
- The one Meter IR balloon program. A bit of history and events not yet told. Flights 1 thru 5.
 - Flight 1 was an engineering flight.
 - Flight 2 was another engineering flight.
 - NASA-JSC 3 months of thermal/vacuum testing
 - Flight 3 was successful (E. Wright thesis)
 - Flight 4 was a balloon break at 50K ft.
 - Flight 5 Source detection made and maps created



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



8 TONE COMMANDS
56K bits TM
N SLIT PHOTOMETER
E PROM ROUTINES
8K UPLINK

TELETYPE MACHINE FOR
QUICK LOOK GONDOLA DATA
SCIENCE DATA LIMITED DISPLAY
FLIGHT DATA ON TAPES
PDP 11 FOR DATA RECORDING
FILM CAMERA FOR POINTING CONF.

27 MAY 2009

FLYING BLIND WITH
DETERMINATION

G. NYSTROM/F. LICATA



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



FLIGHTS 6 - 19

TO IMPROVE PERFORMANCE AND RELIABILITY, THE PAYLOAD SERVO SYSTEMS WERE REDESIGNED, ELECTONICS AND CABLES REBUILT WITH AN INTENSIFIED CCD CAMERA INSTALLED FOR ACTIVE POINTING CONTROL AND VERIFICATION.

FLIGHTS:	14
SUCCESSFUL FLTS:	11
BALLOON BREAKS:	2
REEFING SLEEVE:	1

THE PROGRAM WAS TERMINATED IN 1989 BECAUSE FLIGHT RELIABILITY WAS DETERMINED TO BE UNACCEPTABLE.



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



ROUNDING UP THE RECOVERY TEAM



BALLOON ATTACHED

27 MAY 2009



GREAT LANDING

FLYING BLIND WITH
DETERMINATION



EASY RECOVERY

G. NYSTROM/F. LICATA



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



ACCOMPLISHMENTS

6 PHD THESES-FAZIO

E. L. WRIGHT (H)
M. STIER (H)
D. JAFFE (H)
S. ODENWALD (H)
D. HEARN (H)
S. CAVRAK, Jr. (H)

OTHER BALLOON PHD THESES

L. O'LOCHRAINN (D-McBREEN)
J. BRASUNAS (CFA-TRAUB)
J. HOFFMAN (CFA-HELMKEN)

PUBLICATIONS (59)

ASTRONOMY 42
INSTRUMENTATION 6
ATMOSPHERIC 11

VISITING SCIENCE PROGRAM

B. McBREEN (D)
T. N. RENGARAJAN (TIFR-INDIA)

GUEST INSTRUMENTS

4 COLOR BOLOMETER-G. VIANA
FIRS-W. TRAUB
POLARIMETER- G.CHENIN
MULTI-COLOR BOLOMETER
K. SHIVANANDAN



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



OBSERVATIONS CONDUCTED

ASTRONOMICAL SOURCES

ORION NEBULA	W42	M17
M43	M16	NGC 6334
W3	M17	IR12.4=0.5
Rho Oph	M17 SW Mol Cld	RCW122
URANUS, NEPTUNE	MGC 6357	NGC 6334
CERES	RCrA	G351-1.3
M20	W28	NGC6334 (V)
M82	GALACTIC CENTER	CYGNUS-X
M8, M8E	W33	W31
W51	IRC+10216 (SIZE AND SPECTRUM)	
(DR-6,7,22,15)		

SEVERAL MAPPED FOR THE FIRST TIME IN THE FAR-INFARRED

27 MAY 2009

FLYING BLIND WITH
DETERMINATION

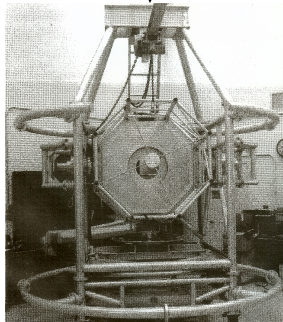
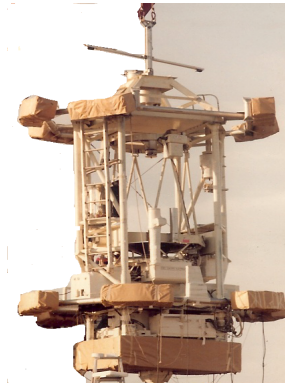
G. NYSTROM/F. LICATA



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



OFF SPRING (TECHNOLOGY EXCHANGES)



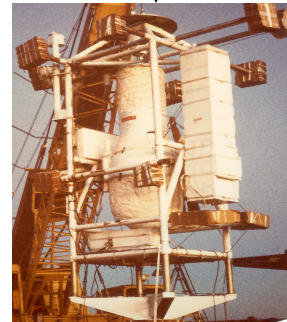
R. SIVERBERG
NASA-GSFC

27 MAY 2009



D. RUST
JHAPL

FLYING BLIND WITH
DETERMINATION



J. GRINDLAY
HCO

G. NYSTROM/F. LICATA



T. N. RENGARAJAN
(TIFR-INDIA)



50 YEARS OF ASTROPHYSICS GIOVANNI FAZIO



THE TELESCOPE DEVELOPMENT WAS FUNDED BY HCO (L. GOLDBERG)
AND SAO (F. WHIPPLE) UP TO AND INCLUDING THE TESTING
CONDUCTED AT NASA-JOHNSON SPACE FLIGHT CENTER.

NASA CONTINUED THE FUNDING STARTING WITH THE THIRD FLIGHT.

TWO IMPORTANT POINTS TO REMEMBER ARE:

1. MANY CURRENT SPACE SCIENTISTS AND PI'S DEVELOP THEIR SKILLS FROM BALLOON-BORNE SCIENCE MISSIONS.
2. BALLOON ASTRONOMY IS AN EXCELLENT MEANS FOR DEVELOPING AND TESTING INSTRUMENTATION FOR SPACE EXPERIMENTS.