

X-Ray Astronomy Discovery Experiments, III

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ABSTRACT

X-Ray Astronomy Discovery Experiments, III* P.C. FISHER, Ruffner Associates, LTD — The first paper established the existence of concurrent discovery experiments by Riccardo Giacconi and myself at the start of x-ray astronomy.^{1,2,3} Paper II ⁴ described some acts by some individuals/institutions over four decades that may have caused the illusion that I had not made a discovery. Some additional data about this illusion, and the first possible measurement of x-ray emission from a black hole, will be presented. This paper's primary goal is for the American Physical Society to have Giacconi comment on several questions of a historical nature.

*Work supported by NASA contracts NAS5-1174 and NASw-909, the Lockheed Independent Research Program, and Ruffner Associates.

¹R. Giacconi *et al.*, Phys. Rev. Lett. **9**, 439 (1962).

²P. C. Fisher *et al.*, *Quasars and High Energy Astronomy including Proceedings of the 2nd Texas Symposium on Relativistic Astrophysics 15 - 19 December 1964* (K. N. Douglas *et. al.*, eds.) Gordon and Breach Science Publishers, New York, p. 253 (1969).

³P. C. Fisher, BAPS **53** No. 2, 165 (2008).

⁴P.C. Fisher, <http://www.aps.org/units/fhp/index.cfm> plus FHP link to April 2009 presentation H14.00006.

Published in BAPS **56** No. 4, 168 (2011).

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This talk is dedicated to a chap who passed away last year named Allan Sandage.

I have to read fairly closely because the paper was written with the aid of a trial lawyer. The first paper on the subject had two purposes: 1) to remind people of a successful discovery experiment I announced in a meeting in December 1964; and 2) to help shield physicists and their families from an American Institute of Physics (AIP) that could be misled or deceived. Although unpublished, a copy of the handout for that talk is archived at the Center for History of Physics. The purpose of the second paper was to briefly describe the discovery that I made and tabulate the behavior of some AIP members over forty years of time. The goal of that was to have the AIP require members to properly credit contributions of others.

That talk was published. The primary goal of the present paper is for the American Physical Society, the APS, to have Riccardo Giacconi comment on several questions of a historical nature.

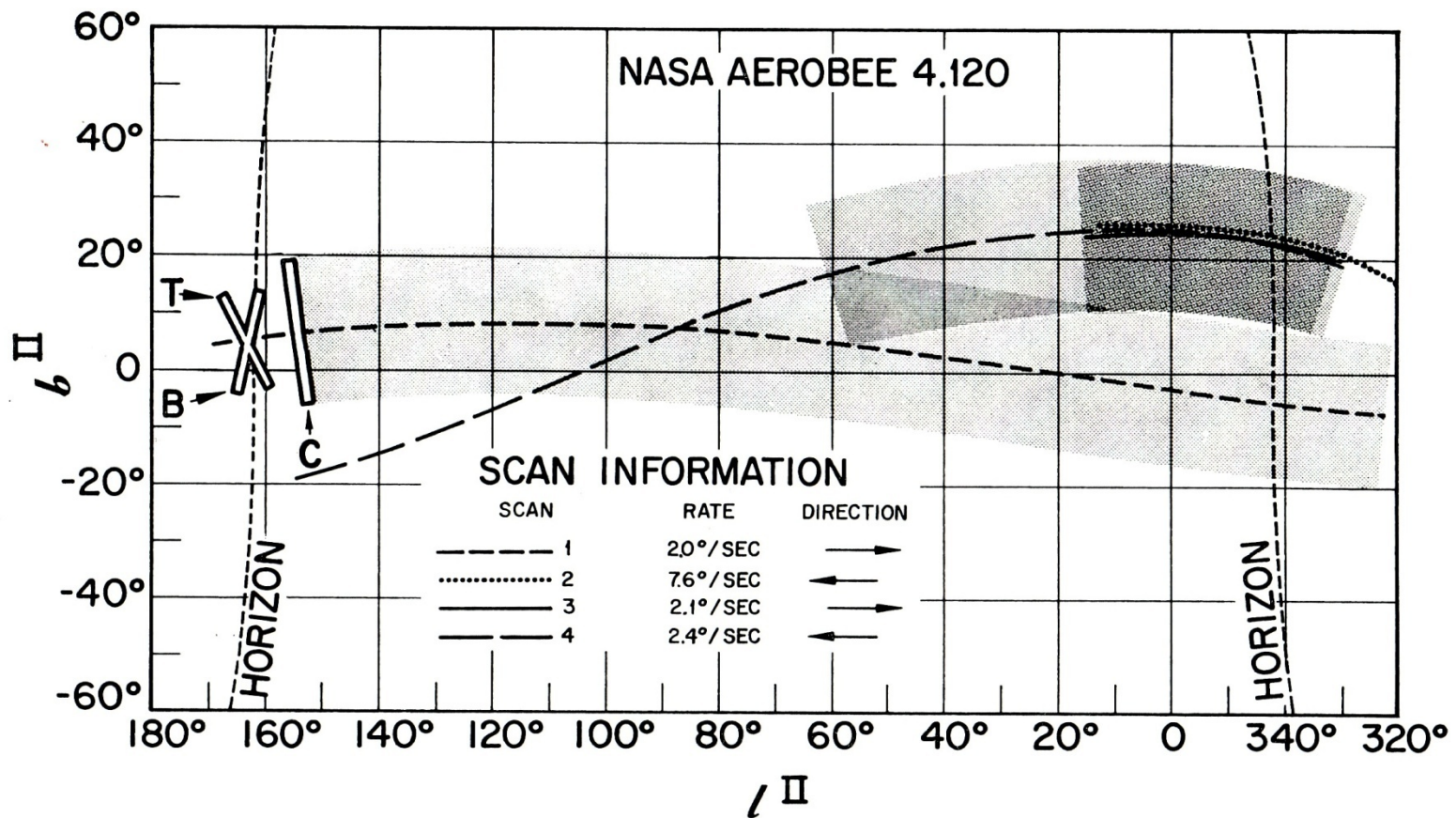
The delivery time of the talk is divided about equally between a brief history of the start x-ray astronomy and the questions for Giacconi. (If I fumble a little, I should say when I gave the last talk, I didn't know what I said for the middle ten minutes). The paper is concerned with possible unethical behavior, apparently not recognized by member societies of the AIP, and what seems to be the first unambiguous observation of x-ray emission from a black hole. The colored vu-graph at the end of the talk is a pictorial description of the present situation.

In August 1960 the Lockheed Missiles and Space Company (Lockheed) submitted an unsolicited proposal to NASA to search for x-ray emission from previously unobserved sources in the night sky. NASA replied that they could not support the proposed effort. In December 1960, Lockheed submitted a second proposal to NASA requesting permission for rocket-mounted detectors to “scan along the galactic equator in the direction of the galactic center” and also look at the Crab Nebula [1]. Herb Friedman (an obvious competitor) of the U. S. Naval Research Laboratory, the USNRL, and Leo Goldberg, then head of the Smithsonian Astrophysical Observatory, were asked to recommend that Nancy Roman’s office of NASA fund the effort. My only independent proof of these review requests is a 26 November 1963 letter from Roman [2] indirectly suggesting Friedman did act as requested.

NASA divided the proposed effort into two phases: 1) a learning exercise with spinning rockets; and 2) a performance phase involving the requested, but not yet available, slowly rolling attitude controlled rockets. Funds for the first phase were awarded [3] about a half year before Giacconi of American Science and Engineering (ASE) and associates discovered the first x-ray source (Sco-X1) in June of 1962 [4]. In May 1963, the USNRL observed Sco-X1 and the Crab Nebula [5].

Results from Lockheed's spinning rockets were published [6], criticized by Stewart Bowyer of the USNRL [7] in an article in the *Astrophysical Journal* with an editor whose name you probably are familiar with, and withdrawn [8] because of poor statistics of x-ray source signals as Bowyer claimed and a non-understood but variable background whose existence had taken over a year to identify. So the Lockheed x-ray group was in disgrace.

One month after the second Lockheed phase was funded (still having the jitters of the preceding time), in June 1964 Friedman and associates flew another spinning rocket and discovered eight new sources, all at low galactic latitude [9]. In December 1964, Willard Jordan, Arthur Meyerott and I [10] presented preliminary results of our first (October 1964) attitude-controlled rocket flight. This vu-graph (one) presents a galactic coordinate plot, galactic equator being the (long central) horizontal line, for the observing program of said flight, which was established when the only sources known to exist were Sco-X1 up here and the Crab Nebula which is over here. Vu-graph two shows the counting rate of one detector as it was scanned along the galactic equator.

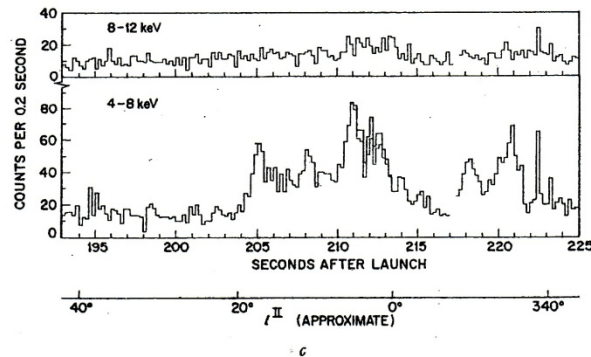
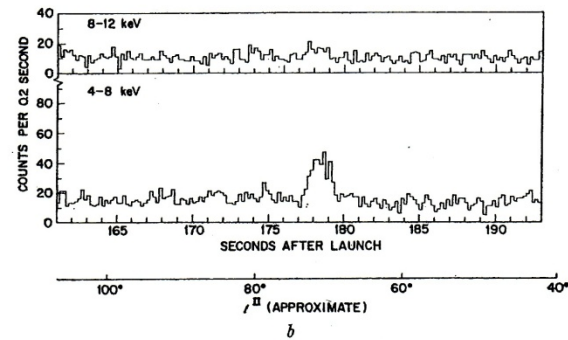
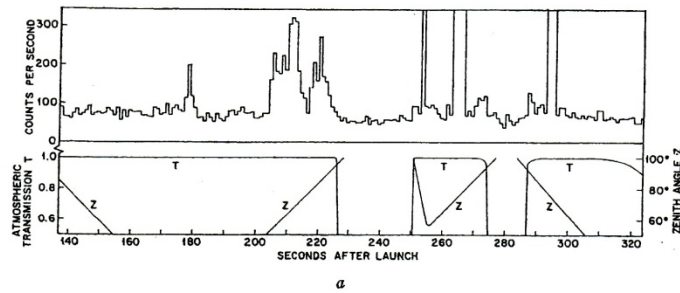


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(Revised 1964 figure of Fisher, Jordan and Meyerott in reference 10.)

vu-graph 1

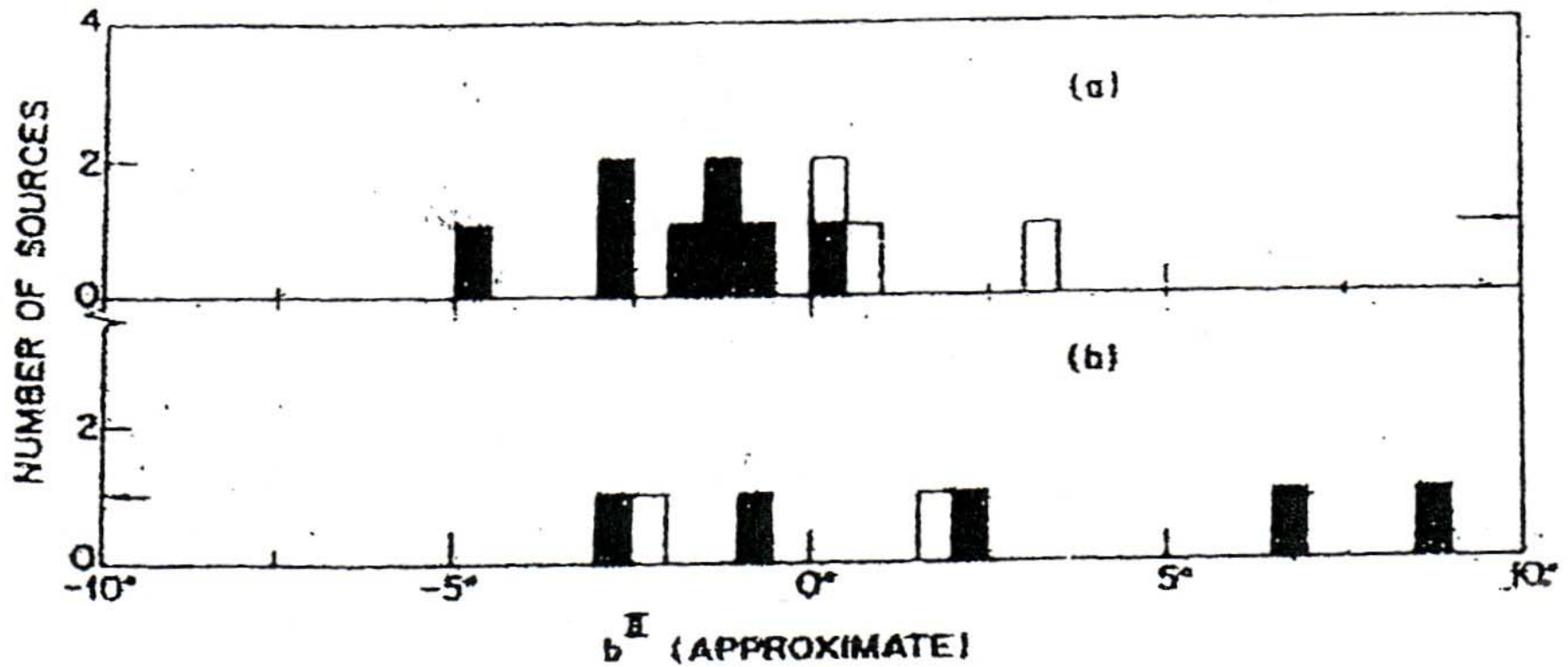


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vu-graph 2

The observations of Sco-X1, which are the off-scale readings were suggested by consultants Geoff Burbidge and Willy Fowler on the grounds that if we made the galactic equator observations and saw something nobody would believe us if we didn't see something somebody else had seen.

The second rocket flight was made because two of the three counters (of the first flight) failed, so the second rocket flight was used to get the missing galactic latitude information. The next vu-graph (three) shows a histogram of the number of sources (excluding a source in Cygnus) versus latitude of what we had found on the two rocket flights. The final results of each of the two rocket flights were published in individual articles in 1966 [11,12]. This vu-graph (three) is from an article published in 1968 [13]. The experiment presented a discovery that was concurrent with the discovery of Sco-X1 because the experiment was started before the discovery of Sco-X1.



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vu-graph 3

The discovery is believed to outrank the discovery of Sco-X1 in scientific importance because of the results we found, and (the fact that) they were postulated before Sco-X1 was discovered.

The first international discussion of x-ray astronomy results occurred at the 1967 International Astronomical Union, the IAU, meeting [14]. In an invited review of surveys, Friedman gave incomplete and misleading data [15] when he said Lockheed examined limited regions of the sky but did not say that the examination started with a scan for sources at low galactic latitudes for a hundred eighty degree range of longitude. Friedman further minimized Lockheed's efforts by failing to mention that Lockheed had flown the first x-ray astronomy satellite experiment, which had yielded no data because of unsuccessful attempts to correct the tumbling of the vehicle and the resultant failure of the vehicle's power supply.

Next, Giacconi in an invited review on x-ray sources [16], was tragically misleading because he did not mention he and his co-authors prior republication [17] of Lockheed's first flight results when he described the galactic equator survey performed by his group with an observing program essentially identical to that in the first Lockheed article published one year earlier. Giacconi did not reference that effort or provide a literature reference for Lockheed's second publication whose position results he presented.

The next vu-graphs (four a and four b) are from a cover letter [18] for an article presenting the final results of our seven years of efforts at performing this galactic equator survey. The letter was only sent to I think eleven people and you can see one of these people was the sitting president of the American Astronomical Society, the AAS.

Lockheed
PALO ALTO
RESEARCH
LABORATORY

3251 HANOVER STREET • PALO ALTO, CALIFORNIA • 94304

July 28, 1967

Dear

This is a private communication and is being forwarded only to the individuals listed below; primarily to inform them of past activities of some X-ray observers at Lockheed in Palo Alto. My personal opinion is that disclosure of the contents of this communication prior to September 1, 1967 is not in the best interests of any of the individuals listed, or of the manuscript's authors. However, a knowledge of these data may be of some use.

Preprints sent on 28 July to:

G. R. Burbidge
W. A. Fowler
L. Goldberg
J. E. Kupperian, Jr.
N. G. Roman
B. Rossi
A. Sandage
A. E. Whitford

Preprints to be sent after acknowledging Ap. J. postcard to:

H. Friedman
R. Giacconi
H. M. Johnson

Sincerely,

Philip C. Fisher

Philip C. Fisher

PCF/cj

LOCKHEED MISSILES & SPACE COMPANY • A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION

vu-graph 4a

Dear

This is a private communication and is being forwarded only to the individuals listed below; primarily to inform them of past activities of some X-ray observers at Lockheed in Palo Alto. My personal opinion is that disclosure of the contents of this communication prior to September 1, 1967 is not in the best interests of any of the individuals listed, or of the manuscript's authors. However, a knowledge of these data may be of some use.

Preprints sent on 28 July to:

G. R. Burbidge *consultant*
W. A. Fowler *consultant*
L. Goldberg *IAU commission 44 president*
J. E. Kupperian, Jr. *provide NASA rocket*
N. G. Roman *review proposals provide #*
B. Rossi *competitor*
A. Sandage *knowledgeable observer*
A. E. Whitford *sitting AAS president*

Preprints to be sent after acknowledging Ap. J. postcard to *competitors*

H. Friedman *organizer of IAU meeting*
R. Giacconi *x-ray astronomy*
H. M. Johnson *former Lockheed x-ray group member and organizer of IAU meeting on x-ray astronomy*

Sincerely,

Philip C. Fisher

Philip C. Fisher

PCF/cj

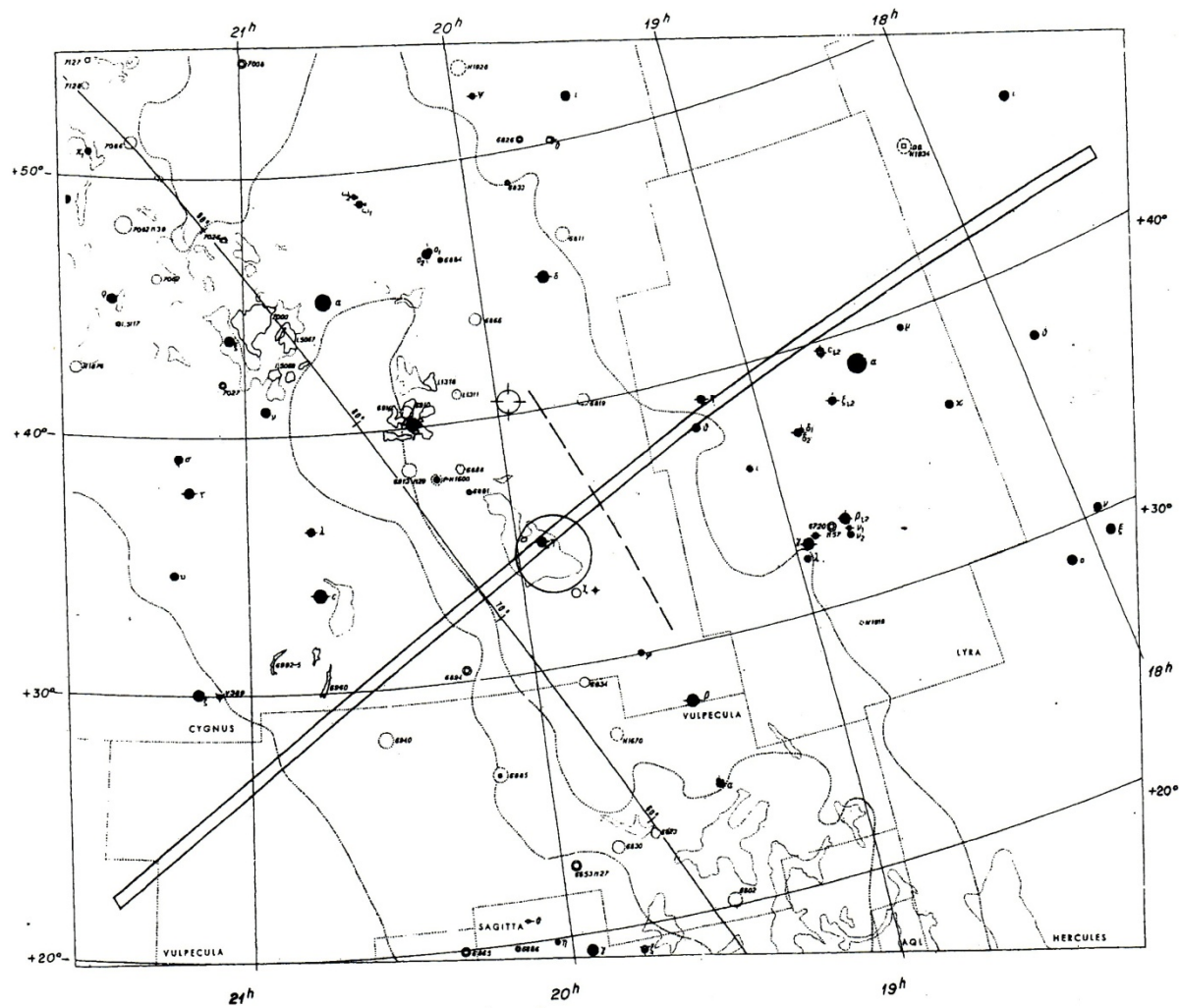
LOCKHEED MISSILES & SPACE COMPANY - A SPACE DIVISION OF LOCKHEED AIRCRAFT CORPORATION

vu-graph 4b

The three publications just noted [11, 12, and 17] plus the preprint [13] with the cover letter provide four reasons that establish that the misleading of the IAU audience was done with the full knowledge of the Lockheed effort and so appears to have been intentional. I've tried to correct the misleading account a number of times over more than twenty years, but have not been successful. The knowledge of Lockheed's pre Sco X-1 discovery proposal is not needed to question whether Giacconi's action amounted to plagiarism.

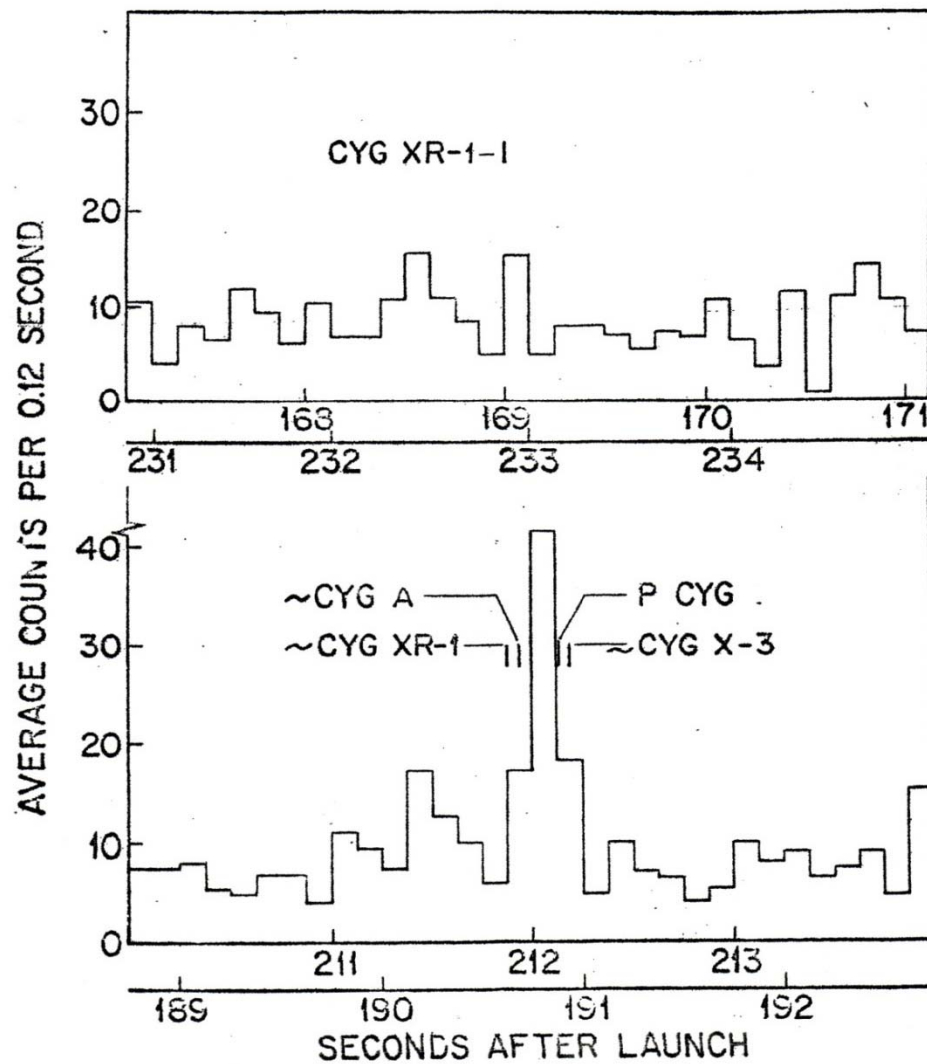
Incomplete and probably misleading information about the existence and location of x-ray sources authored or co-authored by Giacconi was presented in publications of 1967 [19], 1970 [20], and 1985 [21]. Paper two of this set [22], presented a table as I mentioned (describing) the actions of many people.

The second subject of this paper is evidence related to the existence of a black hole. The next vu-graph (five) shows position information obtained in 1964 by the USNRL [9], and by Lockheed [11]. The circle is the position error for the USNRL data and the rectangle is the position error for the Lockheed data. Together these were used, combined, to secure a better source location, and then the results of the first spinning rocket flight were re-examined. The results here (vu-graph six) are the data of that re-examination. The bottom set of data presents the average of data from three successful spins of the rolling rocket, and this is the proper full width at half max for a signal. The top (set of data) shows a background from one spin of the rocket. (These data were taken when) the source was at a large off axis (collimator) angle and at a low altitude where the x-rays might have been absorbed (by the earth's atmosphere).



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vu-graph 5



NASA Aerobee 4.69 Data of 1962 September 30
vu-graph 6

This appears to be the first unambiguous observation of (x-ray emission from) a black hole, as Cygnus XR-1 is claimed to be. I do not have the original 1962 telemetry record, so I cannot prove to you that I made no mistake in the reduction of the data.

The evaluation of the historical data available to me leaves numerous questions unanswered. Starting with the 1967 IAU meeting, my experience was that stealing and misleading the scientific community were either not recognized by the AIP or were acceptable behavior for AIP members. Some related institutions may also have knowingly permitted stealing. In 1991, the APS adopted a code of ethics [23] that made stealing and misleading unacceptable. In publications in 2002 [24] and 2005 [25] Giacconi appears to have violated the APS code of ethics. I may not have time, but there are nineteen questions (to ask). Questions fifteen, sixteen, and seventeen are related to said violations. Whether or not Giacconi engaged in plagiarism is still to be resolved.

Additional details are available.

The main purpose of this talk is to have the APS provide Giacconi a forum to comment on the nineteen related questions. As time is short, if I could have gone twenty four minutes I could have read half of them, but I still couldn't have read all of them.

Confusion about the existence of Lockheed's discovery has lead to a knowledgeable expert like Michael Turner publishing an inaccurate appraisal about significant contributions to the start of x-ray astronomy [26]. From my comments so far, and the questions for Giacconi, Michael Turner's confusion was understandable. It is my hope that knowledge of the possibilities of Giacconi's plagiarism and misrepresentation will receive (limited) notice outside the physics/ astrophysics community until he has a chance to publish the answers to the questions that have been prepared.

I hearby call on Giacconi to set the record straight. Since I don't have time to read the questions, I will comment that I have copies of this talk which contain the nineteen questions.

An accurate description of the present situation is contained in the next vu-graph (eight). This is a painting by Francisco Goya, called the “The Third of May, 1808”. I have one that has the title up here but it is just called “the price of success”. The explanation of this story is that on the second of May, Napoleon Bonaparte arranged a revolution in Spain. This revolution of the second of May was successful. On the third of May, Napoleoan had all of the successful revolutionaries killed, including the leader who was the man in the white shirt. I think I know how he felt. Any Questions?



Figure 15A Copy of a painting by Francisco Goya entitled "Third of May, 1808". Positive identification has been made of a number of individuals/institutions in the firing squad on the right hand side of the picture, if the painting can be used to pictorially paraphrase the author's experience.

Figure reprinted from 26 December 2004 proposal of Ruffner Associates, LTD.

vu-graph 8

1. What journal are we talking about for the data (verifying the accusations)? These were in the Astrophysical Journal and talks in the proceedings of the IAU in 1967, also in 1969, and the questions listed for Giacconi . These answer the question you just asked. It's all a matter of I haven't said anything you can't document, or that I haven't documented [including 3, 10, 11, 12, 13, 16, 17, 18, 19, 20, 30, 31, 34, and 35]. It's taken me five years to do this.
2. Could you repeat please, where you said about Fowler and Burbidge? I couldn't hear (precisely) what you said but they were consultants of mine. (Their response to my situation was that) they encouraged me to go look for Sco X-1 or the Crab Nebula. I had submitted a proposal to scan along the galactic equator. Their concern was since we had just withdrawn a paper from the Astrophysical Journal, it made not only us look like a fool, but Chandrasekhar, the editor, look like a fool. Their comment was if you can't see something that somebody else has seen, nobody will believe anything else you saw.

3. Partially intelligible question. You are correct, and that's why I said at the beginning this paper was written with the help of a trial lawyer, as the preceding paper was written as I have written papers that have been rejected over the last ten or fifteen years, all with the help of a trial lawyer.
4. Partially intelligible question. Pardon, well, in one case I wrote, ah, the date is in here, I wrote the Council of the American Astronomical Society on a date given (2 December 1998). I wrote them several times, never got any reply. The last manuscript I wrote got turned down by some journal called Physics Today. That was in 2002 or 2004.
5. I have sent copies of the manuscripts to the Governing Board of the AIP. Now it's in their hands. I would have liked to have read half the questions, because the story would have been much more straight forward to understand.

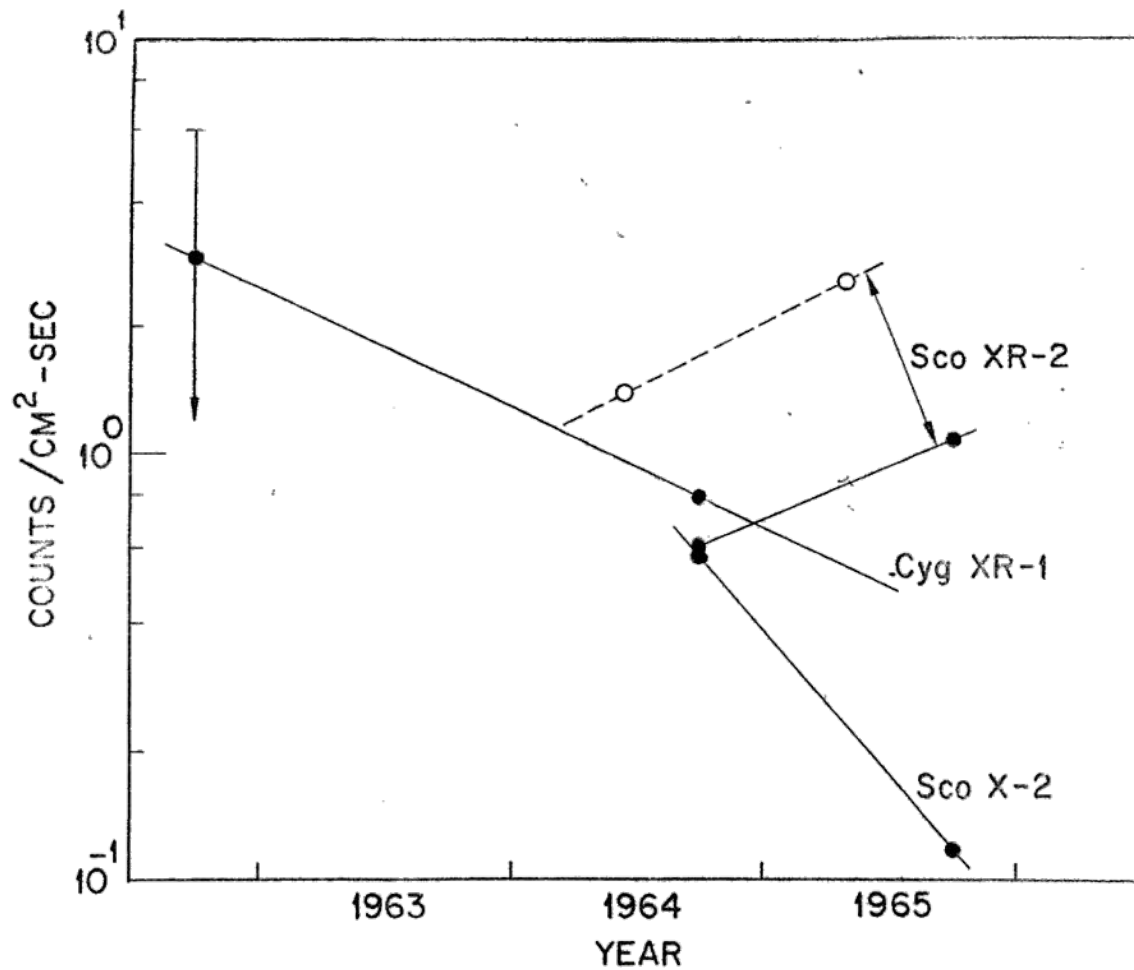
Notes added in proof.

A. In the edited text, some of the words or phrases in () have been added to make the text more clearly understood. Confusion was especially significant in the author's answer to question two concerning Burbidge and Fowler.

B. The talk went unexpectedly slowly so that two sentences about the flux of Cygnus XR-1 and its value on the rocket flights of 1962 and 1964 (see vu-graph seven) were abstracted from the talk handout (which is to be archived at the Center for History of Physics). Also omitted from the verbal comments was the remark that the unpublished data for vu-graphs six and seven were plotted in 1965 and should be considered of a preliminary nature.

C. The nineteen questions for Giacconi were also abstracted from the talk handout.

QUESTIONS



Lockheed and USNRL Data for Several Sources

vu-graph 7

1. Do you recognize the scientific difference in using a spinning rocket with detectors that can scan all sources in the available sky at a particular epoch as compared to using an attitude-controlled rocket with detectors that can scan only selected regions of sky at a given epoch?
2. At the 1967 IAU discussion on x-ray astronomy you described a galactic equator survey performed by ASE [16] that was essentially identical to a survey announced by Lockheed at a meeting three years earlier (with the announcement being eventually published [10]). The Lockheed results were described in detail in an article [11] published one year before your lecture and summarized by you and seven coauthors at a one year earlier meeting in 1965 [17].

However you did not mention the nature of the twice published by Lockheed effort or those results, or give a literature reference to them in the publication of your lecture even though you yourself presented data from an unreferenced second Lockheed flight [12]. In your mind, how does your behavior differ from plagiarism?

3. In your IAU lecture just referenced, you gave position results from Lockheed's second attitude-controlled rocket flight [12] which scanned only about one third the galactic longitude range of the first flight. Did you realize the audience or lecture reader would not understand that Lockheed's first flight had performed a more extensive survey by scanning a much larger range of longitude than the Lockheed flight for which you presented data but did not give a literature reference?

4. Although both you and Friedman appear to have misled the 1967 IAU x-ray astronomy audience by ignoring Lockheed data in three publications and a just delivered preprint, probably at least Leo Goldberg explained the misleading to the IAU Executive Committee [27] which violated normal procedure and within a few days made Fisher a member of the IAU, but let the misunderstanding you and Friedman created go uncorrected. Did you know their action re Fisher's membership was publicly posted on the last day of the meeting [28]?
5. What is your guess as to why the Executive Committee accepted Fisher as an IAU member and left the x-ray astronomy audience misinformed about the Lockheed effort?

6. Did you realize that Hugh Johnson's presence at the meeting as an organizer and member of Lockheed coupled with Fisher's absence might have caused x-ray astronomy audience members and meeting proceeding readers to believe that Johnson was the scientific leader of the Lockheed x-ray group [29]?
7. Eight years later, in a private conversation [30], A.E. Whitford the sitting president of the AAS at the time of the 1967 IAU meeting, admitted to Fisher that he recognized Fisher's discovery investigation was being stolen at the IAU meeting when it occurred. He gave Fisher the two reasons why he chose not to intervene. Did Whitford ever say anything to you about Fisher's discovery investigation being stolen?

8. In a 1967 *Astrophys. J.* paper [19] submitted about the same day as your IAU talk, you and two co-authors wrote that “the prevalence of sources on or near the Milky Way is a well established feature” but you gave no names of the scientists responsible for establishing this feature. Will you please now give the names of the scientific leaders of the x-ray groups that made the necessary measurements to gain this understanding, the sequence in time of these measurements, and whether spinning or attitude-controlled rockets were used for each measurement?
9. In the *Astrophys. J.* paper just referred to you, referenced the first detailed Lockheed publication [11] that you had omitted from your IAU talk, but your plot of source positions gave data from Lockheed’s second attitude-controlled rocket flight [12] and omitted the Lockheed measurement in Cygnus from the first flight that established the large longitude range of the Lockheed survey.

Since you had included the USNRL Cygnus data in a previous publication [17] did you realize that failure to include the Lockheed datum would mislead your reader about the range of galactic longitude examined on Lockheed's first attitude-controlled rocket flight?

10. At the second IAU meeting on x-ray astronomy, in describing the galactic distribution of x-ray sources [20] you referenced your previous survey described in the 1967 IAU and Astrophys. J. articles noted in the proceeding two questions. You also noted the Cepheus-Lacerta sources found by the USNRL and gave a reference for the USNRL work [31]. You did not state to your audience or lecture reader: 1) that the USNRL work referenced gave a detailed comparison of USNRL results in 1964 and 1965 to the 1964 discovery flight results of Lockheed you may have plagiarized at the 1967 IAU meeting;

and 2) four publications of the Lockheed discovery data [11, 12, 13, 17] that now existed. Although following the USNRL literature reference would lead to your plus coauthors summary of the original detailed Lockheed publication [17], any member of the listening audience or lecture reader would have to wait for the meeting proceedings to be published and search references before the original Lockheed publication could be found. In your mind did your behavior amount to misleading, or plagiarism, or something else?

11. If you had made a mistake in one or more of your 1967 and 1969 invited IAU lectures or the 1967 Astrophys. J. paper you had coauthored, who would have been responsible for seeing the mistake(s) corrected?

12. In particular, since you were well placed in ASE, who was the chairman of the board of ASE in each of the years 1966, 1967, 1968, and 1969?
13. In 1974 you and Herbert Gursky were co-editors of a book titled *X-Ray Astronomy*. Did you realize that Gursky and Daniel Schwartz [32] published a false statement in that book to the effect that the 1964 Lockheed survey was performed from a spinning rocket (and so could not have been a discovery experiment)?
14. In 1985 Wallace Tucker and you published a book advertised as describing the ASE effort [21]. But you gratuitously listed the Crab Nebula occultation experiment performed by the USNRL [33] and only the engineering-type accomplishment of Lockheed who introduced slowly rolling rockets to scan selected regions for x-ray sources.

Did you realize you misled your readers by noting the significant Crab Nebula scientific measurement of USNRL but not noting the five times published [10, 11, 12, 13, 17] scientific discovery experiment of Lockheed concerning the approximate location in the galaxy of the apparently brightest x-ray sources?

15. When you gave your Nobel Prize acceptance lecture [24], you stated that after the discovery of Sco X-1 “the NRL group and the Lockheed group continued mostly broad surveys”. This contrasts with 1) the low galactic latitude part of the sky where sources were discovered by Lockheed and described in five publications; and 2), annual listings for Fisher in the Marquis publication *Who's Who in America* from 1997 to 2004 [34].

That listing gave the 1960 Lockheed pre Sco X-1 discovery postulate that the apparently brightest x-ray sources would lie in the galaxy and at low galactic latitude and noted the postulate had been experimentally verified. Did you realize you misled your audience about the published purpose and success of the Lockheed effort?

16. In your 2002 Nobel Prize lecture you referenced a thesis by Richard Hirsh [3]. Did you realize that although he quoted from the December 1960 Lockheed proposal Hirsh failed to recognize the discovery nature of the proposal (see page 88 of his thesis) or the success of the discovery experiment (see page 153 of his thesis)? (After your Nobel Prize acceptance lecture, the Marquis publication listing appeared in *Who's Who in the World* [35], the first proof of the listing having been requested eleven years earlier, in 1994.)

17. Did you know that your most recent misleading statement was in a 2005 invited paper [25] that said the discovery of Sco X-1 “stimulatedrenewed observation efforts” at Lockheed, when Lockheed was actually continuing the program proposed to NASA before your discovery of Sco X-1?
18. Considering the preceding questions and your answers, do you now believe that Lockheed performed a discovery experiment that was at the least concurrent with the discovery of Sco X-1?
19. Considering the preceding questions, your answers, and that Lockheed postulated the existence and location of the apparently brightest x-ray sources before you and your associates discovered Sco X-1, do you now believe that Lockheed’s discovery experiment was superior scientifically to the discovery of Sco X-1?

D. Numbers in [] represent references in the handout for the talk.

E. The original (unedited) transcript was prepared by Christa Poe, Administrative Services for Hire, Vacaville, California.

F. The proper title of Goya's painting in vu-graph 8 is "The Third of May, 1808."

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