Parking Information

Afternoon Retrospective

Parking is available on a "space-available" basis in the West Garage Annex (north side of Vassar Street, just west of the West Garage). State you are attending the ClarkFete.

Evening Dinner at the Hyatt

Reduced rate parking will be available at the Hyatt Regency Garage. Parking validation stickers will be available at the dinner.

There is limited street parking on Vassar Street.

Parking in any MIT open (non-gated) lot is available after 5:00pm. Open lots closest to the Hyatt are Kresge Lot and West Garage Annex.

If you have a MIT parking permit, the West Lot has a gate which can be accessed with a MIT Parking ID. This lot is on the north side of Vassar Street across from the Westgate Lot.

A ClarkFete

You are cordially invited to

a Retrospective and a Dinner

honoring

PROFESSOR GEORGE W. CLARK

upon his retirement

to be held at

Massachusetts Institute of Technology

and

The Hyatt Regency Cambridge

Friday, November 8, 1996

Retrospective

MIT Room 6-120
November 8, 1996
2-5pm

Dinner

The Hyatt Regency Cambridge
Empress Room
14th Floor
575 Memorial Drive
Cambridge, MA 02139
November 8, 1996

6:00 p.m.

Reception/Cash Bar
Buffet Dinner

R.S.V.P.
by October 25, 1996
by sending the enclosed form
to
Arlyn Hertz
Massachusetts Institute of Technology
Room 37-241
Cambridge, MA 02139
(617)253-1456
aph@space.mit.edu

We hope you will be able to join us!

ClarkFete Committee
Hale Bradt, Claude Canizares, Arlyn Hertz, Walter Lewin, Jonathan Woo

A Book of Letters

We plan to present George with a book of letters and photographs from his friends. Thus we are asking everyone receiving this invitation to send any appropriate photographs and to write down some thoughts and recollections of George and to mail (or email) them by October 25, 1996 to:

Arlyn Hertz
MIT Center for Space Researah
37-241
70 Vassar Street
Cambridge MA 02139-4307
aph@space.mit.edu

Your remarks can be short or extended, personal or professional in content, humorous or serious, handwritten, typed, or sent by email. The letters will have the most lasting value for George, his family, and the historical record if they include specific recollections of events that illustrate George's style, personality, creativity, accomplishments, modes of interaction, outside activities, and yes even an occasional mistake or (minor) shortcoming. We do not intend to distribute this book widely, but do intend to provide copies to attendees and to the MIT Archives for the historical record.

The ClarkFete Committee

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Cambridge, Massachusetts 02139-4307 *Room 54-422*

DEPARTMENT OF EARTH, ATMOSPHERIC, AND PLANETARY SCIENCES

November 5, 1996

Prof. George W. Clark
Bldg. 37-611
MIT

Dear George:

Well, it was 35 years ago this past September when I arrived at MIT as a freshman and faced you as my lecturer in 8.031 (and then again in 8.041 the following spring). You promptly shook my confidence in starting at MIT with sophomore physics—you began the first lecture by writing Maxwell's equations on the board, and said these were our "postulates". This meant to me that I really should have a thorough understanding of them in both integral and differential form before beginning the course! Fortunately, before I could submit a drop form, one of the sophomores wanted to know if I were as "snowed" as he was. Then he explained to me that whole course would be to learn Maxwell's equations. I remember these two courses as extremely challenging, but well worth the effort, because you taught us a lot of physics.

For the historical record, I have attached the syllabi for 8.031 and 8.041, as you taught them during the academic year 1961-62. Things have changed, and I'm not sure that all the change has been for the better. What's not on the syllabi is that we had three hours of lab per week in each of those courses, as well as in freshman physics and freshman chemistry (two terms in those days). Having problems due twice a week may not be necessary (but I remember recitation attendance being better then), and having the first term extend after the winter holidays really was a bummer!

Thanks from one of your former students for teaching such great physics courses!

Yours truly,

Jim Elliot

Jim Elliot

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

ASSIGNMENTS — PHYSICS 8.031 — FALL TERM, 1961-62

Week of:	Lecture	Text Assignments in addition to Notes	Problems Due: Tuesday	Thursday
Sept 18	1	Notes only	---	3.2,3.3,3.4a
" 25	2	Secs 2.1,2.2; 3.1,3.2,3.5	2.2;3.6,3.23	1.1,1.2; 2.4
	3	1.4; 2.3		
Oct 2	4	1.2,1.3,2.4	1.7;2.6;3.9	Spec Problems #1,2; 2.8
	5	3.6; 1.5		
Oct 9	6	3.3,3.4; 2.5	2.9,2.11;3.12 3.14, 3.16, 3.17	H O L I D A Y
	7	4.1, 4.2		
" 16	8	4.3,4.4,4.5	3.18,3.19, 3.21;4.3, 4.4,4.7	4.10,4.15,4.16 4.18,4.20,4.21
	9	5.1,5.2,5.3,5.4		
" 23	10	5.5,5.6,5.7	5.1,5.3,5.8, 5.19,5.22	Review Problems #1,2,3,4
	11	Review		
Oct 30	QUIZ #1	---	QUIZ Discussion	5.24,5.34,5.42; 6.1
	12	6.1		
Nov 6	13	6.3,6.4; 7.1	6.2,6.5,6.12	6.13,6.26; 7.9,7.15
	14	Notes		
Nov 13	15	7.2,7.3,7.4,6.2	7.16,7.17, 7.22,7.28	Spec.Prob #3; 8.4
	16	8.1,8.2		
Nov 20	17	8.3	8.10,8.15,8.16 8.24	H O L I D A Y
	18	8.4		
Nov 27	19	9.1,~~9.3,9.4~~,9.6 9.2 9.3	9.3,9.4,9.5 9.36	Review Problems #5,6,7,8
	20	Review		
Dec 4	QUIZ #2	---	QUIZ Discussion	13.1,13.2,13.3
	21	13.1,13.2,13.3		
Dec 11	22	13.4,13.5,13.6	13.8,13.14, 13.23	14.1,14.2,14.4
	23	14.1,14.2,14.3, 14.4		
Dec 18	24	14.5	14.6,14.10, 14.13	H O L I D A Y
	25	14.6,14.7		
Jan 1	---	H O L I D A Y	HOLIDAY	14.6,14.10,14.13 Review Problems
	26	Review		
Jan 8	QUIZ #3	---	QUIZ Discussion	10.1,10.2,10.4, 10.5,10.7,10.8
	27	10.1,10.2		
Jan 15	28	10.3,10.4	Rev.Problems #9,10,11,12; 10.10, 10.11	---
	29	Review		

Lectures: Mon+Wed, 1-2, 2-3 pm. Room 26-100.
QUIZZES: Oct 30; Dec 4; Jan 8. (5 pm) Rooms to be announced.
TEXT: Frank: "Introduction to Electricity and Optics" - 2nd Ed.
Undergraduate Office: Room 4-356. Ext.4841. (Mrs.Thomas)

Professor G.W.Clark, in charge
Office: Room 26-447, Ext 3170

Professor R. W. Bauer, Administrator
Office: Room 6-101, Ext 4853

Kendall 2-337

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

ASSIGNMENTS PHYSICS 8.041 Spring Term, 1961-1962

Week of:	Lecture	Text* Assignments	Problems due: Tuesday	Thursday
Feb 5	---		8.031 Exam. Discussion	Sp.Probs. #1,2,3
	1	VII: 2; Notes I		
" 12	2	Notes II	Sp.Probs.#4,5	VII: #1,2,4,5
	3	VII: 3, 4	VII: 7	
" 19	4	VIII: 12; Notes III	VII: 9; VIII:	32,33;
	5	VII: 6	Sp.Prob.#6	Holiday
" 26	6	I: 1,2,3,4	VII:14,16,19	I: 17,18,19
	7	I: 5,6; Notes IV	I: 3,8	
Mar 5	QUIZ #1	--	Quiz Discussion	I: 22,23
"	8	I: 7,8,9	I: 20,21	
" 12	9	II: 1,2,4,5	II: 3,4,29	II: 11,12,18, 19,22
	10	II: 6,7,8,10		
" 19	11	III: 1,2,3,4,5	III: 1,2,3,4, 5,6	III: 9,10,11, 12
"	12	III: 6,7		
	(Vacation - March 26 through April 1)			
April 2	13	III: 8,9	III: 13,17, 21,24	III: 32,33,34
"	14	III: 12,13,14, 15,16		
April 9	QUIZ #2	--	Quiz Discussion	IV: 1,2,3,6
"	15	IV: 1,2,3, 4	III: 35	
April 16	16	IV: 5,6,7,8	IV: 4,5,7,8	
"	17	IV: 14,15,16		Holiday
April 23	18	IV: 17,18	IV: 17,22,23, 29,32	IV: 35,36,39
"	19	VI: 1,2,3,4		
April 30	20	VI: 5,6,7	VI: 3,7,9,11	VI: 10,13; VIII: 1,2
"	21	VII: 5;VIII:1,2		
May 7	QUIZ #3		Quiz Discussion	VIII:5,6,11,12
"	22	VIII: 3,4	VIII: 3	
May 14	23	VIII: 5,6	VIII:13,15,17, 20	VIII: 27,28,29 31
"	24	VIII: 8		
May 21	25	REVIEW	IX: 3,4	

QUIZZES: 5 pm, Mondays.
#1. March 5
#2. April 9
#3. May 7
(Rooms to be announced.)

Professor G.W.Clark, Lecturer
Professor R.W.Bauer, Administrator

*Text: "OPTICS" - Rossi

Undergraduate Office: Room 4-356 (Ext 4841)

A retrospection on the occasion of George Clark's retirement, by Mark Schattenburg, Oct. 28, 1996.

The occasion of retirement is a marvelous opportunity to heap well-deserved praise, to distill the essence of character and accomplishment, and yes, to reveal endearing and embarrassing foibles. George Clark is one of the most remarkable, most influential, and most inspiring persons I know. I'll leave it to others to chronicle his many seminal academic accomplishments. Instead, I would like to share a few recollections of George from a purely personal point of view, which I hope you will enjoy.

I first met George Clark in Honolulu in 1978 when I was working through my senior year as a physics undergraduate at the University of Hawaii. The story of how this chance meeting led to my coming to MIT sheds some light on several interesting aspects of George's character. It certainly was the single most momentous event of my life. But first I must relate as to how I came to be in Hawaii in the first place, and why George was visiting there.

My father was an island boy and so I grew up there. Hawaii was home to me and my family, and we lived for a time on all the major islands as my father worked up through the American Factors sugar plantation conglomerate. Rural plantation life in those days was a different world which is now long gone; however that is for another story. From an early age I was interested in all types of technology: electronics, computers, math, chemistry, physics, machinery, space, etc. Perhaps it was the geographic and cultural isolation that encouraged long hours of tinkering and daydreaming. I remember clearly as a child watching the "artificial auroras" made by sounding rockets that were launched from the Barking Sands Missile Range near our home on the island of Kauai, and my complete fascination with space, radar, computers, and all those cool sorts of things. I was completely engrossed with this stuff and spent many happy hours playing with radio, morse code, computers, rockets, explosives ..., anything that I could get my hands on.

So naturally after high school I wanted to study Electrical Engineering. That was the coolest thing! But at the time I was reluctant to leave the islands, so I enrolled at the University of Hawaii. I didn't even bother applying anywhere else. I knew it couldn't be such a very great school, but it was convenient, so it was a compromise. Anyway, I had a wonderful time in college. I enjoyed my classes and learned a great deal, except sadly for the ones in Electrical Engineering! I couldn't believe how bad the professors were. Just putrid! Fortunately, at the same time I was really enjoying my physics classes. Physics was fun, seemed much more fundamental, and the professors were good. I realized that I had a choice of a bad engineering degree, or a good physics degree. The former was a dead end, while the latter I could build upon, so I switched majors.

Then in my sophomore year one of my physics lab teachers that I really liked, Ron Ono (who is now at NIST), described to me the work he was doing for his Ph.D. He talked about these multilayer crystals that had a 2d-spacing that was comparable to soft x-ray wavelengths. These were made and tested in the laboratory he worked in. The lab was called the Soft X-ray and Electron Spectroscopy Laboratory, and the professor was Burton Henke. Henke, as it turns out, was well known as one of the pioneers in the "soft" x-ray band (100-1000 eV) which was extremely challenging in those days. (Of course, I knew nothing of this at the time.) This all sounded very interesting, so I asked Ron for a lab tour. It was very cool stuff. They built almost everything themselves, including the x-ray tubes. Now this was real physics that I could understand, and Henke was obviously a first-rate scientist. So somehow I snagged a job in the lab programming computers, with which by then I was quite expert. I had finally found a home and completely immersed myself in the laboratory culture. These were happy years and I learned an enormous amount.

A couple of years later I found myself a senior applying to graduate schools. At this point I was quite ready to leave the islands and applied to a number of west coast and midwest schools. While I was waiting for responses to my applications I had my first encounter with George Clark, which I don't think I'll ever forget.

I was in the lab one day, as usual, when Prof. Henke came in with a visitor from MIT. I was introduced to a Professor Clark. (I knew about MIT as a kid from reading the "Time-Life" series of science books, and remember being in awe of the place.) I remember being struck by his pasty New-England-winter complexion (sorry George!), and a couple of days of stubble. (I guess he was enjoying the relaxed island lifestyle.) Burt related that I was good with computers, and that I was graduating soon. Right on the spot, George said something to the effect that "Why don't you apply to MIT? We're building an x-ray telescope, and need people who are good with computers." Now that sounded very interesting, but I knew that the deadline for MIT was long past, and told him so. He gave me a knowing look and said, "oh, don't worry about that, apply anyway." Now, this was most unusual. Why would an MIT professor be encouraging someone he had just met minutes before, a kid from a third-rate school, with Charles Manson hair and decidedly poor prospects, to be applying to MIT well after the deadline? And then to tell him "don't worry." I thought to myself, either this guy is desperate and crazy (he was kind of wild-looking anyway), or maybe he really was some kind of big cheese at MIT and thought he could get me in somehow.

(It turns out that George was in Hawaii visiting his sister who lived there, and I've always wondered if he had just popped into the lab as an excuse to bill NASA for his trip. Wouldn't that be an ironic twist! I've never had the *cojones* to ask him this, though.)

So I applied. I got into all the schools I applied to, except for Stanford, which was disappointing but not unexpected. (I did have high grades, but after all it was the University of Hawaii.) And then, to my utter amazement, I was accepted to MIT! Now I was convinced that George must truly be a towering figure at MIT, who could make a mere Department Chairman quiver, and could force the Admissions Office to accept even the most marginal applicant with a single phone call. What power! Even more amazing was a signed letter from George offering me a summer job which would pay $900/month—a staggering sum in those days. Now I had this image of George moving in the upper Pantheon of MIT, swaggering around campus in front of genuflecting administrators, his labs filled with satellites and computers and slaving graduate students whose pockets were stuffed with cash. (Some of these naive impressions would later get me into trouble.) This was too good to be true! I had to have it, and accepted immediately.

I spent the rest of the semester pestering George for copies of manuals for the advanced computers I would soon be working on (he never sent any), and as soon as I could I blew out of there for Cambridge.

It turns out that a former lab partner of mine in Henke's lab, Chris Berg, had transferred to MIT a year before, and worked in the CSR on the same project I was to be assigned to. This was really great because now I had a friend from Hawaii who had learned the ropes. He was extremely helpful getting me settled. I was to work in the group of a young professor, Claude Canizares, on an instrument called the Focal Plane Crystal Spectrometer, which was to fly on the HEAO-B satellite in a few months (later called the Einstein Observatory). George was actually the PI for the FPCS, but seemed to do very little with it, as far as I could tell, as in those days SAS-C was at its zenith which took up all his time. This turned out to be a wonderful place for me since Claude was a terrific advisor and the group was doing some very challenging work. I got to get in on the ground floor, so to speak.

Soon after getting settled, I went down to the second floor of the CSR to take care of some administrative details, and was disappointed to learn that my actual summer salary was going to be much less than the promised $900/month. It turns out that tuition was supposed to be deducted, and so George wasn't authorized to offer such a salary. This is when another amazing thing happened. George was summoned into Jack Morway's office (the CSR financial administrator at the time), and shown the letter promising me $900/month. Jack said "we can't pay him that!" George said "no, that was what he was offered, and that is what he will be paid." I don't know what trick Jack had to pull, but I got all of it.

At this point I was so awe-struck by George that I took to calling him "sir" which must have really annoyed him because he finally took me aside and said very pointedly "my name is George." I got the message.

I hope these stories reveal several remarkable aspects of George's character. First that he is a man of impeccable integrity. When he promises something, you can count on him delivering. It doesn't matter that what has been promised is impossible! Whether it is an outrageous idea like building and launching a satellite by ourselves (SAS-C), or paying a student more than is legally allowed, George will find a way.

Second is his willingness to "bend the rules" if necessary—of convention and of bureaucracy—in order to achieve his goals. Through ingenuity, integrity, force of will, and focus on the big picture, George always seems to find a way around roadblocks which would make others give up.

Third, and perhaps most important, is his ability to see and seize opportunities that others might pass by. His legacies of opportunities grabbed are legion, from his many students and CSR staffers, the professors he has mentored, to the many pathbreaking instruments the CSR has built or is in the process of building; they all bear his indelible stamp. For me personally, George saw a person of high energy and enthusiasm and realized that this made up for a relatively poor academic background. I'll always be grateful to him for seizing that particular opportunity.

Whether these qualities were handed down by his mentor Bruno Rossi or part of George's upbringing I can't tell. In any case, there is another aspect of his personality that I also greatly admire and enjoy. Despite his ivy league background and refined worldly tastes, he is the kind of guy who just loves to roll up his sleeves and do some *real* work. Give him a ladder and some roofing shingles, or an oscilloscope and a piece of laboratory apparatus, and it doesn't matter, he's happy.

These lessons learned at the feet of the master made a great impression on me, and you can observe me daily striving—sometimes imperfectly!—to reach for high goals, to seize opportunities, and to deliver what I promise. These lessons are much more important than specific details of astrophysics which have long been forgotten.

To this day, I'm still not sure if George actually pulled any strings to get me in here. You know, I don't think I really want to know the answer. For one thing, it makes for a great story. (As my grandfather says, never let the facts spoil a good story!) But more importantly, this feeling that somehow I don't really deserve to be here, and if not for George I would not have gotten into MIT and my life would have been much less interesting, has turned out to be very useful. Since I've always felt that I was somewhat out of my league here, I realized that if I just tried to muddle through or rely a flash of brilliance I would get creamed. So when I have a new problem to solve I systematically amass as many resources as I can muster, and then launch a sustained attack with full frontal assault. I'll use any trick. So far this has turned out to be a very effective strategy.

The retirement of George Clark marks the passing of a rich era at MIT, and the start of yet another. As with the retirement of Bruno Rossi some years ago, this is a bittersweet moment. Looking back on George's long and brilliant career there is much to be proud of and comment upon. Yes, all good things must come to an end and it makes me deeply sad to think about it. However, the solid foundation he leaves is allowing us to reach ever higher with a flotilla of new initiatives and powerful instruments which are already bearing fruit. A new and explosively exciting era is dawning once again in the CSR.

I thank you, George, for all you have given me. I owe you a debt of gratitude that can never be repaid. I sincerely hope that we will continue to see you in the halls of MIT for some time to come. I really enjoy our chance conversations and the occasional visits with you and Charlotte at the Vineyard. Your interest and pride in my work over these many years has meant a great deal to me, and I'll always be grateful to you for plucking me out of that laboratory in Hawaii and giving me this marvelous opportunity. I wish you and Charlotte a long, healthy, and happy retirement! *Aloha Oe* my friend!

Mark Schattenburg

We, the Bridge family, have known George for many more years than, probably, any of us care to admit to. I think some of our best recollections are of the "old" days in Colorado. The days of the Echo Lake and Mt Evans lobs. George was living in the dorm at Echo Lake, while Herb and I and our three children, ages about 7, 5 and 3 were staying at Doolittle Ranch, a few miles down the road. Our children, all now in their 50's still remember their (our) evenings with George. Many evenings he would come down to the ranch, possibly for dinner (I don't remember that detail) and would entertain them by the hour with jokes and origami. The children adored him, and, of course, Herb and I were (and not just in the past) quite fond of him ourselves.

And I know how much Herb admired him professionally for all the years they worked together.

Best Wishes, George, for success and happiness in whatever you plan for the future.

Jeanne Bridge

Dr. Richard and Elizabeth Borken

54 Aspen Road
Placitas, New Mexico 87043

phone: 505/867-8732
e-mail: 71544.1556@compuserve.com

October 7, 1996

Dear George,

It doesn't seem as if it's been almost twenty-five years since I left your group. But it was in September 1972 that you signed my Ph.D. Thesis. In fact, you signed a number of copies, and I've kept every one. I am proud to call you my advisor and friend, and I'm pleased to be able to congratulate you on your retirement.

I recall that summer well. You left at one point, and I was basically through with my research work by then. I told you that I would have the first draft done by the time you got back. It was a month later I think. You know how you get a feeling that someone really doesn't believe you? Well, I'm pretty sure you didn't think I'd get that draft done by then. It took a lot more work than either I or Liz expected. (She typed the whole thing and still talks about how poor my handwriting was.) We did in fact get it done, and I still remember handing it to you when you walked in.

I thought I was close to completion. I quickly found out that there was still a lot of work to do. Your standards are high indeed.

I first got to know you during my Junior year, as a weekend number cruncher in the lab, then my first real taste of research was when I did my undergraduate thesis under your direction. In addition to physics, I received a lot of guidance from you about clear thinking, about working with people and about written and spoken communication. Your teaching style is such that at the time I often didn't appreciate the full extent or scope of what I was being taught. But I do know now that I learned a lot from you beyond the immediate subject matter. This is truly a gift you have, and it was an honor and a privilege to be your student.

I can't pass up recalling one particular incident. It was when I was a graduate student, and you asked me to sit in with you at a meeting with the engineering group. There was a very long discussion regarding which type of shift register to use in a particular design. You clearly

led the meeting, bringing out a good in-depth discussion of the advantages and disadvantages of each particular device type. The engineers reached an agreement, and we went on with life. I bet everyone there went away impressed with your detailed knowledge of the device family.

As you and I walked back to the lab, you said: "Rick, just what is a shift register exactly?" The real skill was your ability to lead knowledgeable people to arrive at a conclusion. This was a lesson in leadership I have never forgotten.

Several years after I left your group, I left astrophysics and walked away from an academic career. When I was struggling with this decision, I called you several times for advice. I want you to know how much your personal support and advice meant to me. Thank you!

Since then, I've worked for the Honeywell Corporation. Our work is based largely on engineering, and I'm expected to manage things. They made me a vice president this year. It may not be conventional management thinking, but I am convinced that the training as a physicist I received under your guidance, in logic, in clear thinking, and in leading people, has been key to my ability to do the job.

Remember the town of Ely? That's the place in northern Minnesota I suggested you go when you wanted to take your daughters on a wilderness canoe trip. We make a point to get there at least once a year, and it's still the same great place. It's remote, but it's great.

I will not be able to attend the retrospective nor the dinner in your honor, but I am pleased to be able to send this to you and tell you how significant you have been in my career and in my life.

Please know that you have the very best wishes from Liz and me for an enjoyable and satisfying retirement.

Rick

Rick Borken

Working on SAS-III data with George Clark was a lot of fun. George's enthusiasm is contagious, and he generates a lot of excitement. It's one of the chief reasons I got into Astrophysics in the first place.

Mark Skinner

Harvard-Smithsonian
Center for Astrophysics
60 Garden Street. MS-4
Cambridge. MA 02138
November 1. 1996

Prof. George Clark
Department of Physics and
Center for Space Research
MIT
Cambridge. MA 02139

Dear George.

I would like to send you my greetings on this occasion which honors your retirement and distinguished career in astrophysics. You are in the select group of people where the phrase "scholar and a gentlemen" truly applies.

You are in the first generation of distinguished physicists who made the transition from the laboratory to space with grace and great success in establishing the fields of X-Ray and gamma ray astronomy. Futhermore, you provided the guidance and wisdom that helped to make the Center for Space Research so eminent in this field and the place which spawned many excellent research scientists who have gone on to other centers. I have witnessed this process starting from the time I was a graduate student at the old MIT synchrotron laboratory thirty-five years where I often shared the gamma beam with you and your graduate students as you tested very early gamma ray detectors destined for launch into space.

You are at least partly responsible for where I am today. In 1965 after returning from a two year post-doctoral fellowship in high energy physics in Italy, I was interested in pursuing a new direction in physics. I sought the advice of people for whom I have great respect and naturally that included you. You suggested that I connect with American Science and Engineering. the private company which discovered the first cosmic source and was carrying out a first class research program in the new field of X-Ray astronomy. I took your advice and have never looked back.

Congratulations and best of luck.

Sincerely.

Paul Gorenstein

Paul Gorenstein

DEPARTMENT OF THE NAVY
NAVAL RESEARCH LABORATORY
4555 OVERLOOK AVE SW
WASHINGTON DC 20375-5320

IN REPLY REFER TO

7600/399
30 October 1996

Dr. George Clark
Massachusetts Institute of Technology
Physics Department
MIT 37-611
Cambridge, MA 02139

Dear George:

I may not be able to make to your retirement-fest on 8 November. NRL has a retreat that week for senior managers that will not be breaking up until the 8th and I'm not sure that I can get away early enough to make it to Boston that evening

Somehow it's gotten to be out of fashion to express public gratitude, and I'm pleased to have the opportunity to at least write this brief letter to you. Our careers have intertwined in ways that go well beyond the normal collaborations that make it into the history books. Somehow I can always recall "chasing" the group at MIT, looking up to you and the others there as the paragons of science research; individuals that I could aspire to but never catch up with.

Our first encounter occurred when I was a graduate student. It had to be in 1955 or 1956. I was building up the instrument that I eventually used for my thesis and traveled to MIT where the Cosmic Ray group generously gave me an enormous slab of plastic scintillation material. At least for me it was enormous. You were at that time putting together the large detectors that were going into the air shower array in New Mexico and you personally showed me a working detector that was set up in the lab happily counting muons. It took me several years to appreciate what you and others were doing at MIT. I was still caught up with the glamour of elementary particles, but the MIT group had several years earlier begun to put its energy into the cosmic aspect of cosmic rays. Eventually there was an enormous payoff for MIT. Even I personally benefited since it's hard to imagine that the research program at AS&E would have taken the direction it did, had not MIT been involved in astrophysics.

In addition to determining the direction of our work at AS&E, the MIT cosmic ray effort brought together a remarkable set of scientists. I am still in awe of Satio Hayakawa and Minoru Oda, your collaborators on the BASJE, with their impressive knowledge of fundamental processes and their ability to apply their knowledge to understanding cosmic x-ray phenomena and designing experiments. It was our great fortune that they were visiting the US just at the time that we had first detected x-rays from cosmic sources and were able to contribute to our understanding of what we had discovered. I was tremendously impressed by your argument that the x-rays were the result of synchrotron radiation emerging from the electrons that had to be accompanying the gamma rays for which you had evidence from BASJE. It provided me with a sense of reality to the x-rays we were seeing.

There were two other interactions that I can mention; actually, they were more in the nature of the crossing of paths. As part of the work on Uhuru, I discovered an excess of x-ray sources with globular clusters never published because I was having trouble reconciling the statistics of associations with stellar objects generally. You made the discovery independently which you

turned into a noteworthy paper. But then you saw the first x-ray bursts in the SAS-C modulation collimator which you didn't publish because you were worried about artifacts. I then found bursts in the ANS data which we did publish.

Two generations of scientists and students have had interactions with you much like mine. It must be a great source of satisfaction to you to think about them all and the scientific contributions you have made. I look forward to many more years of association with you.

Very truly yours,

HERBERT GURSKY
Superintendent
Space Science Division

George:

It's hard to even imagine that you are going to "retire". Wellllllll it is not really a retirement as, for starters, you will be at MIT full-time for at least 5 more years.

The impact that you have had during the past 31 years on my life has been ENORMOUS. It's very simple, without you, I would NOT be where I am now, and I would not have been able to do the many exciting things that I was able to do (and are still doing). For that, I simply can never thank you enough, and I won't even try.

We are both so fortunate that we are being paid for something we LOVE to do. What a bargain!

You have been a continuous support of me, and you have helped/rescued me countless times when I was stuck on a physics problem or concept. The number of times that you came to me for help can be counted on one hand (more about that on November 8!).

We have been fairly close for the past 31 years and we have shared pains and happiness in our professional as well as in our personal lives. There have been ups and downs in both our lives (and, for sure, there are more to come). But when I make up the balance, the "UPS" have it (so far), and I know that is also true for you.

We will both grow "even" older and gradually enter a different domain of our professional and personal lives. Not only will our scientific output go down, but even our (not so) "vicious" tennis strokes (remember how you always beat me?) will gradually become even weaker and weaker.

Such is life!

Let's make the very best of it while that is still possible!

Walter Lewin

11/1/96

George Clark, Computer Scientist

I joined the SAS-3 group as a third year graduate student in the summer of 1975, a few months after SAS-3 was launched. At that time, the SAS-3 group was still learning how to best use the satellite and the computers that handled operations and data analysis.

Before SAS-3, computer use at CSR was mostly limited to the IBM 360/65 mainframe over at LNS: you'd punch up a card deck and put it in the input tray. Perhaps you'd also register a data tape for the operator to mount when your job came up. A few hours later, the operator would put a printout in your cubbyhole.

SAS-3, by contrast, had three minicomputers: one for reception and processing of "quick look" data, and two for serious data reduction. As a bit of an afterthought, there was also a terminal for MIT's "Multics" time sharing system. The minicomputers were generally used for batch processing or for program development. They could not time share, and thus could not effectively support quick interactive calculations. Multics was thus used for calculations in support of operations or for final reduction of small quantities of data.

The SAS-3 group was also loaded with young computer talent. Our programmer was Jonathan Sachs, who would later write "Lotus 1-2-3". A number of postdocs and students were also computer savvy. However, the faculty members in the group were generally not major computer users.

George Clark was the exception. He was the biggest user of the Multics terminal, and I think he wrote more programs for Multics than the rest of the SAS-3 group combined. Each of his programs was short, simple and directed precisely at a particular problem. George couldn't have read Kernighan and Plauger's "The Elements of Programming Style" (it was published in 1978), but he followed Brian Kernighan's most famous recommendation: "Each module should do one thing well". But even more importantly, each module embodied a clear idea.

I think that of everyone in the SAS-3 group, George had the clearest vision of what the computer could do to serve the science. His programs were his way of sharing that vision. They were rough cut gems, but they needed some polishing for everyday use. Several of us found ourselves spending significant effort transforming George's programs into finished software. This was not drudgery: it was rather easy (and illuminating). It was time consuming because George was so prolific.

I'm still using some of this 20 years later: I've been computing initial HETE contacts with a program that includes some Keplerian orbit code that George wrote.

John Doty

EUROPEAN SOUTHERN OBSERVATORY

Organisation Européenne pour des Recherches Astronomiques dans l'Hémisphère Austral
Europäische Organisation für astronomische Forschung in der südlichen Hemisphäre

Director General

Prof. George W. Clark
Massachusetts Institute of Technology
Cambridge, MA 02139

U.S.A.

October 22, 1996
DG-sp/641-96

Dear George,

I regret I am not able to join the many friends that are wishing you well upon your retirement on November 8. I certainly would have been there if I could have. But unfortunately my new career in the Old World necessitates my presence here just in that period.

I remember with great pleasure our first encounters in 1959 at ASE and the stimulating discussions we had on x-ray astronomy which was then still to come.

In the years that followed, our research interests diverged somewhat but our friendship continued.

Thinking back to how kind, warm and charming you were to myself and Mirella, I have come to worry that I have not expressed to you enough in the past my friendship, gratitude and respect. Your gentlemanly style both in your private and public life and your intellectual probity have come to represent for me about the best that I have encountered in the United States.

I hope to see you again soon.

Warmest regards

Riccardo Giacconi
Director General

Dictated but not read

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George Clark Remembered
Roger J. Sullivan
October 23, 1996

I first met George Clark in the fall of 1959 when I took 8.031 "Electromagnetism". George was the teacher, and he always explained things very clearly. I remember one week when George was away, and another professor substituted for him. When George returned he was greeted with an ovation. Fortunately I don't remember the other professor's name.

After the lecture several students would crowd around George with questions. I was most impressed by the way that, unlike many professors, George always stayed after lecture until the last questions were answered. A few years later I appreciated this even more, when I learned how busy George was with so many other things.

In my third year I chose to do a Junior Lab project on electromagnetism. I asked George for advice several times, and he was very helpful each time, even though he had no official connection (then) with the Junior Lab program.

In my fourth year I chose to do my senior thesis for George. He suggested the project -- to build a "hodoscope" (array) of neon-filled glass tubes, put them between two metal plates, and apply a high voltage between them whenever two other detectors determined that a cosmic-ray particle was passing through the device. The tubes through which the cosmic-ray particle passed glowed briefly, and an open-shutter camera recorded the pattern on film, thereby indicating the trajectory of the particle. Somehow I got it working.

After I graduated I spent a year at Cambridge University in England. George and I corresponded several times. His continued inspiration convinced me to come back to MIT to get my doctorate. I did another special project for Gorge on the expected pattern of electromagnetic radiation from the sky as a function of different cosmological theories of the universe (please don't ask me to explain this now...). On this project I learned why the sky is dark at night. (Do you know??)

George was my thesis advisor, in the field of x-ray astronomy. I chose to build a device to search for x-rays from the galaxy M87 -- Virgo A. I built an array of xenon-filled x-ray detectors and send it into the stratosphere fastened to a balloon, which flew to an altitude of 130,000 feet (25 miles) and expanded to a sphere 270 feet across (10 million cubic feet

in volume). The first summer that I worked with George, he brought me to the Balloon Base in Palestine, Texas, to help him with an experiment. George, Bill Smith, and I left Boston about 5 PM, stopped in Cleveland and St. Louis (no non-stops then), and landed in Dallas about 11 PM Central Time. We then rented a car and drove to Palestine, arriving in town about 2 AM. I thought we would go to the hotel; but, no, we went to the Balloon Base! It seemed that we needed to pour some "RTV" liquid rubber compound around some critical components in George's x-ray detection package. Then we went to the hotel. We were up at 7, and the rubber had solidified by the time we arrived back at the Base about 9. It was a short night, and not the last working with George.

Most of my thesis memories are of long hours working in the lab -- mornings, afternoons, evenings. George was always extremely helpful. Well, almost always. I recall one time when a high-voltage pulse was creating a low-voltage "spike" elsewhere in the equipment, where a spike wasn't supposed to be. I asked George for advice. He paused a few seconds, then said "Well, you know Maxwell's Equations -- you figure it out!" and returned to his office. But this was the exception.

I also remember an evening about 6 PM when George and I were talking in his office. Suddenly the lights flickered and went out. We stepped out into the hall and discovered that the whole hall was out Then we walked to a corner and found that all of MIT seemed to be out. Then we looked out the window at the Boston skyline and learned that the whole city was out! Back at the dorm I learned that the whole East Coast was out, down through New York City. This was of course the Big Blackout of 1965.

I finally finished my thesis in 1968 and left for other activities. I haven't lived in the Boston area since, and I don't get here much. But George is always there when I need him; in 1989 when my son Andy interviewed at MIT, we met with George, and George gave Andy some extremely good advice about the slings and arrows of applying to college.

So "Thank you", George! You've worked hard -- I hope you slow down a little to celebrate your retirement!

22 October 1996

Professor George W. Clark
MIT Center for Space Research
70 Vassar Street
Cambridge MA 02139

Dear George,

I'm sorry that teaching duties will prevent me from coming to Cambridge for the festivities associated with your retirement.

It seems like it was only yesterday that we were frantically trying to develop technology for the MIT air shower array in laboratories directly across from the chairman's office in Building 6. I was a very young undergraduate doing a senior thesis with Bill Kraushaar, while you were a very young assistant professor working with Peter Bassi on fast timing for the determination of arrival directions.

A year or so later, when the array had come into existence at the Harvard observatory, I was first exposed to what I later called "George Clarking". I was carefully removing wing nuts that held a cover on one of our liquid scintillators, one by one, saving the nuts for reuse. Suddenly, you dashed up, and with both hands, began to unscrew nuts, which went over your shoulder into the brush.

I was not the only person who was amazed by this mode of operation. One day, Charlie Fernald, our machinist, had to leave his shop when you came in intending to stir a gallon can of white paint with a coat hanger chucked up in the drill press. Later, when you were developing plastic scintillators, he and I sought shelter together when the huge reactor, full of styrene and cooled by two puny glass heat exchangers, went exothermic. But the only time I saw him really dismayed, was the Monday when he came into the shop after you had spent the weekend making twenty sets of apparatus to make it possible for students in a teaching laboratory to measure the speed of light with a clock and a meter stick.

Your accomplishments make it clear that the "George Clarking" really paid off. Congratulations and best wishes for the coming years.

Sincerely yours
Jim Earl

James A. Earl
1303 Eva Gude Drive
Crownsville MD 21032

October 28, 1996

Dear George,

Welcome to the wonderful world of retirement! I hope your adventures are as rewarding and memorable as mine have been this first year.

Our first encounter was at Lincoln Labs when you, Bill Kraushaar, and Gordon Garmire were developing the OSO-3 X-ray experiment. Many exciting experiences followed, especially Africa for SAS-C. Your leadership at CSR, MIT and in the international astrophysical community will never be forgotten.

Best wishes to you and your family for a most delightful and enjoyable retirement.

Joe Binsack

Lab Life with George

About 1967, in a spacious and elegant laboratory in an upper story of Building 6, Jay Stein and I were helping Ian Glass ready his balloon payload for its maiden flight. The objective was to measure the energy spectrum of the Crab Nebula, which was widely referred to by its radio name, Taurus A.

Often while working in the lab, we would recognize George's approach by his rapid footsteps in the hallway and the speed with which the heavy door to our lab was thrust open. As I recall, George would feed us the latest astrophysics gossip, consult on problems of the day, and wrap up the visit with a brief pep talk.

Recently, Ian had been suffering from an advanced case of tuberculosis and was recovering from a serious operation that just saved his life. Consequently, he worked only a few hours in the morning, and took long naps in the afternoon. One day, the three of us decided the project needed a name and a snappy acronym. After stewing on this for several days, we settled on the following name: the "Scientific Investigation of the Energy Spectrum of Taurus A"--i.e. Project SIESTA. We thought this was perfect since it ably described our science objective, and it played on Ian's daily afternoon activity.

But now, we wanted to go one step further and advertise our work. The elegant doors in our hallway all had large, opaque glass windows, which bore the names of professors or special laboratories. Our window was blank, so we sent a requisition to physical plant requesting that they adorn our door with Project SIESTA and our three names. After some long time, they flatly refused to letter our door. Consequently, in Ian's morning hours he collected brushes and black paint and scrutinized the lettering on the nearby doors. Within a short time, he lettered our door freehand. His work was brilliant and masterful--even superior to the lettering on neighboring doors. Our door now read:

Project SIESTA

I. Glass
J. Stein
J. McClintock

A few days later, we heard George's quick gait in the hallway. Surprisingly, we heard him pass on by; but he quickly retraced his steps and opened the unfamiliar-looking door. He gave us a perplexed look. I wish I could recall what he said. I wouldn't say that he was happy about "SIESTA," but he was at least wonderfully tolerant of his grad students.

Which reminds me, on more than one occasion, Ian, Jay and I had discussions on whether George was "perfect." Being grad students, there was some irreverence in our remarks, but I can assure you that most all of our remarks were colored by our true feelings of what a wonderful person George is.

To show that George could not protect his graduate students and was therefore not perfect, I will close by telling what happened to our beautiful lab. A very few months after SIESTA appeared on our door, the three of us were working on the balloon payload and a tall, balding gentleman in a suit walked into our lab. I don't think he replied when one of us said, "hello." In fact, I doubt if he even saw us. For about five minutes he gazed at the ceiling, peered out the huge windows to the garden and courtyard below, and so on. Then, he abruptly turned about and left. A few days later, we received a memo informing us about the new location that had been selected for our lab. Our visitor had been the redoubtable Charles Townes, MIT's new Provost, and our lab was to be his office.

Jeff McClintock

Wonderful Memories

Dear George,

We thank you for the memories of a long friendship. It all started in the mid 60's - 30 years ago! There were the parties in Brookline, and skiing at Cannon Mt. Do you remember that it was 11 degrees below zero when we got out of the gondola to begin our descent? Kasha and Jackie were crying because of the cold, and their tears were freezing on their faces. When I looked down, I too began to cry. You hadn't told me we were on an expert slope and it was only my second time skiing! It was a long way down on my bottom.

On the warmer side of things, what fun we always had on the Vineyard! We so enjoyed our trips down to help you build your house. There was always something going on - and the day would end with your famous dinner of barbecued chicken and broccoli.

As the years went on, and the house got built, our children, too, had many happy times there learning how to row, canoe and wind surf.

We all loved visiting you - the great conversations, the great company and the great food (except for the omelet made from swan's egg!) .

To top off the wonderful visits, there was always the tire squealing mad dash to get us to the ferry. We always made it - with not a second to spare!

Once again, thanks for the memories, George - we love you!

Fran, Jeff and Dana McClintock

This is Dana (11 months) and Jeff in July of 1972, when we were down helping to build the house.

Baseball Fever

Growing up, a highlight of every summer was visiting George Clark's Vineyard paradise. It was probably the only place I ever got to play croquet; and it was where I got to play tennis on my favorite surface: clay. In particular, I remember one day in the summer of `78. It was September and I had just turned seven. As Red Sox fans remember, that's the year the Sox led the division by double digits at the All-Star Break, only to see their lead dwindle through August and September. That Sunday was the last day of the regular season. The Red Sox were now only up by one game over the Yankees. But still, a Red Sox win or a Yankees loss would assure the Red Sox a place in the playoffs.

Since my family was never that into sports, I sometimes wonder why I am. Maybe it has something to do with that day. Diehard Sox fans were everywhere. We had two radios going -- one for the Red Sox game and one for the Yankees. We were outside on the deck playing games...eating...drinking..... I didn't fully understand what was going on; it was a real challenge for a kid. When all the adults (mostly bearded hippies) would cheer, it could have been one of four things: The Red Sox doing good, their opponent doing bad, the Yankees doing bad, or their opponent doing good. This was fascinating. Everybody was so excited.

In the end, the Red Sox lost and the Yankees won. This was the only dreaded combination out of the four possible scenarios. Red Sox lore will tell you that Bucky Dent's homerun beat the Red Sox in the special playoff game they played a few days later. But that game wasn't as much fun, because I didn't listen to it on Martha's Vineyard.

Dana McClintock

October 20, 1996

Dear George,

It has been my good fortune to have you as a friend for nearly half a century. During the 1950's and early 60's we worked together in a manner that enhanced our scientific productivity both as individuals and as collaborators in the several rather grand projects that we worked on. Here I have in mind particularly the (then) giant air shower experiment at the Aggasiz station of Harvard, the several balloon-borne gamma ray attempts and then the two rather bold satellite gamma ray adventures, Explorer XI and OSO III. These were all multi-year projects with only a little more than their fair share of problems of the category that lead grown men to tears. The projects were scientifically rewarding and I believe that our many collaborators (colleagues, students, technicians, engineers, associates at NASA) were encouraged to share in our satisfaction and sense of accomplishment.

Just for fun here is a list of people, events, places or what-not that might serve as reminiscing triggers for a couple of old geezers sitting around a wood stove in Denmark or Edgartown.

Bill Grever
Chuck Lundquist
Jim Kupperian
Ernst Kastmeyer
Olin King
Vela
Artemis
Bill Schmidt
Tom Sutherland
Nancy Roman

Piraeus
Meltemi
Glifada
Larry Hogarth
Mike Coogan
Bob Nauman
Dick Baker
Jesse Mitchel
John Nagel
Ernst Stuhlinger

Henry Smith
Fred Stecker
Pop pop
Harvey Golden
Leonard Mitchum
Mike Coogan
Monemvasia
Homer Newell
V. Ginsburg

Best wishes for a happy retirement.

Bill

W. L. Kraushaar

Dear George,

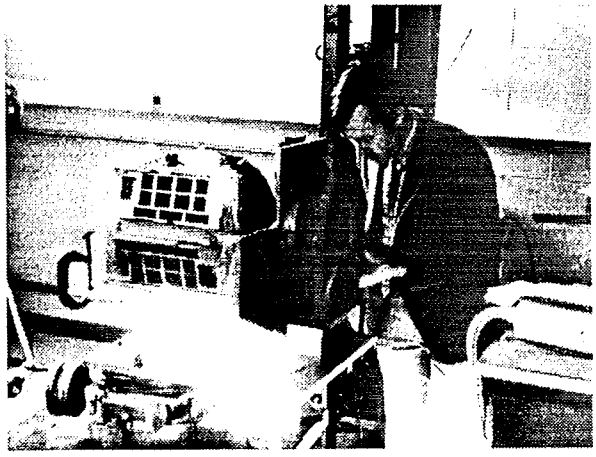
The e-mail announcing your retirement party elicited a fairly hearty gasp of surprise when it popped open on my computer screen. I'd not imagined you were even close to retirement.

I took away many lessons and happy memories from working with you on OSO-7 and SAS-3. A few stand out in particular.

Do you remember marking up the proposals I wrote for you as if they were graduate student papers? They came back to me with some pages so dense with red corrections that I could barely read the text underneath. I would quietly fume at this. "What does it matter, if the English is off a bit? Doesn't he know I have more important things to do? Ye gods," I thought, "he's trying to drive me crazy!" But I would make the changes, then make them again when you'd marked up the second revision, then the third, until finally it dawned on me that I was using less than half the words I'd originally written and my ideas were clearer to boot. In retrospect, I probably should have been paying you for the advice.

George Clark (1971)

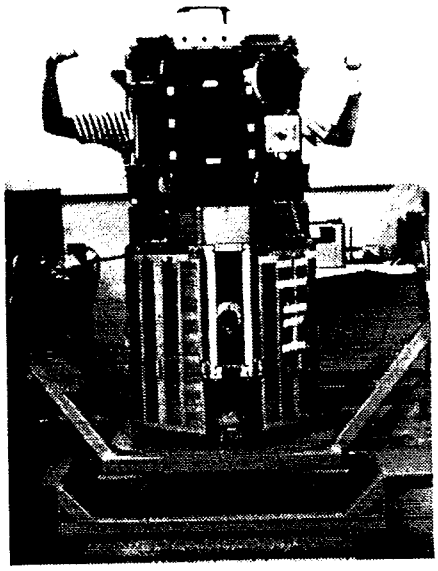
Do you remember when you discovered that I had a tendency to remove data points I didn't like from my test notebook, as if they were garden weeds? I thought this was a perfectly reasonable way to interpret data. You thought it was absurd. Despite my sometimes grumpy resistance, you kept asking me questions, in the nicest, gentlest, most reasonable way possible until each weeded data point was reproduced and each anomaly explained - fully! How I ever managed to get through engineering school without having that kind of attention to detail drilled into my head is beyond me, but I did. Your patient lesson in intellectual rigor has served me well over the years. When the need arises today, I try to apply it to others the way you did with me, using as much gentle, persistent questioning as I can muster. (It's not always easy, I don't know where you found that remarkable patience.) It works wonders. Thank you for that, and for the writing



Calibrating OSO-7 (1971)

Our Kenyan adventure was a fine end to a good project, wasn't it? Someday all us former SAS-3'ers can log onto the Internet from terminals in our nursing homes and reminisce about tuna and tomatoes for breakfast, green mombas in the hotel bushes and getting the first signals back from the satellite at the base camp when Margie turned it on

What *is* wrong with this thing anyway?
(Mike Doucette, me and you - 1971)



(1973)

before the Goddard controllers could get to it - to say nothing of going to work by boat and in a Billy Pew net, giving everyone on the project life preservers that said "M.I.T." on them (I don't think the APL'ers liked that much), and the magnificent storm cells we often saw on the horizon from San Marco tower.

The OSO photos were taken at M.I.T, although, of course, we spent an awful lot of time at Goddard and Ball Brothers, too. I still cringe a bit when I walk into the test area in Building 5 at Goddard today. The memories of far too many midnight shifts working near that little thermal vac chamber we used for both OSO instruments flood back every time I go in the area (which is often, since the groups working on our SWAS and SIRTF IRAC instruments are in that building now). My eyelids get heavy and my eyes sandy just opening the door to the test area. Didn't we have a furious argument there too? Actually, I think I was the one doing the shouting. I seem to recall you wanted to spritz one of the flight

SAS-3 Data Room

preamps with Freon to isolate an intermittent fault and I wasn't having any of it. I also remember patching things up with you in that dismal little hexagonal snack bar in the basement - another crummy/wonderful memory, that snack bar - (It's still there, too).

I wish you well in retirement and many happy hours on the Vineyard. By now you must have the reservations problem on the ferry licked for sure. I bump into Joe Binsack around Bedford from time to time. He's walking around with a big smile on his face since he retired. I suspect you'll soon be doing the same thing, too. My very best wishes to you for a healthy and happy retirement.

Richard S. Taylor
October 16, 1996

On the 7 am boat for San Marco

It's difficult for me to write about George Clark, in the context of his retirement. For purely selfish reasons, I don't want him to go! Of all the bright, creative people I've had a chance to work with at MIT, George has been the one to most challenge, teach, and trust me.

As a technician/machinist and informal designer for the CSR, I've worked with many people, on dozens of projects large and small. For large experiments, I may only work on a few parts, or see just a bit of the overall experiment. With George, it's both of us in the trenches, designing an entire experiment, going over a problem with a spectrometer grating mount, aligning an optical bench, or fixing a part of his sailboat.

For me, it's always been a pleasure following George as he practically runs down the halls of MIT, through shortcuts and doorways that I've never seen before, and suddenly I'm in a room where groundbreaking physics was done, and George is explaining a point he brought up ten minutes ago that I didn't quite understand. George's outstanding characteristic is that he wants *you* to learn, to share the excitement he feels about science.

I will also remember the time my sister and I spent with George and Charlotte in Martha's Vineyard. We were invited out a few years ago, and spent two wonderful days biking around the island, seeing President Clinton while he was vacationing, the wonderful conversations in his living room (George always has interesting guests), and especially, the food! George was also able to teach me how to make it across the lake on his sailboard, but I fooled him and was able to make it back.

To have been lucky enough to have worked, spoken, and played with him, is to have a model of how a man might live.

David Breslau

Dear George

It is hard to believe that you are about to celebrate your retirement. I only wish that I oculd have been physically present on this special occasion, as an active participant.

The four years that I spent as your student I look back upon with fond remembrance and I still appreciate the many things I learned from you, both in and out of science.

Your dynamic and positive character affected my own outlook a great deal and helped me to overcome much of my shyness. You gave me a certain outlook on science which has always encouraged me to try to be part of the mainstream and to avoid backwaters.

The atmosphere in your x-ray astronomy group in the sixties was something quite special and the friends that I made at that time are still very dear to me.

Your concern for me during my illness and your many kind acts during that difficult period of my life meant a lot to me and I will always feel grateful tto you for your concern.

I hope that your formal retirement is just that, and that you will will not be giving up your scientific activities.

I send you best wishes for the future, whatever it will bring.

Hopefully it will not be too long before I visit Boston again or otherwise have the opportunity to see you.

With kindest regards
Ian
IAN GLASS
Visiting Institute d'Astrophysique,
Paris

I was a bit lost at the end of my first four years at MIT. I wanted to continue in physics but my record was poor. Some professors suggested that I leave academia but Professor Clark gave me a job building experiments in Junior Lab. Together we built a muon parity violation experiment. This was very satisfying. I felt as though I was getting the MIT education I had missed before. Professor Clark made me confident about my work. When we discussed my projects he would really listen and take an interest in what I was saying,. He didn't just try to compile a list of my mistakes. And he took care to make sure I got to feel intelligent. This job made me feel good about MIT, it put my career back on track; it gave me a second chance. Thank you.

At the beginning of every fall term George Clark takes another set of data from the Cavindish experiment. And every year I suppose he comes up with the same value of G. But this is the sprit of Junior Lab. The number an experiment gives isn't so important, its the fact, that a student can measure the value for himself which is so fantastic. George Clark has never tired of this theme. And it is his spirit which keeps Junior Lab young. He has been adding new experiments at a rate of 1 a year, while revising older experiments as they start to age.

I am grateful for George's invitations to Martha's Vineyard. During these weekends I was able to witness the private side of a professors life. It was both comforting and inspiring to see that an accomplished professor could have such a rich life outside the University. We began in the morning with an hour of tennis then wind-surfed until lunch then another hour of tennis followed by several hours of sailing and a swim in the ocean. After dinner we took a short nighttime canoe trip. I was sore for two days. It was a bit alarming to be completely run down just trying to keep up with a man almost 3 times my age.

I hope in my career that I can bring the spirit of George's Junior Lab to the university where I teach. And I hope that I will be able to help a few students as much as Professor Clark has helped me.

Peter Yesley
CERN, 1996.

Pat,

I will not be able to come to George's celebration but wish him well. My recollections of him are more in the Junior Lab than in his research.

As you know he has done an admirable job of holding the Junior Laboratory together and has been one of the primary figures in providing it with new and interesting experiments. The Junior Laboratory is for many students the most memorable and educationally rewarding part of the undergraduate physics experience.

Rai Weiss

George:

Pam and I send our best wishes for a great party – not that we can visualize you as "actively" retiring! Junior Lab will never be the same (or are they hiring you back?).

Sorry we couldn't make the party!

Gordon and Pam Pettengill

With very best wishes from someone who has always greatly admired George and tried to follow in his pioneering footsteps from cosmic rays to gamma rays to x-rays (is not immitation the fondest form of flattery ?).

Josh Grindlay

Dear George:

I shall probably regret not flying to Boston for your party tomorrow: we are all becoming aware of the shrinking of opportunity space for anything we want to do ! (It would be morbid to add that I should have gone to Herb Bridge's, a few years back, but I'll add it anyway.)

You and Herb were among the very most positive influences I recall of those persons who were not my advisor or my classroom professor but who were just circumstantially around, to talk to and to listen to.

I certainly enjoyed seeing you last month, when I was up at MIT on HETE business (talk about morbid ...). That chat gave me the sincere satisfaction that you hadn't changed! You still know how to live.

I have the feeling that, despite the fact that you may be "retiring" from some activity arenas, your youthful style will guarantee that there will be plenty of opportunities to enjoy running into you again.

TLC

– T. L. Cline —— cline@apache.gsfc.nasa.gov

Notes on George Clark, by George Field

I had known and admired George ever since meeting him out at Oak Ridge Station with his air shower array, when his name came up as a possible member of the Astronomy Survey Committee in 1979. The small steering group considering the matter recognized that he was one of the few in the high energy astrophysics community who had the stature to represent that community, and one of the few with the emotional detachment to extract concensus recommendations from such a highly competitive group of scientists. So we were grateful when George agreed to join the Committee, and to also head the Panel on High Energy Astrophysics.

The result of those deliberations was the recommendation by the Panel, and then by the Commmittee as a whole, for AXAF. The power of his arguments was such that it emerged as our highest priority recommendation, a situation that we hoped would enable AXAF to be launched during the 80's. That was back in 1981, when George was only 53 years old. Now he is retiring, and AXAF is still in the future. Such is the pace of NASA launches, which moves me to salute all of those of you, George included, who have endured such long waits to see your experiments launched.

There were light-hearted moments along the way, as when George raised his hand in a quiet moment and formaly moved that AXAF be given the highest priority in our report. Although many committee members were tilting in this direction, we had not formally discussed the issue, and I was afraid that if we were to take a vote then and there, we might regret having made a hasty decision. Not being much of a parliamentarian, I was at a loss as to what to do. At someone's suggestion, I declared a coffee break, and fortunately we were able to come up with a graceful way out over doughnuts. When the proposal was made later in a more systematic discussion, it passed overwhelmingly.

By the end of our committee experience, all of us were tired of flying back and forth across the country, so when George invited us to spend the day at his home on Martha's Vineyard, we jumped at the chance. I still have slides of various luminaries munching hot dogs on that pleasant occasion. But I failed to catch on film the many instances of colleagues in the process of capsizing their boards while windsurfing.

Fortunately, the Committee as a whole did not capsize. Our report was completed, and though it did not open the flood gates of funding for astronomy, at least it helped to keep people's attention on the highest priorities. Who knows, maybe AXAF will be a little earlier than it would have been otherwise as a result. If so, we have George Clark, the statesman as well as the x-ray astronomer, to thank for it.

A note for George's celebration:

I have many fond memories of the times I spent with George, so many that I cannot even give a representative sample here. I would like to say thank you to George for his kindness, patience, and guidance through my undergraduate years at MIT. Simply put, I would not be pursuing a research career in Astrophysics if it had not been for George's influence on my life. I will be forever in debt to him.

With that said, there are two short stories I would like to relate about George, one which is probably common and one which is not.

We all know that George's command of the English language and his exacting standards for writing are legendary. As I was finishing my thesis, I was in the usual state of most undergraduates. I was struggling to get the document in on time, was under a large amount of stress, and had not sleep much over the past few weeks. I remember being in George's office the day before it was due. I was there to get George's signature so that I could turn in the document the next day. George had been particularly interested in getting the abstract right. We had edited it at least 50 times ! But at long last, I was at the end of the road, I had this thesis done and all I needed was George's signature. Or so I thought. As George went to sign the acceptance form. He thought for a moment and said, 'Let's look at that abstract one more time.' I was in a state of shock as George's red pen once again attacked the already terse abstract. At this point George must have sensed my feelings of despair, because he suddenly looked up and said, 'Well, I think it is fine. Why don't you read it over one last time and whatever you decide is OK.' Thank you George.

A second fond memory was George's and my first trip to the McGraw-Hill (as it was then called) 2.4m observatory. We had already observed on the 1.3m telescope; but the 2.4m was new to us. In the middle of the first night, we had difficulty acquiring the next standard star. George was at the workstation controlling the telescope and I was at the workstation which ran the CCD camera. After many frustrating minutes, we could not find any object in the sky after several small moves. We were quite puzzled by this because we had heard the telescope slewing. George went into the dome to see if the dome-tracking mechanism had failed and we were observing the dome or if a cloud was in the way. He suddenly rushed back into the control and commanded the telescope to move to the zenith position. He told me that when he entered the dome, he was horrified to see the telescope's axis was parallel to the ground (essentially on its side) and the liquid nitrogen was flowing out of the CCD camera since the telescope is never supposed to be in this orientation. Fortunately, the safing command worked and the telescope regained its proper orientation. George then leaned over to me and said, 'If that didn't work, you and I were going to get into the car and drive to Mexico.'

Once again,
thank you George
Paul Plucinsky

Massachusetts Institute of Technology
Department of Physics **Center for Space Research**

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Mail:
Hale Bradt
37-587, MIT
Cambridge MA
02139-4307 USA

4 November 1996

Dear George,

It has been an unbelievably long time that you and I have been walking the halls of MIT together. My first impression of you was a talk you gave at the weekly seminar of Bruno's group, in 1955. I don't remember the topic, but I do recall the enthusiasm and zest you brought to the topicand also the enthusiasm and participation of everyone in that small group of no more than 10-12 persons. It was enough to get me out of solid-state physics and into Bruno's group.

Our next encounter was your suggestion that I adopt your second muon-polarization experiment for my thesis project. (Your first, for the general audience, showed that the non-conservation of parity in cosmic-ray decays indeed led to a net polarization of the cosmic-ray muons.) It was a pretty good deal for me since you had the big muon detectors well designed and already under construction. (Not to say that there weren't significant problems left for me to solve.) This monstrous experiment (4 detectors each 5 feet square and 7 feet tall) was supposed to go underground. I remember asking where you thought that might be, and your reply was that you didn't really know, but had heard about some old underground caves or tunnels in Boston Harbor. Well, there weren't any suitable ones and we ended up in a mushroom cave (old cement mine) near Kingston NY. It was a great experiment for me: I learned a lot, was able to do most of it myself, and it gave a significant ratio of kaon-pion production at relatively high energies.

I recall the time you checked up on my progress on this experiment as I prepared for a test run in the penthouse of Building 26. I was proceeding very slowly, checking out and understanding each electronic circuit, one by one. You came by and simply turned on everything and watched it start counting. A lot was wrong, but we found out about it all right away. I have passed this lesson on to many students since.

You also had a wonderful facility of letting your students and younger colleagues run with a project. You would get us started and then back off so the experiment became ours. You usually went off to do something else that interested you. In addition to my thesis, I saw you do that with the balloon program for Walter, and the Bolivian Air shower experiment with me. For the SAS-3 satellite, you let us each "have" an experiment and/or "do" observations in the areas of our particular interest after launch while you pursued your particular interest in the soft background. Finally, I saw you give a very long leash to Claude in the initiation of high-resolution spectroscopy on Einstein.

I have the pleasure of recalling your efforts with Bill Kraushaar to find cosmic gamma rays and your eventual success which heralded an entire field of gamma-ray astronomy which still thrives.

During the four years we shepherded SAS-3 around the earth every 90 minutes, you were involved every day. This mission was another of your great achievements. You awarded observing time based on quality and publications; you wanted the science be first rate. There were a few minor explosions when differences as to what was "best" arose. I must say, you really were a gentleman through it all; I am not sure the rest of us always were. But I think we did teach you that there are different types of "best". But, the tone you set and all this did lead to an outpouring of great results. SAS-3 was the experience of a lifetime for all of us: Saul Rappaport, Herb Schnopper, Walter Lewin, Dave Hearn, Bill Mayer, Bill Wheaton, John Doty, Tom Markert, Jeff Hoffman, Herman Marshall, Mel Ulmer, Rich Kelley, Lynn Cominsky, Rob Petre, Al Levine, Frank Winkler, Fuk Li, George Ricker, Krishna Apparao, George Ricker, Jan van Paradijs, Don Lamb, Roger Doxsey, Garrett Jernigan, Ron Remillard, Brin Cooke, Carl Dobson, Fred Marshall, larry Petro, Mark Johnston, me, and others. What a crew you had there!!

When I look at all the x-ray astronomy group has done these past 30 years, I see that almost all of it came from you either through the initiation of a particular project or through those of us whom you launched into the field. We are all grateful to you for that.

I also remember warmly your family, especially Kasia and Jackie at very young ages, visits to Martha's Vineyard, and always your and Charlotte's hospitality and warmth to me and my family. I wish you the best in your non-retirement. I hope it goes well for you. I will be watching to see how it goes because I am not that far behind you!

In closing, let me remind you that I once told one of our group how to get to my house in Belmont: Take Concord Ave. to Common St., to Clark St., to Clover St. The immediate response was "Oh, you were a Common musician, then you met Clark, and now you're living in Clover." And so I am, thanks to you. In fact, you made the x-ray branch of Rossi's old cosmic-ray group a bed of Clover for all of us.

With best wishes for many more productive years,

Hale (Bradt)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CENTER FOR SPACE RESEARCH
CAMBRIDGE, MASSACHUSETTS 02139-4307

Office of the Director

November 6, 1996

Dear George:

There is no way that these few lines can really encompass the extent of your influence on me, my career and my life over these past twenty five years.

You took the risk of hiring me, when I knew nothing about astronomy, astrophysics or X-rays. Over and over, you put me forward for promotions, awards and honors. You encouraged me, supported me, and freely offered sage advice at my numerous scientific and professional crossroads.

Above all, you became a warm and valued friend, one of very few I know I can count on totally. In this I also include Charlotte, of course, whose affection and frequent hospitality I also cherish.

The best part of writing this is knowing that I have many more years in which to share your companionship at MIT, in Brookline and on the Vineyard, many more conversations about science, politics, music and life, more oysters, more tennis, more sailing, more ....

Thank you, George.

With warmest wishes,

Claude

crc@space.mit.edu

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Robert W. Rasche
7428 Paseo Ronceval
Tucson, AZ 85704
(520)-742-0370

October 30, 1996

Dear George,

Can it be that thirty years plus or minus a few have gone by since we first became acquainted on OSO-3 and then worked so closely together on OSO-7 and SAS-3? Those were exciting and rewarding times which produced both good friends and good memories that I have kept through the years.

When I left the SAS-3 program, you wrote me a kind and generous letter that meant a great deal to me when I received it. You said that what you had enjoyed most in our relationship was working together to solve problems and to overcome difficulties. That observation pleased me no end because this was where I also found great satisfaction and still do. That letter of yours was typical of the way you interacted with all of us. It was caring, considerate, to the point, and well-said.

Over the years, I've come to realize how important and effective your approach to interacting and working with people is. When we worked together, you generally exuded enthusiasm, optimism, and cheerfulness regardless of the situation and I, for one, found this to be infectious. You were always polite, a good listener, diplomatic, and treated everyone with respect – even brash young engineers. I always thought of you as open minded and innovative and was always impressed by your ability to genuinely consider all sides of an issue. While there may have been a few times when we didn't agree, I never once felt that I got less than a fair hearing. And I have become old enough and wise enough to know that this sometimes required extra effort on your part.

In addition to all your other contributions, I'm confident that over the years you have been a good role model for lots of people. I know that I profited greatly from working with you during those long ago times and have come to appreciate how much my own effectiveness has benefited from my labors in your vineyard. I am not alone. In the time since we worked together, I have met many people who know you from a variety of interactions. I have never met anyone who did not speak highly of you and who had not enjoyed knowing you.

I wish I could be at your party to hear you praised and roasted, but duty and distance preclude this. I am sure that you will be one of the youngest-looking old timers there. Anyhow, the best of everything to you, George. Anyone who could deal with Hale Bradt, Walter Lewin, Herb Schnopper, Bob Rasche, and a host of others (including my current boss, Rodger Thompson) all at once so skillfully and effectively certainly deserves a long and satisfying "retirement." However, I suspect that you will not retire, but will just do something new.

Warmest regards,

Bob

November 8, 1996

Dear George,

I don't know whether you are fully aware of the profoundly positive influence that you've had on my professional life. Of course, your invitation to me to join the SAS-3 team gave me the greatest opportunity of my career. What a privilege for a theorist to be turned loose in the midst of all those wonderful observational data! But there were two events, years earlier, that I will never forget.

The first was the occasion of my

first colloquium at MIT, in early December of 1970, when I was still a graduate student at Cornell. It was the first time we met. After the colloquium you invited me to your office, where we had a delightful and stimulating conversation. The first snow of the season was falling lightly outside your window, and Cambridge never looked more beautiful.

The second was on the occasion of your visit to Princeton and the Institute for Advanced Study during the winter of 1972-73. On the evening a group of us, including you and me,

went out to dinner at the local Rusty Scupper. Those were the heady days of Uhuru and the discovery of the first binary X-ray pulsars, and throughout that dinner you led the discussion of the exciting new results coming in.

Those two early encounters with you were instrumental in persuading me that I wanted to be a part of MIT. And my decision to join the MIT faculty was the best decision of my life.

Thank you, thank you, thank you!

With warmest wishes for a happy, productive, and rewarding retirement,

Paul Jass

Angela Markert
103 Walnut Street
Brookline, Massachusetts 02146

October 29, 1996

Dear George,

On this very special occasion, I know that Tom would have wanted to offer some thoughts and recollections. I will try to speak for him.

You were an inspiration to Tom. He respected and admired your knowledge, and he appreciated the knowledge that you so readily shared with him. He also admired your integrity and learned from your example - how to be a scientist, a teacher, and a colleague.

On a personal note, we always remembered fondly the weekend we spent at your home on Martha's Vineyard. We also remembered, not so fondly, how you took us both on together at tennis, and trounced us!

I know now only too well how short life is. Please remember that and enjoy your retirement.

Angie

3105 Good Shepherd Road
Las Cruces, NM 88005
October 2, 1996

Dear George,

Although I call myself one of Bill Kraushaar's students, I feel that you were one of my mentors also. I remember your personal kindness, invitations to your home and dinner with your family, your sharing recollections of your parents when I mentioned that my fiancee was a nurse. But let me recall to you your story about Explorer XI that you told me when I was first given charge of the data reduction team.

Because the micro-meteoroid population was not well known in the early sixties, a thin metal plate was placed in front of the telescope to provide a shield; it was to be jettisoned near the end of the mission. A unique and supposedly protected sequence of three commands was required to release the plate, but, of course, the command sequence got tested during initial turn-on. It was fortunate, you said, since the very low gamma-ray rate would have been far lower still. There was considerable rejoicing when the experiment's cost per gamma-ray fell below $100 k. That would correspond to a generous number of gamma-rays at today's price for a satellite; then it was only 22!

The efforts of you and Bill, Herb Bridge, Stan Olbert, Hale Bradt, Al Lazarus, and others to educate me seem to have done some good. Today I am the PI at the Los Alamos National Laboratory for the Treaty Monitoring X-ray instruments on the GPS constellation of satellites. We are currently upgrading these instruments to include particle measurements that will eventually allow collection and near real-time display of useful scientific data from the radiation belts by all twenty-four satellites simultaneously.

I wish that I could be at your party to hear recollections by others and the recounting of stories about you, such as your well-known elevator prank; but, since I can not be there, I will simply extend my very best wishes to you upon your retirement and for your plans thereafter.

Sincerely yours,

Paul

Paul Higbie

Wed. September 25-96
Cambridge -

Dear George,

my recollections of you go way back in time! For instance I remember your many visits to Wellfleet when you, still a student, Bruno and I would go swimming and swimming in the middle of Long Pond, while Talking and Talking until, thoroughly exhausted we would swim back to our cabin and a good Italian meal--
I also remember some more recent wonderful adventures with you in Kenya including a good scare when the "fancy" car broke down not very far from a great number of lionesses and a big lion!

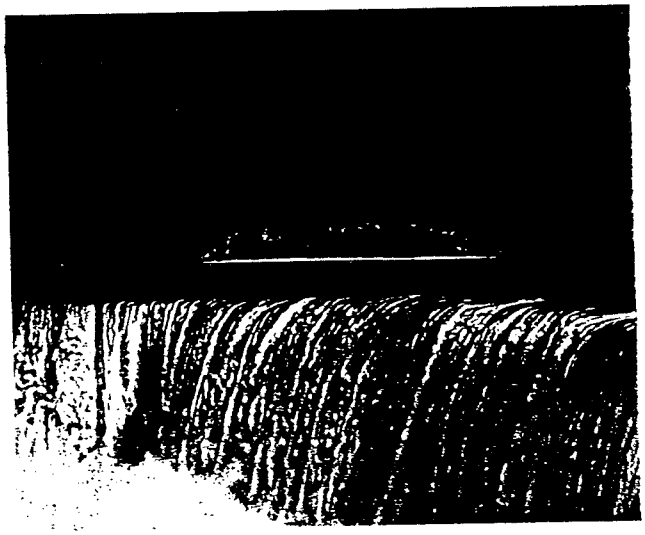
But especially I remember how very fond of you was Bruno and how happy was he that you stuck around M.I.T. and collaborated for so many years taking part ~~in~~ so many scientific adventures -

Best wishes from all the Rossis for an enjoiable and full life for many, many years to come -

Love

Nora

NORA ROSSI



10/29/96

Dear George,

I just learned that you are retiring and that there is a party for you on Friday. Sorry that I can't come.

I want to wish you a happy and stimulating retirement. If it is fractionally as good as mine, it will be difficult but wonderful.

All the best,

Vera

Vera Kistiakowsky

George,

Best wishes for your retirement, although I'm sure you will keep ~~close~~ close to your scientific interests for some time to come. I will always remember those exciting years of scientific discovery working with you at the dawn of High Energy Astrophysics.

Best wishes,
Gordon [GARMIRE]

Sorry I couldn't stay for your dinner.

October 22, 1996

George,

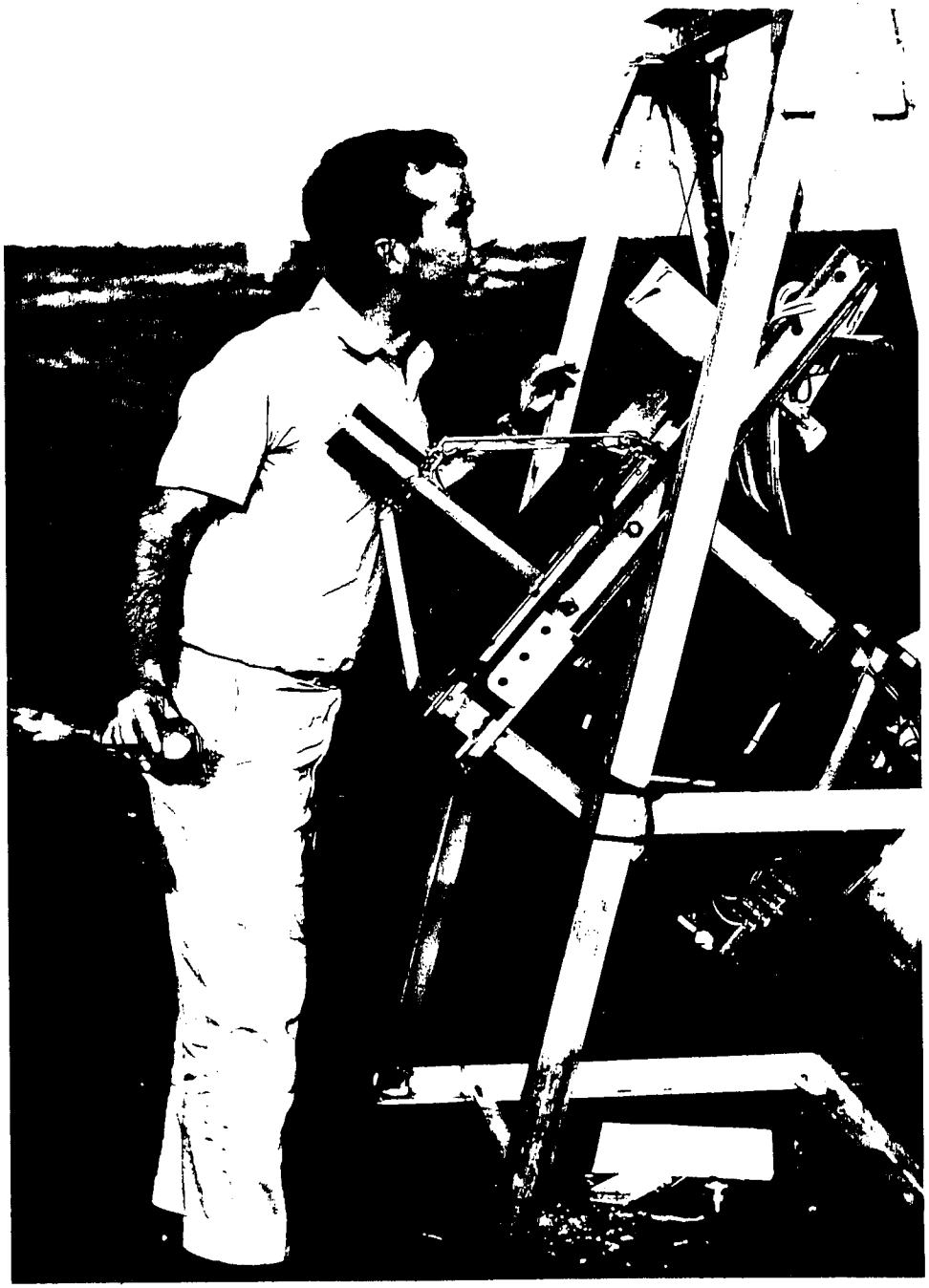
Congratulations on your retirement! This event brings back many memories of my days as an MIT undergraduate from 1964-1968. Knowing you then had many influences on my subsequent life and career. Here are a few examples:

- My interest in astrophysics began with a lecture you presented to incoming freshmen in 1964. I've been hooked ever since.
- Working in your research group as a lab assistant gave me a love for experimental physics and scientific ballooning. The enclosed photo was taken at Palestine, Texas in July, 1966.
- Your recommendation of the high energy astrophysics group at Minnesota ultimately led to a PhD from the analysis of data from a balloon payload which I built and flew at Ft. Churchill, Canada.
- Finally, the look of horror on your face when I ordered a steak "well done" in a Palestine restaurant led to a liking of rare steak and many other foods.

I am currently leading a project to develop new techniques for monitoring and safeguarding nuclear materials - applying tools I first learned in your lab at MIT.

Best regards,

Bob Scarlett
1449 San Ildefonzo
Los Alamos, NM 87544
scarlett@lanl.gov



National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

Reply to Attn of: Code 660

October 24 1996

Arlyn Hertz
MIT Center for Space Research (Room 37-241),
70 Vassar St.
Cambridge, MA 02139-4307

Dear Arlyn,

Thanks for your invitation to attend the ClarkFete for George Clark. I won't be present in person on November 8 but I would like to participate in the gift project (see enclosure) and share some recollections.

My first interaction with George was as one of his students in a graduate course in cosmic rays (Physics 8.56) that he gave in 1954; I was a first year MIT grad student at the time. I still have my lecture notes and homework problems from that course. Looking back over this material today reinforces my recollection of what an excellent course this was and how thorough and clear George was then (and still is) in the presentation of challenging new subject matter.

After I joined the cosmic ray group I became aware of what an extraordinary astrophysicist George is in the sense of his having the scientific courage and talent for being intimately involved in all aspects of his research, freely ranging between hardware development, data collection, data analysis and theory; as such, he has been an ideal role model for students. I was certainly impressed by the "factory" he and his collaborators created for producing the gigantic plastic scintillators then needed for cosmic ray air shower experiments.

George's 1964 observation of hard X-rays from the Crab Nebula was the first successful balloon-borne experiment in X-ray astronomy; I had the pleasure of serving as a referee for the resulting paper published in Physical Review Letters 14, 91 (1965).

I served with George and others on the NASA working group for a LOXT (large orbiting X-ray telescope) that ultimately led to the Einstein X-ray Observatory as well as on the NASA working group for defining the initial concept for AXAF; George's thoughtful dispassionate participation in these sessions was always constructive and often crucial, especially during some rather tense moments. And I think we can properly identify George as the "father of high resolution spectroscopy for X-ray astronomy", such as pioneered with his experiment on the Einstein Observatory.

Finally, in the category of nostalgia, I wish I could find an EFP60, an electronics tube (not transistor) that was a favorite of his. As I recall it had a cylindrical red metal container. If anyone knows of a possible source please let me know; I'll take one and give one to George.

Best wishes,

Elihu Boldt

BOLDT@LHEAVX.GSFC.NASA.GOV
(301) 286-5853

November 18, 1996

Dear George,

It has been over 10 years since I met you and we began working together. All these years, you have always been there: as a patient teacher to teach me when I was lost, as a good father to support me when I was down, and as a good friend to share joy when I was happy. It is needless to say how greatly my career in physics has been influenced by you over these years. Especially, I simply cannot think of my present life without you. For one obvious example, if I had not done my graduate work with you, I would not have met my wife in Korea on the way to Japan to work on the Ginga data at ISAS.

I have always admired your diligence. At first, I was not able to comprehend how such an ingenious man like you works so hard. When you face a challenging problem after persistent tackling to the problem, you always come up with either a solution or an alternative. I have learned from you how to be patient with a research problem.

Among many countless examples of your ingenuity and skill, I remember your Ginga spectral fitting program written in the Quick Basic language. The program ran in Mac Plus as fast as the standard Ginga fitting routine that was running on a supercomputer. Your program was so efficient in terms of its user interface that the real time to make a fit was only as long as it took to make a fit on a supercomputer, which was much faster in computational speed but had a large overhead.

I feel so lucky that I have been able to keep working with you after my degree. Your inspiration and guidance have kept me going in astrophysical research without losing momentum. For my selfish reasons, I am hoping that we can keep working together, especially as you become more active in astrophysical research after your retirement!

Best Wishes,

Jonathan W. Woo

How George Clark and I discovered an X-ray pulsar

Submitted by Lynn R. Cominsky

It was Winter break of my first year as a graduate student. Everyone in the group , it seemed, had gone to Hawaii to attend an American Astronomical Society meeting. So, it was my turn to be 'duty scientist' for SAS-3 for the first time. It all seemed very overwhelming, I had barely made it through my classes that first semester, and now I was entrusted with the care of the group's most precious resource! However, everyone assured me that all I had to do was babysit, and nothing extraordinary would happen.... I could just relax, take it easy, and learn how to interpret the plots of data that were coming in every 90 minutes. So, with my faithful dog, Felicia the Pooch sprawled out on the computer room floor, I settled in for a long holiday shift.

Much to my surprise, I heard the footsteps of another dog (Panther), accompanied by George Clark. I had met George before coming to MIT for grad school, but we had never really interacted scientifically. He came over to the pile of plots and asked how things were going. 'Fine, I guess', I replied, gulping nervously. 'Well then, what is this source that is showing up in the scans? We are supposed to be looking at Cas A, and I didn't think there were any other sources around there bright enough to be seen in a single scan. Here, I'll show you how to figure out its approximate position'. He calculated for a while, and told me where he thought it was. I immediately realized that it was the return of the transient source 4U0115+63, first seen in Uhuru data, that I had recently written about in a paper before coming to MIT. I knew that the source had a 'hard' spectrum, and was likely to be pulsar. 'I think the source should be a pulsar! How do we point SAS-3 so we can get more data and take an FFT?' I exclaimed. 'Call Bill Mayer', George replied, and he will walk you through all the steps needed to change the observation plan.' So I worked on this all the rest of that day, and then came in early the next morning to see the first plots coming out with the satellite pointed at the target. The FFT of the very first data set showed huge spikes, and, as they say, the rest is history. .PP We had discovered pulsations from the first transient source shown to be a member of a binary system (with the help of many later observations over a month, led by Saul Rappaport). Although this may seem obvious now, back then, no one knew exactly what transient sources were, or why their emission was so irregularly dramatic. The discovery made the New York Times, and because of George's quick response, SAS-3 beat HEAO-A to the result (although the competition was fierce for a while!) We later used the RMC on SAS's z-axis to find a better position for the source, which helped identify the optical counterpart as a Be-star. These type of (mostly) transient systems are now recognized as a major class of high mass X-ray binaries, characterized by the sporadic X-ray emission due to the interaction with the wind of the Be-star. I am still studying 4U0115+63, almost 20 years later, with data from RXTE, but nothing I find will ever equal the excitement of that first discovery, for which I gratefully thank George Clark.

I know George from more than 40 years. My first recollections go back to some 40 years ago in occasion of the Varenna (Lake of Como - Italy) Cosmic Ray Conference and to a Consiglio Nazionale delle Ricerche colloquium in Roma in a which I was involved with Pietro Bassi for a position as a Research fellow. An eminent Professor of the examining commission (Prof. Perrucca from Torino) asked Pietro Bassi to comment about his role in the research regarding the "Density-timing method for the EAS with a scintillator array at MIT" . Perrucca said textually: "I know Bruno Rossi to be a famous scientist, but what about you and this fellow named Clark?" And Pietro Bassi: "I am myself and we can discuss any detail you wish; for what George Clark is concerned I can tell you by sure that he is an intelligent and prepared young man, with, from I can see, a brillant career on front himself". Pietro was certainly right.

I remember also George in Milano in the early 60's in the Lab. of Beppo Occhialini in the early 60's, trying to transform a gadget based on striped printed circuit boards into a working spark chamber. For my part, I consider George as the positive rapresentative of a generation of scientists for which human and intellectual values are as important, but certainly greater, than those of pure scientific achievements.

Please, transfer to George my deepest and friendly regards.

Livio Scarsi

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
CAMBRIDGE, MASSACHUSETTS 02139

Reminiscences of George Clark as a Lecturer

On the occasion of your retirement, George, I would like to state some of my reflections on you as a colleague and also as a teacher of mine. First, I appreciate the fact that over the years you have been a very friendly and congenial colleague in the Physics Department. I have the distinction among your faculty colleagues, perhaps, of being the only person who was also once a student in your physics lectures. The year must have been Spring 1961, and the subject 8.04 Electromagnetic Waves and Optics. I remember this because we were doing wave propagation, and I remember distinctly your giving the lectures. One often wonders why, after 36 years, you remember anything about any lecture, but interestingly I remember a few specific things about yours that might be interesting to you.

The fact that I remember anything about your lectures at all attests to the fact that they must have been excellent, for otherwise I simply would not have attended the class, as was my habit in those days. I also remember that you wore a brown tweed jacket frequently, you had a strong Harvard accent and a very preppy and smart appearance, and this tended to increase my and the other students' attention to what you were saying, as you radiated the sense of being a sharp character.

There were two very specific aspects of your presentations that are clear in my mind. The first is that you did some interesting demonstrations. Of course, demonstrations in electromagnetic theory are always interesting, and sometimes spectacular. You had the habit, in those days, after a demonstration had worked of exclaiming, "Gee whiz, isn't that interesting." Apparently you did this frequently enough that I and my student colleagues began to refer to you affectionately as "Gee Whiz Clark." I don't know if you were ever aware of this friendly nickname, but it permeated the entire class, and for years afterwards, when thinking about the lectures of G. W. Clark, we interpreted the initials as standing for "Gee Whiz Clark."

The other very distinct remembrance which I have, which was actually much more stirring and inspiring, was the point in the course when you had developed the electromagnetic propagation with the velocity of light. At the beginning of that lecture you came out and laid a large book, I remember it to be very thick with a green cover, on the lecture table and proceeded with the lecture. After deriving the electromagnetic propagation and the velocity of light, you then opened the book, which was the collected papers of James Clerk Maxwell, and read in the great master's own words how he had made that revelation for the first time. Somehow this left an indelible impression on my mind, and I would say it was your best demonstration of the year. I remember thinking to myself, in the vernacular of the times, "Now that's really cool."

Thus I can stand as a representative of the student body and belatedly give you a course evaluation for 8.04 in 1961. With a student sampling space of N=1 and the infamous rating scale of 0 to 7 (0 being an abysmal performance and 7 being superlative), I hereby give you a 7 for an excellent job in 8.04 for the year 1961.

With best personal regards,

Eric R. Cosman

Eric R. Cosman, Ph.D.
Professor Emeritus and
Senior Lecturer

Old Photo·Album

回想のアルバム

——45年の軌跡——

45yrs trac

I recall, my career has long been with George.

1988年10月

小田 稔

Minoru Oda