



John Boccio, Professor of Physics
46 Years at Swarthmore College



A Tribute to John Boccio in Photos and Tales
from Friends, Colleagues, and Alumni of Swarthmore College

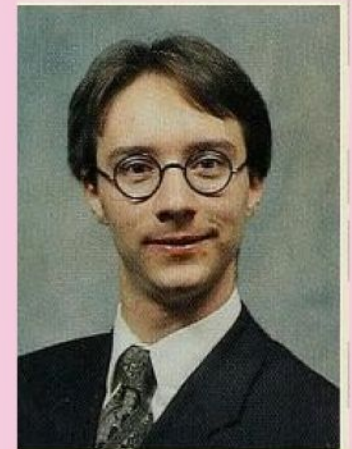


Lisa Larrimore

On the first day of Physics 7, John insisted that he would only answer to “John,” and rather than setting office hours, he set non-hours—the few times when he wouldn’t be in his office to answer our questions. And then he dove right into the material, pushing even those of us who had sailed through high school physics. I still remember spending hours sitting in his office while he patiently re-explained some concept on his giant sketch pad, waiting for it to click—and I also remember the triumphant feeling of emerging from his office, giant paper souvenirs in hand, understanding the physical world just a little bit better. Some of those papers ended up decorating my dorm room wall, to my roommate’s chagrin. John epitomizes why I chose Swarthmore over a fancy research institution: teaching us was always his first priority. And even though his classes were hard, we loved him, and were thrilled each time he was scheduled to teach a course on our track. Indeed, his Physics 50 class may have been the most valuable course I took at Swarthmore, building a foundation in math and programming that helped me excel when I did end up at one of those fancy research institutions for grad school.

Lisa Larrimore Ouellette ‘02

I was lucky enough to have John for three classes and as my advisor for my honors thesis. One of the (many!) valuable lessons I took away from my time with him is the importance of thinking like a physicist, not a mathematician. Even though we spend a lot of time and effort in classes learning how to use math to characterize the world, the important part is the world and not the equations. In Physics 7, for instance, John told me that a physicist should never compute an indefinite integral: you always know what the limits are! But perhaps my favorite example came at the beginning of Physics 50. To explain why we were so much better off taking differential equations from him instead of from the math department, John told us that all those mathematicians wasted tons of time proving that solutions exist to differential equations. In physics, you never have to do this, as John demonstrated: he picked up a piece of chalk, dropped it on the floor, and said “There. A solution exists to Newton’s law of gravity.” I still use this example in my own teaching!



Nick Ouellette ‘02



I started working on my senior thesis under John’s supervision the summer after my sophomore year. I arrived in John’s office for my first day of research to find a black tee shirt at my desk that John had had made for me. The back named all four of the fundamental physical forces with appropriate corresponding diagrams, and at the bottom it read “One string to rule them all”. It is by far the nerdiest shirt I own and, to this day, still my absolute favorite.

John’s impact on my life has been incredible. I’m finishing up a PhD program at the University of Michigan in the philosophy of physics, a subfield I was first introduced to by John when he assigned David Albert’s Quantum Mechanics and Experience as a textbook for Physics 6, my first physics class at Swarthmore. My thesis research under his supervision allowed me to engage this subfield of philosophy I hadn’t known existed despite the many philosophy classes I took. Without his instruction, I wouldn’t be where I am today, nor would I have had the opportunity to work in a field that I love. I couldn’t possibly thank him enough for his guidance over my time at Swarthmore, and I wish him the best in his retirement!

Daniel Peterson ‘08

I was lucky to have had John as a professor for many of my physics courses when I was a student at Swarthmore (1999-2003). I particularly remember Physics 111 (Classical Mechanics, Fall 2001) and Physics 113 (Quantum Mechanics, Spring 2002). John really challenged us a pushed us to learn more material. I particularly enjoyed the seminars we did studying chaos and toys at the end of Physics 111. I remember fondly the toy week where I researched the rattleback, and I learned from my classmates the physics of how bikes and boomerangs work. I owe my strong foundation in Quantum Mechanics to Prof Boccio. John was always available to chat about homework or anything else. He was very supportive while pushing us to be confident and learn more.

Robin Smith Petruzielo '03



I was one of the many typical Swarthmore Honor's work alcoholics. A double major in Physics (12 credits) and Chemistry (13 credits) including the third thesis in Chemistry ever written. (The first was David Baltimore in 1960 and the second was Charlie Kresge in 1975.) Counting the 6 credits in Mathematics that is 31 of the 32 needed for graduation although I had 40 credits when I finished. Including my time on the soccer, golf and volleyball (captain) teams, my daughter who graduated in 2011 thought that I was crazy. However, as I ended up working for DuPont in Wilmington, I attended many reunions and have seen John often in the years since leaving Swarthmore. The most relevant "Boccio" story involves my decision to attend graduate school at Cornell and my time there. John had often talked of his time in Ithaca, of being given the "teaching assistant of the year" award. This had much influence on me. For example, I decided to attend Cornell although I entered the Chemistry Graduate School. I wanted to continue the rigor of my education by taking the quantum mechanics course taught to the first year physics graduate students. It was assumed that as a Chemist that I would not be able to handle it. I would need the permission of the department Chair, Michael Fischer. Michael had a joint chair in the Chemistry and Physics Departments. He started off the meeting by saying "No". I persisted. Swarthmore was mentioned. He tossed me a piece of chalk and curtly asked me to describe (derive) perturbation theory. Without hesitation, I went to the board and stared writing. After several minutes, he just said OK. Next semester, he taught the course in "Statistical Mechanics" to both the physicists and the chemists. Very tough course, I was one of the few As. I always took my teaching duties very seriously. My sections always scored statistically above average. My third year, one of the other teaching assistant committed suicide in the middle of the semester and I was asked to "take over" his sections. I did so without hesitation or monetary compensation. The Chemistry Department gave to me the same "teaching assistant of the year" award that John had been given by the Physics Department many years before.

Charles Wilker '77



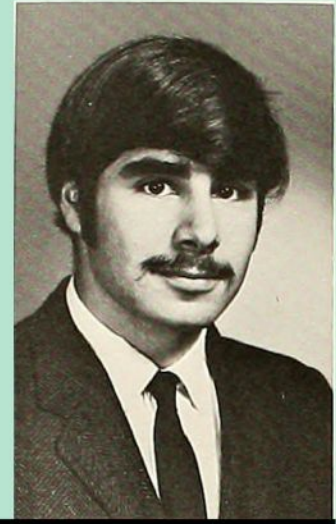
Prof. Boccio is, hands down, one of the best professors I have ever had at Swarthmore. Enjoy the well deserved retirement!! :D

Danielle Greenberg '15



John Boccio has taught general relativity to generations of Swarthmore students. But he wasn't always a GR expert; here's how it started. In the fall of our senior year, classmate Bruce Draine (now a Princeton University astrophysicist) and I approached John about doing a spring-term independent study project in general relativity (that was for spring of 1969). None of us, including John, knew much about our subject. We selected as our text Peter Bergmann's Introduction to General Relativity (Prentice Hall, 1942, with preface by Albert Einstein). Now, 1969 was an exciting time in astrophysics, with the nascent field of X-ray astronomy giving our first looks at what turned out to be the black holes now known to be prolific throughout the Universe. But Bergmann's book was so dated that here's what it had to say about the Schwarzschild singularity, which is general relativity's mathematical manifestation of the black hole: "In nature, mass is never sufficiently concentrated to permit a Schwarzschild singularity. . .," and went on to describe a simple example Einstein himself developed to demonstrate the impossibility of a Schwarzschild singularity and therefore of a black hole. Times have sure changed!

Rich Wolfson '69



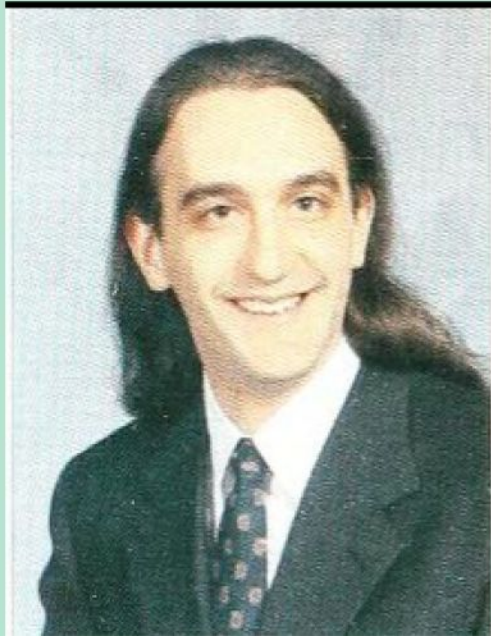
Two generations that John taught:
Rich Wolfson '69 (R) and his nephew Zach Wolfson '06 (L)

As a student, I was lucky to take several courses and seminars with John Boccio in the latter part of his 46 year long Swarthmore career. That was about 15 years ago. In those days, and probably still, the Physics & Astronomy Department always had a positive, family-like social atmosphere. John and Frank Moscatelli would often be seen in the morning on the couch in that lobby by the entrance to the old DuPont Science Hall. Discussing the latest local news and greeting everyone walking in after the long night of studying, or maybe partying... This was the department where I felt at home and chose to spend most of my time in.

It is hard to imagine the Swarthmore Physics & Astro Dept without John Boccio. In my mind, he always was the social and academic nucleus of the department; the quintessential old-school theoretical physicist that no good physics department can do without. Not to take anything away from the rest of the wonderful department's faculty, but it was always John's courses that most students, especially theoretically inclined ones, wanted to take. Some even planned their course-taking schedules years in advance, just to maximize the overlap between theirs and John's teaching schedule.

Whenever I now visit Mike Brown in the new Science Center, it is always reassuring to run into John, shake his hand and have him pat you on the shoulder. It somehow brings a sense of stability to an otherwise hectic life of an early career scientist. There is a lot that I know I learned from John in my four Swarthmore years, and there are surely even more lessons that will become apparent as years roll by. One of the most practical ones I learned early on: how to pick and act at a fine restaurant. [I have rarely been to one before I had a chance to join John and others on the department's tab at fancy Main Line spots for after-colloquium dinners with visiting speakers.] One of the most profound ones: the difference between the "why" of religion and the "how" of science. The difference between what we know, what we think we know, what we know we don't know, and everything else.

Vyacheslav (Slava) Lukin '00



I took my only class with John (Quantum 2) during the fall of my senior year. He was, of course, legendary in the department as an engaging and dedicated teacher. The problem sets were challenging, and each week, most of the class would gather in Cornell to try to make our way through them. Many times, these sessions would go late into the night, but John was frequently in his office to help out. One time, we had a problem of finding a wavefunction for some Hamiltonian $H(t)$. I went to his office with a fully worked out solution that gave the wrong answer but in which I could find no error. I had applied $H\psi = E\psi$. I presented the solution to John, and he could find no error. He showed me a different way to get the correct answer (using the full Schrodinger equation), which made sense and was much easier. But I wanted to understand why my answer was wrong. I left his office a bit frustrated and went back to Cornell to work on the rest of the problem set. Forty-five minutes later, John appeared next to our work table and excitedly exclaimed that he had figured out my error. That is the only time I ever had a professor track me down to help me with my work. I had applied the time-independent Schrodinger equation to a time-dependent Hamiltonian. He confidently predicted that I would never make that mistake again. And indeed I have not.

Jacob Krich '00

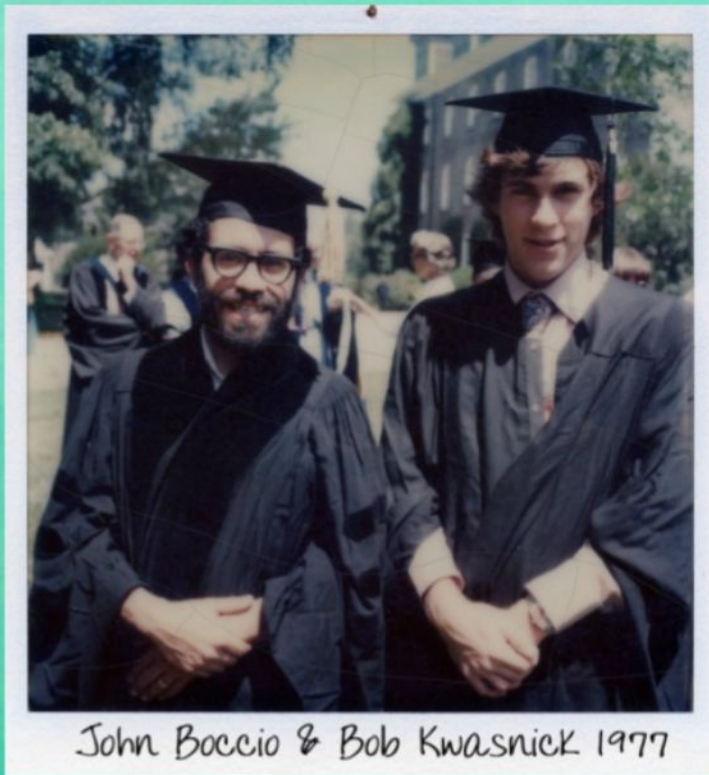


*1986 Dept Picture FR: Olexa Bilaniuk, Mingwhei Tung, & John Boccio
BR: Frank Moscatelli, Paul Mangelsdorf, Rush Holt, & Mark Heald*



John Boccio & Chuck James

1980's Halloween Party



John Boccio & Bob Kwasnick 1977



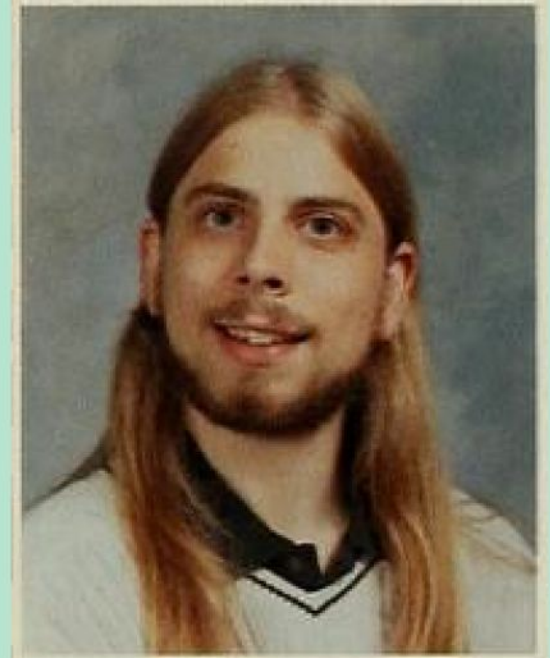
Faculty Play 1978
Paul Mangelsdorf, Bob Savage, John Boccio, Jim England

Two brief recollections of John:

My very first encounter with John was over email the summer before I started at Swarthmore. He was listed on the web as the chair of the physics department, so I contacted him to ask whether he recommended I, as a prospective physics major, should get a Mac or PC for college. In the context of what I later learned of his strong pro-Apple convictions, his reply was actually relatively restrained. I think his bottom line was “It will simply be easier on a Macintosh”.

In the summer of 2000 (between my sophomore and junior years) Nicholas Ouellette ('02) and I began the first of two summers working with John on quantum information, quantum computing, and quantum measurement. Task 1 was to first learn quantum mechanics, since we would not take Physics 113 (the Quantum Theory seminar) until the following spring. John gave us each a copy of his manuscript text on quantum mechanics and would assign sections to read. Nick and I would spend the day reading and discussing the material, and in the afternoon we would go to John's office with a list of questions and points we didn't understand, and John would explain it to us. Often we would come in the next morning to find a revised manuscript clarifying whichever section had been confusing us the day before. The whole experience epitomized the Swarthmore educational ethos: intense learning experiences driven by personal intellectual curiosity and honed by close interactions with both peers and faculty committed to mentorship.

Robert McFarland '02



Robert McFarland



Dear John,

Congratulations on your retirement!

My calling, as it turns out, was not a career in physics. However, many of the things that you taught me have endured over the years. Some of the most important lessons include:

(A) Do what you love and have fun doing it. (You supported my pursuit of physics, studio art, field hockey and finance!)

(B) Failure can be overcome! (If you get a 44% on an exam, just keep your head down and keep going!)

(C) Listen to and learn from your teammates. (How else are you supposed to get through seminar?)

(D) Always appreciate a cold beer. (Isn't that what the physics lounge was for?)

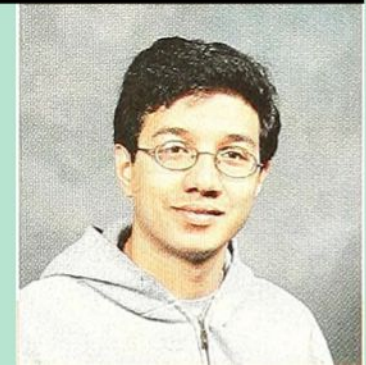
Thank you for being such a wonderful professor! I wish you all of the best in your retirement.

Lauren Hopkins Lischer '98

On the first day of Physics 7, John walked in and said “I'm John. If you call me by any other name---Prof. Boccio, Dr. Boccio, or whatever else---I will not respond.” And I actually witnessed him walking away from a student until he was referred to as ‘John.’

It took me till the end of semester to think of him as ‘John,’ but that ‘John’ has remained the same ever since, buried in the various rants about dark matter, having to assign grades to his students, the elegance of the gyroscope, and the simplicity of IDL. John was a fabulous teacher and an inspiration to study and understand the beautiful and elegant Universe we live in.

Saurav Dhital '06





One of the things I remember most about being John Boccio's first-year seminar on quantum mechanics is the final. In addition to writing a paper, we also went to his house for dinner and a play. It was a lot of fun to walk over to his house, eat tasty food, chat with my classmates, and put on an informal play about quantum theory! By far that was the funnest final I have had!

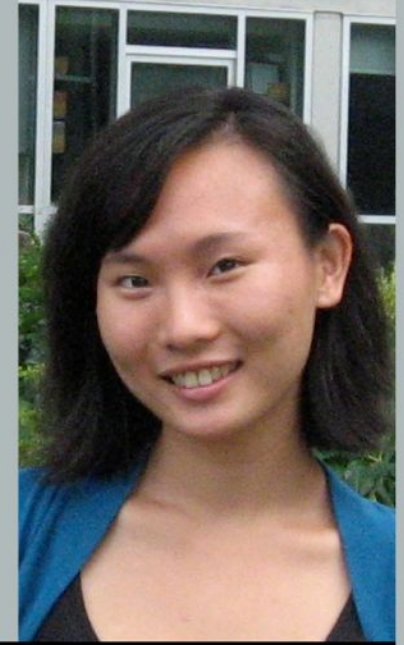
Rose Pozos-Brewer '15

I don't think anyone left the physics program at Swarthmore without having taken a class with John (I took five with him!), and as such, he was like a rite of passage. His classes were challenging, both because of the workload and because he sometimes covered topics that aren't always seen in undergraduate curricula. In my graduate program here at UC Santa Cruz, his quantum textbook touches on most topics that my graduate classes cover, and his Physics 50 notes have been very useful (though at the time I remember thinking, "When would I EVER use these equations?"). John challenged us so as to help grad school seem easy!

Beyond the course material, he also taught us to be skeptical about what's accepted as truth, to cook tons of lasagna and freeze it so that you have meals for weeks, to draw electrons as straight and squiggly lines, and to not cry when you get your physics GRE scores back (there's still hope!).

One of my fellow classmates (Jono) had snapped the attached photo of John in his house. On March 20, 2010 (the day before John's 70th birthday), many of us changed our Facebook profile pictures to this photo and we friend-requested John en masse that day. I went back recently and looked at some of the Facebook profiles of the people who did it, and they still have John's photo among their profile pictures (myself included). I think this is appropriate -- John became a part of each and every one of us, and we will always remember him, not just as an integral part of our Swarthmore careers, but also as a mentor, role model, and inspiration.

Jen Trinh '11



John played an important role in encouraging my development as a quantitative biologist. During my last year at Swarthmore, I approached him about putting together a course on the physics of biological systems. With his interest in complex systems, he was able to help me get started putting together materials and getting a student-run course approved through the department. The final course drew a wide range of students and remains one of my most formative intellectual experiences. I'm sure it had the same impact on many others. John's quiet support, and participation in our late-night gatherings made this all possible.

I'll also never forget the long nights spent reading through endless pages of his quantum mechanics textbook, testing my mind against the problems he set out. I have strong memories of the presentation of that text - the very serious monospace typeface, and the boldface ideas sprinkled throughout the manuscript. I still think John was able to explain ideas more cogently in these pages than many textbooks I've encountered since.

And lastly, I can't forget the leisurely evenings spent visiting Frank's house on the other side of the Crum, with John appearing as if by magic from his side of the property. Those warm, grassy evenings seem far away and frozen in time, a happy memory from when all our ideas were just beginning to form.

Benjamin Blonder '08



1996 Seminar Dinner

*Back row: Ann Moscatelli, Theron Schmidt '96, Sam Weiler '96,
Catharine Glasheen-Civillico '97, Colin Schatz '97, Jessica Gorman' 96,
Eric Engstrom '96, and John Boccio
Front row: Brandon Howard '96, Neilu Naini '96, & Charles (Chaz) Teplin '96*



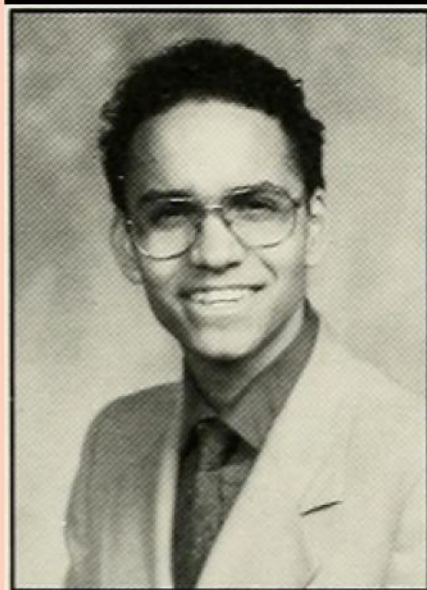
I give John and his engaging teaching a lot of credit for rekindling my interest in physics after some burnout during freshman and sophomore years (too many years of home-work without enough rewards). I later went on to get a PhD in astrophysics at Rutgers. One of my fond memories of John's classes: He was teaching us the junior level classical mechanics seminar, where you do freshman physics over but understand it this time. Mechanics classes begin with all sorts of difficult to set up problems, blocks on inclined planes and so on. Toward the end of the semester, John taught us the Lagrangian and Hamiltonian, which make all of those problems so much easier to formulate. We were briefly relieved, and then the entire class in outrage demanded to know: Why didn't you teach this to us at the beginning?! Of course that's not how you learn it, but John made it look simple.

Ben Weiner '89

After all these years, I particularly remember that after covering all the freshman physics material a day early, Dr. Boccio gave his final lecture on some current research involving liquid helium. While I have forgotten the specifics of that lecture, I do remember that it was as clearly explained and interesting as were all of his lectures, and that the whole class attended and enjoyed it, even though it was not going to be on the exam, and study time for the final exams in all our classes was getting short. His freshman class contributed a lot to my decision to become a physics major, and his quantum mechanics seminar was a highlight of my senior year. Though I won't be able to make your party in person, I am sending hearty good wishes for a happy retirement.



Caroline Morgan '73



A couple of memories of John come to mind:

(1) A friend of mine was taking John's class on Relativity for non-physics majors. One day, in the 'ville, this friend saw John in front of Michael's Pharmacy. The friend was momentarily blinded by a bright flash of light, and when she looked back, John was gone. Since she was in John's class, and "flashes of light" had come up, she, naturally, deduced that John had just run into the anti-John and had annihilated in a brilliant flash of light.

(2) (A tidbit, which is more meaningful to me). When I was applying to graduate school, I wasn't confident in my abilities or whom I should approach for a recommendation. I was, perhaps, more nervous and concerned than I should have been; but, hadn't discussed my concerns with anyone; so, I was suffering on my own. At the time, I was taking John's Applied Quantum Mechanics seminar and, one day, John walked up to me and asked, point blank, "So, when are you going to ask me for a recommendation?" It was an incredibly kind gesture and it completely put me at ease.

Cheers,

Ward Lopes '92

My favorite class in college was Quantum Mechanics with John Boccio. Since then, every day I am rewarded with a quantum view of the world. Thanks, John. Have a long and happy retirement.

Cornell Chun '73



1990's
Amy Bugz, Carl Grossman, John Boccio, Tom Stephenson



2007 Holiday Party
Anne, Peter, John, Carolyn, & Diane



2006 Picnic

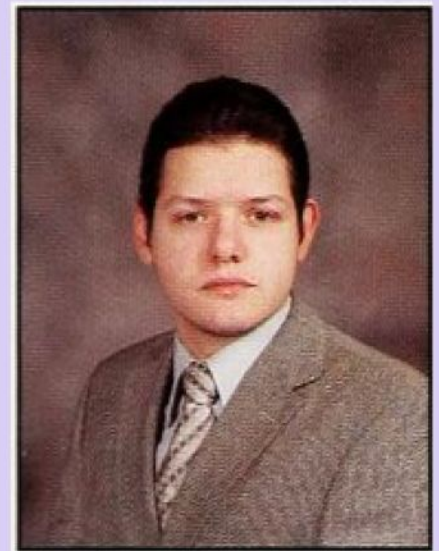


2005 Honors Dinner
John & Frank



2006 Liquid Nitrogen Ice Cream

Out of many, here is my favorite. John didn't teach my Physics 111 seminar, but I heard this one many times when he would talk to his students during seminar break, or when he would walk by and my group would be working on our assignments.



“You see, you just need to find the generalized coordinates, and then it's just algebra. And then you can plot it in IDL.”

On other occasions, John would extol the virtues of Fortran. His office door is the first place where I saw the quote “Most Fortran programmers aren't programmers. They are just scientists in need of data crunching.” John didn't come up with this one, it is a famous quote, but for me it is a John quote since I first saw it on his door :) While I never understood John's passion for IDL, for seven years (5 years of grad school + 2 years postdoc) I used Fortran almost exclusively as one of those non-programmers, and got to appreciate it a lot - no language works better for fast number crunching to this day!

Finally, when my dad and I arrived at the party for the graduating seniors at Frank Moscatelli's house during my Senior Week, we approached the table with the food. There were a few people around, including John, and when I asked him where the end of the line for food was, he replied “What line? Where do you see a line? You see, I'm from Brooklyn, we have no lines there.”

Milos Ilak '04



Eve Curie's biography of her mother, Madame Curie, evokes the spirit of Marie's college days at the Sorbonne. She was mesmerized by the power, the majesty, the unity of physics, and to her that power and majesty and unity was all wrapped up in one phrase uttered by Paul Appell: "I take the sun, and I throw it..."

And who wouldn't be impressed by such a phrase? It embodies the grandeur and fascination and beauty of physics. We can, in our daily work, move stars, abolish planets, and vary the dimensionality of space. We set the temperature to infinity and with equal ease set it to zero. With nothing but pencil and paper we track the planets in their paths, we find the hydrogen spectrum from ultraviolet to microwave — and with a computer added we uncover the gravitational radiation from colliding black holes. Who else accomplishes so much given so little?

It was a parallel phrase, John Boccio's "Imagine a universe in which. . .", that seduced me into physics. (I entered Swarthmore College intending to become a biologist.) We could change the law of gravitational attraction. We could change the mass of the Sun or of Jupiter. And after that intellectual stunt, we could return to our own universe and find out what that exercise in imagination told us about our own home. It is still easy for me to remember the vivid excitement, the raw power, and the stupendous glory of John Boccio's Physics 3 lectures. He talked about lasers and black holes and special relativity. I didn't understand all of it — I didn't understand most of it — but I knew that I loved it.

So I loved it. But could I make a life of it? Would I be accepted by the physics community? Here I was, a naive boy raised on a farm by parents who had graduated from high school. (My father still insists that he didn't deserve to graduate from high school, but his teachers wanted him out and graduation was the easiest way to get him out.) What would happen if someone like me tried to enter this august group of seekers after truth?

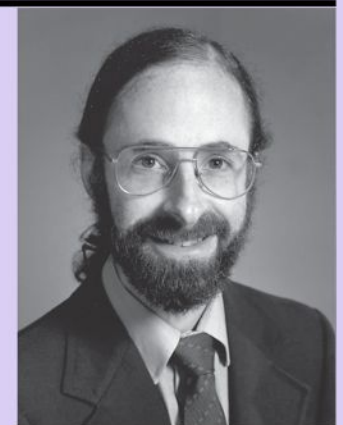
I got my first inkling of an answer, again from John Boccio, when he described the photoelectric effect: "you shine light of various wavelengths on a metal...." That word "metal": Mark Heald pronounced it "met'-l", Paul Manglesdorf pronounced it "met'-l", even I pronounced it "met'-l", but from John Boccio's Brooklyn-reared mouth it came out "met-al'". And this bothered no one. I have since come to understand that physicists don't care what you sound like, what you look like, what you dress like, who your parents were, or what color your skin is. If you work hard and are productive, you're in. The fact that John Boccio was accepted into the physics community gave me hope that I would be accepted as well.

Thank you, John Boccio, for all you've done for me — for introducing me both to the ecstasy of physics and to the generosity of the physics community.

Yours in truth,
Dan Styer '77

I arrived at Swarthmore with several possible majors in mind. But after my first semester of physics with John Boccio, I had a pretty strong suspicion what my major would be. He really conveyed the pleasure and excitement of physics, and doubtless influenced my later path.

Jerry Tersoff '77





2003 Dept Picture: Leo, Catherine Crouch, Chris Burns, Peter Collings, Prue Schran, Mary Ann Klassen, John Boccio, Frank Moscatelli, Michael Brown, and Paul Bloom



John Boccio's 1977 Seminar Class



1982 Dept Picture: Rush Holt, John Boccio, John Dougherty, John Donel, John Andrews, Rick Behrman, Dave Rehfield, Mark Heald, Olexa Bilaniuk, & Freda Oppe



The Department of Physics and Astronomy, Swarthmore College, March 2006



Student Common Room 2010



Halloween 1980's



1982 The Old DuPont Science Center



Memories of John

I.

I'm sitting in class, front row, my seat. (Funny way you end up having 'your' seat even only a few days into the semester). It's about halfway through class; John's lecturing about waveguides and fiber-optic cables—so, it must be physics 8; I took four classes with John but only one of them was E&M. I've been reading *A Town Like Alice*, quite a well-known novel by Nigel Shute; it's sitting on the desk in front of me. "So," John continues. "If we pretend that this—" he holds up an Ethernet cord he's presumably found on the podium, "—is a fiberoptic cable, and—" he looks around (and it's just like John, isn't it, that instead of going for the electronics, he goes for the nearest square object, because he's a theorist through and through and we all love him for it—he has to have other people give his demos for him, because otherwise they don't work; John is an oxymoron, the physicist for whom physics doesn't work), and he picks up my book, glances at it, and for a split-second his attention shifts. "Good book," he says in an aside, and then continues with the lesson, leaving me feeling warm and tingly and proud because it's my book and a good book (and I'm also glad I decided to read it instead of one of my trashy fantasy novels!)



After class, I'm ambushed by two of my girl-friends. "I can't believe John recognized your book!" they say, and I find I'm surprised that they're surprised. Of course John recognized my book; it's a famous book, and, okay, yes, he's a physicist, but I'd never have expected him not to recognize *A Town Like Alice*, because he's John and he knows things and they aren't just physics things. Even if physics is what he does, it's not the only thing he does; he gardens and is on Facebook and makes amazing lasagna.

II.

If there's one thing that math class has taught me, it's that proofs of existence and uniqueness are hard. They take pages and pages and never seem to make sense and are horribly abstract. So, in physics 50, I'm not particularly looking forward to handling the existence and uniqueness of solutions to differential equations. It's probably going to take a long time and be boring and confusing. I should have trusted John more: it takes him two minutes.

To be fair, he does go to the board, but he picks up an eraser, not a piece of chalk (and the board is blank, so it's presumably not for erasing with.) "The trajectory of this eraser," he says, "is described by a second-order differential equation." He drops the eraser, which hits the table, bounces once, and falls to the floor. "Aha!" says John again. "It hit the floor, which is a solution! A solution exists!" He picks up the eraser, drops it again. It hits the table, bounces once, and falls to the floor. "Aha!" says John. "It hit the floor in the same place! The solution is unique!" No, it's not mathematically rigorous, but we're doing physics, not math, and it's beautiful. It's simple, and it's logical, and it's clear.

III.

It's senior year, and I've spent the first semester driving myself crazy writing grad school applications; now the acceptances and rejections are beginning to come, which is both the best and the worst part of the application process. I've just got a rejection from Princeton, which is quite a blow, because they were one of my top schools. I come into General Relativity drooping a little, and John asks me what's wrong. "I didn't get into Princeton," I say with a sigh. John fixes me with a sharp look, shrugs. "Their loss," he says, almost offhand. And suddenly, instead of feeling rejected, down on myself, useless, I feel buoyed up and confident. Because John Boccio believes in me, and not getting into Princeton isn't worth being upset about; it's barely worth wasting a fragment of a sentence on.

IV.

Special relativity. This is probably the end of physics 8 again, but it might be physics 50, because special relativity happens all the time everywhere at Swarthmore, particularly in John's classes. John is talking about light-cones, pausing every now and then to make sure that we know, "This is, of course, assuming that no small micro black holes have appeared," because that would, naturally, throw the whole thing

off.

No mention of black holes has appeared recently. We're now studying the light-cone of the starship Enterprise, which is attempting to communicate with us, but we're having a bit of trouble because their lightcone keeps tipping over away from us. Once it's tipped the whole way over, John points out, we can no longer communicate with them at all. "And this," he proclaims, in his this-is-very-serious, pay-close-attention voice, "corresponds to when the Starship Enterprise crosses the event horizon of a black hole!"

V.

I have an occasional tendency to wander around in a miniskirt, leggings, and knee-high rainbow socks. I don't often wear the outfit to class, but I often wear it on weekends; this weekend in particular, I'm bobbling around the science center in this outfit; for good measure, I've got my hair pulled back in pigtails. John is holding office hours for quantum, but I have to drop off my homework for another class, so I skip past the seminar room, where Jean is already getting her things out and talking to John. John glances at me as I go by, and is clearly a little perplexed by my colorful outfit. At this point, the obvious question is, "What on earth is Rachel wearing?" (Something people have been known to ask). John doesn't ask that question. Instead (and I maintain this is because he knows me far too well), he turns to Jean and says, "Who is Rachael being today?"

Ladies and gentlemen: John Boccio.

Rachel Mansbach '11



John at the girls rugby team party 1994



I started off at Swarthmore not entirely sure of which major I was going to take and took Prof Boccio's Physics 3 and 4 using Tipler. He brought an energy and excitement to physics that made it quite interesting. The special relativity section at the end of the course was a highlight and I remember him using some quite imaginative examples. In the lab for the course I first learned about the computer language APL and so it was an introduction to computer science as well. I can say that if it wasn't for his teaching that Physics course I might have chosen a different path in life.

I also took the Statistical and Thermal Physics course with him. This was quite a challenging course and he made it quite fascinating.

I got my PhD in theoretical relativistic nuclear physics and I can say that it all started with my freshman physics course with Professor Boccio. He was always engaging to talk to and I am very glad I got to know Professor Boccio at Swarthmore.

Neil Ottenstein '84

Dear John

Thank you so much for giving me my start in numerical physics and methods. It's something I've relied on and benefitted from ever since, and I'm still doing a combination of experiments with simulations, now in plasma physics. Best wishes,

Cameron Geddes '97



I will remember and be grateful for many things from John's time here at Swarthmore. Here are the ones that stand out:

- John is always available to help when his expertise was needed, whether answering my questions about quantum mechanics as I prepared for Physics 113 or Physics 5, suggesting alternatives to mid-terms for seminar students, or helping me figure out how to get Java working again on my laptop. He gave generously of his time and expertise to his colleagues and students. I've been especially grateful for his support in teaching Physics 5.
- John welcomes newcomers to the department and watches out for them. He did this for me (including at my interview, when he told me firmly that I was to call him John, in spite of having grown up knowing him as Ian's dad). I have seen him welcome and support many others in the time I've been here.
- John cares passionately about physics. I doubt he would put it this way, but his quantum mechanics notes are filled with enthusiasm and joy. It was a real privilege to have John join one of our Physics 5 courses to discuss interpretation of quantum mechanics with the students, and to see him in his element.
- Finally, John invests himself deeply in his students, from teaching and office hours to writing letters of recommendation. The students know how much he is behind them and how much they have learned from him.

Catherine H. Crouch, Associate Professor of Physics, Swarthmore College

Dear Dr. Boccio,

Quantum Theory Poem 1973

For your paper on the square well,
On "resonance," as they say,
How a packet does say farewell
After quite a long delay;

For your lecture on the propagator
With potentials which can vary;
As a Feynman diagram generator
You really sounded scary;

For the notes on complex function theory
On Cauchy-Riemann and other sages,
(To read the thing might make us weary,
But it's all in ten dense pages);

For the Green's function explanation,
Which taught great expertise;
We used this trick with great elation
(And the integral's a breeze!);

For the Wigner-Eckart exposé,
When all the texts had failed;
The proof--abstruse 'til that one day--
You forthrightly unveiled;

For the second quantization lecture,
Many oscillators harmonic;
(Just slightly different nomenclature
With the a - a^\dagger mnemonic);

For all the culinary treats
Which our seminar breaks did grace;
You know how much a physicist eats;
With our appetites you kept pace;

And for the time which you donated
To decode the words of Baym,
Those sessions which you must have hated
And wished we never came;

For these we owe a great big thank-you,
A thousand thanks and more;
.....Just one more thing we'd like to ask you:
Explain page 204 ??

Caroline Morgan

William H. Elberg

$\frac{3}{2}$
10/11
1/2

Cornell Chem



A few years ago John sent me a list of physics demos that he wanted to do for a series of upcoming lectures in physics 8. Every other week I'd wheel a few new demos up to his class and present them- Van de Graaff, Lenz's law, circuits, etc. John felt more comfortable letting me do the demos, as some of them were notorious for going haywire in theorist hands. One demo involved applying a voltage difference across a coil of wire wrapped around a nail to show that magnetic fields in solenoids resemble those of bar magnets (the nail enhanced the field and kept the coil straight). As I was connecting the battery to the ends of the wire I said "now watch what happens when I apply a voltage difference across my nail". Admittedly, this was a bad choice of words, and a few students started to smirk (infact, I smirked too when I realized what I had said). Then, John said in response- "Sounds like something they do at Gitmo." The class burst out in laughter. It was pretty funny. John's rapport with his students always really impressed me. They revered his intellect, and appreciated his sharp wit.



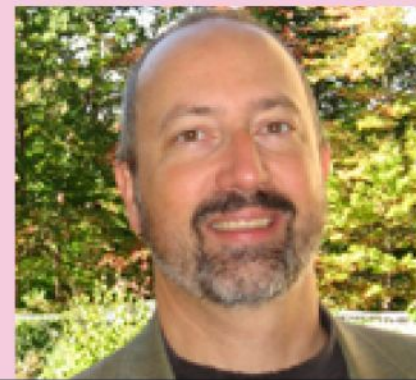
Adam Neat, Lab Instructor, Swarthmore College

When I first arrived at Swarthmore College in 1994, I didn't know quantum mechanics. Of course, I thought I knew quantum mechanics. I thought I knew it pretty well. I had always done well in my quantum courses, so I figured I was set. My first teaching assignment was Physics 6 (the pre-cursor to Physics 5 and invented by John). At the time, the P6 subjects were chaos, special relativity, and quantum states. The first two were a breeze, but when I started to think about quantum mechanics, I realized I was in over my head. To do Physics 6 right, I needed to learn what quantum mechanics was before I could teach it. Luckily, John was there to help me. He introduced me to the beautiful little book by Chester.

What you measure is what you know. Put what you know in the ket.

By 1999 and 2000, I was ready to teach the quantum mechanics seminar. Yes, other professors besides John have taught the quantum seminar. I feel like it went well. I had some great students... Jacob Krich in 1999. Dave Auerbach, Tim Gray, Amy Reighard, Dave Schlossberg in one section in 2000. Mike Seifert and Kevin Setter were in the other section in 2000. These are folks I stay in touch with even now.

Thanks John for being my teacher and our family friend. Dawn, Violet, Zoe, Leah, and I will miss our Thanksgiving dinners together. Best wishes in Atlanta.



Michael Brown, Professor of Physics, Swarthmore College



Dear John,

Thanks for reaching beyond the standard physics curriculum to introduce my classmates and me to ideas about complexity, nonlinear dynamics, and how physics may help us think about biological systems. I can trace so many of my current interests back to your influence, both through the chaos/complexity first year seminar you taught and through your sponsorship of Ben's seminar on the physics of biological systems. It was through your class that I first heard about the Santa Fe Institute. It was also your letter that helped me get into their REU program, an amazing opportunity that I still can't quite believe I got to have as a rising sophomore! So thank you for teaching me physics, for mentoring me, and most of all for helping me pursue my scientific dreams.

Wishing you a happy retirement,

Ari Strandburg-Peshkin '11



2007 Holiday Party: Stephan Hoyer '08, Michael Gorbach '08, Ben Blonder '08, John, Emma Wollman '09, Eric Duchon '08



John & his granddaughter Jessica

2005

One of my favorite memories from Swarthmore is sitting around a table with a bunch of friends in the middle of the night attempting to answer “Using the uncertainty principle, calculate how long you can stand a pencil on its point.” John worked hard to make my college life interesting.

I was a 2007 physics major so I had John Boccio for Physics 7, 14, and 113. I owe almost my entire knowledge of linear algebra, Bayesian probability and quantum mechanics to him.

I noticed not long into my career as John’s student that everything made more sense when he said it than when I read it. I spent hours trying to understand his notes or the textbooks only to have him explain it in nearly the same words and it would click. He had a gift for teaching almost unmatched in my experience. His door was always open, and he was always willing to stop what he was doing to answer a question.

There are so many wonderful memories from classes, seminars, reading groups and office hours with John. His persistent inability to distinguish coke and pepsi. His “class notes” that were longer, more detailed, and easier to understand than the textbooks. His depth of caring about his subject matter and about his students. In the end, though, nothing I can say beats what John can say for himself. I present to you: John Boccio Quotes, Spring 2005 Physics 14 Edition:

Questions You Only Think You Know the Answers To

“Is there any difference between coin tossing and paramagnetism? No! I’m just going to change the numbers...”

“What is the difference between Jason and an electron?”

“We’re going to make another door here and throw George at it. Why doesn’t he diffract?”

“What’s wrong with string theory?” -John (rhetorical)

“It’s philosophy!” - The entire class

Metaphors to Live By

“My coke bottle is on the starship Enterprise.” [It was a Pepsi bottle -Ed]

“It works much better if I make the rubber ducky interact with a particle, like my toe.”

“George might have a wavelength of $7 \cdot 10^{-27}$ cm”



Great Names of Physics

“That’s all I’m saying. And that’s all Fourier said. Unfortunately, he said it first.”

“It’s all right to think like Einstein; he was wrong more times than he was right.”

“Heisenberg derived everything from this... and Dirac derived everything from this... Schroedinger guessed.”

Philosophy of Physics

“Remember, you don’t know anything in physics.”

“How = Physics. Why = Philosophy.”

“I won’t have any reality worries.”

“I use the words heuristic and rigorous... I really mean physics and math.”

And of course:

“There are no logical inconsistencies in Newtonian Mechanics. It’s just wrong.”



Dear John

I started here in May 2003 as the administrative assistant. I have enjoyed the friendship we have developed over the past ten years. I will miss your daily visits to the department office to chat and catch up on the weather and daily life events. I can always count on you knowing what the weather will be like. You have been there for me through a few family disasters and some happy times too, and I can't tell you how grateful I am to have had such a good friend to listen to me. You have taught me so much about computers. When I came here I had never used a Mac before. Now I can barely remember how to function on a pc. As for your retirement, enjoy all that free time to travel, write and read books, visit your sons, play with the grandkids, and of course garden. I feel like you're part of my family around here and I will miss you dearly when you leave the state. I'll just have to come down and visit some time, and hopefully we will keep in touch throughout the year.

Your friend always,

Carolyn Hyde-Warfel, AA to the Physics/Astronomy Nerd Herd

John Boccio hired me back in 1988. He was a very supportive senior colleague - the best that any young faculty member could have. If you came to ask him a question he never let you leave without an answer, and he'd frequently come back to find you with an even better answer, more solid derivation, or the perfect reference. John was encouraging. He never undermined a young colleague's confidence. He let you make your own mistakes, engineer your own successes, and was always part of your solution, never your problem. John was a tireless supporter of women and minorities. When I was tenured, he put his arm around my shoulder and said kindly "Now you're stuck here." John is a grown up flower child - cynical about power structures and ready to foster youth and idealism. John is endlessly optimistic. (He was sure Michael Dukakis was going to win the presidency.) We've been colleagues through Republicans and Democrats, births and deaths, thick and thin. John has never slowed down - he is the same blur of activity that he was when he brought me to Swarthmore 25 years ago ... potting plants, virtually inhaling new textbooks, authoring publication-quality lecture notes, doing extra teaching gladly, making an almost impossible workload look easy to manage, wielding his formidable intellect gracefully ... miraculously refraining from intimidating any of us with it. John is such a dramatically talented theorist and teacher, it is hard to imagine how our department will continue without him.



Amy Graves, Professor of Physics, Swarthmore College



Although I am grateful to John for anchoring the physics softball team, I am afraid that was not one of his more successful efforts. Of course he did not have much to work with. More seriously, I am indebted to him for engaging the interest of a history major who was taking physics to fulfill a distribution requirement and then facilitating his gradual transformation to a physics major. John's class was my first encounter with a professor who would teach with great clarity and then assign problems that would force me to really learn what the lecture was all about. Special relativity, which I saw for the first time in the fall of 1983, is an example, and I am still heavily influenced by the way that John introduced the subject. I was particularly lucky to get my first exposure to quantum mechanics from John. Whether he intended it or not, I was more impressed by the way in which perturbation theory worked than any of the philosophical aspects of the subject. This has influenced how I approach research problems to this day.

Paul Crowell '86

*1973 Halcyon Yearbook
Hot Air Balloon Day*



John & son Ian



The Phoenix presents: "THE DREAM TEAM"

Browse through any popular college guide and you will inevitably come across this all-important category: student-teacher ratio. The lower the student-teacher ratio, the common line of reasoning goes, the more attention each teacher can devote to each student, the better the quality of teaching, and the better the student academic experience.

In the age of rational, scientific thinking, we often find ourselves obsessively trying to find order and meaning in the world by quantifying, compressing, condensing and synthesizing every bit of information we uncover.

The college application process is no exception. Recent years has seen the explosion of literature that provides detailed quantitative data for every college in the nation. The *U.S. News and World Report* has taken the rationalization process a step further, creating a pecking order of its own.

But in our fanatic drive to make sense out of everything, we are glossing over or simply eliminating key information that cannot be reduced to mere statistics, and in the process, oversimplifying, perhaps even misrepresenting the actual reality. What exactly does it mean to be the number one college in the United States? The formula by which the *U.S. News* rankings is derived is so complex that they don't even bother to explain it.

More often than not, at the end of the day, when all the information has been thoroughly processed, the numbers do not tell us much.

A low student-teacher ratio, after all, does not automatically make for a good academic environment. But good teachers do. In the end, it is the people who constitute the numbers that make the difference, not the numbers themselves. Swarthmore is the remarkable academy it is because of the people who do the teaching.

This week the In-depth section honors five of these individuals, who, according to a student vote, represent the best that Swarthmore has to offer. What all of them have in common, our reporting revealed, is their continuing desire to make the learning process more accessible, relevant and productive for each and every one of their students.

A total of 270 ballots were collected. In each ballot students were allowed up to three votes. Each student could only cast one ballot. The survey, again, is not meant to be scientific and does contain certain biases. The freshmen have only been exposed to a limited number of professors. The survey is obviously biased against newcomers who may be very good teachers, but simply haven't been around long enough to establish a reputation. It is also biased against departments with fewer students, such as the Engineering Department, which boasts many fine teachers, our survey reveals. But current student opinion is reflected in the results.

The objective of this report is to highlight the characteristics of quality teaching that elude statistics such as the student-teacher ratio, through telling the stories of the professors who embody these traits. It is not our intention to rank the teachers of Swarthmore in any way. In keeping with that goal, the final results of the vote will not be published. The top five professors, who are profiled here, are not ranked.

—Min Lee

the big five your favorite profs dissected

John Boccio

By Brendan Karch
Phoenix Staff

It is a brisk Sunday afternoon on campus, and like most students, John Boccio is hard at work. A smiling, joking Italian-American with a graying beard and expanding midsection, John (never call him Prof. Boccio) is in his office most any day, at most any hour.

Now in his thirty-third year at Swarthmore, Boccio is everything you'd expect from a veteran teacher – caring, patient, and thorough – and so much more. It is hard to believe that the fossil of the Physics and Astronomy Department is also the most techno-savvy and cutting-edge. It is also hard to believe that, for all his years, he is one of the least jaded physicists you will ever meet.

But it is precisely his drive to stay current and to continually relearn and adapt, qualities reflected in Boccio as technophile and as teacher, that makes him such an engaging and enjoyable professor, and one of Swarthmore's favorites.

Born in 1940 in an Italian/Jewish Brooklyn neighborhood, Boccio was tracked from an early age as a special talent. He traveled two hours each way from his home (then in Queens) to Brooklyn Technical High School. It was there that Boccio discovered his calling in life.

"When I took Physics the first time in high school is also when I decided to be a teacher," says Boccio. "My Physics teacher in high school was terrible. I felt, even then, 'I can do this stuff better than he can.'"

Unprepared to leave behind life in the city, Boccio attended Brooklyn Polytechnic Institute, where he received a B.S. in Physics. He then went straight to Cornell University, finishing his Ph.D. in Theoretical

Physics in 1967. That same year, he was offered a position at Swarthmore.

While at Swarthmore, Boccio has always been on the cutting edge of technology. In the 1970s, he helped study the material base for modern semiconductors. Then, from 1987 to 1993, he was the college's first Director of Academic Computing. Much of today's technology infrastructure – including the campus network, computing labs, file-servers, free software, and free printing – was developed by Boccio.

But even during his stint as an administrator, Boccio taught one class a semester. "I couldn't stop teaching," he recalls. Without it, he said, he would have gone insane.

Boccio's intimacy with the learning process – he continues to explore new areas of physics after forty-plus years – carries over to the classroom. He does not necessarily communicate the fanciest or the best way to do physics, but rather the way that is most beneficial to students. For example, he will often hammer a class with details but then retreat to discuss the implications.

He believes in giving students as much time as they need on their own and with the professor. As a case in point, this semester he has over forty office hours per week.

Students seem to appreciate John's teaching methods and style. They stress both his thoroughness and his laid-back attitude, which combine to make even the most dreaded and difficult material easier to digest.

"To this day I do not feel that I have ever learned a subject more completely than under his guidance," says Amy Reighard '01.

John vows that, even after all these years, "teaching is never a job; it's exciting."

"I love being in the classroom," he says. "I love being able to find new ways to teach students physics."



The Physicist



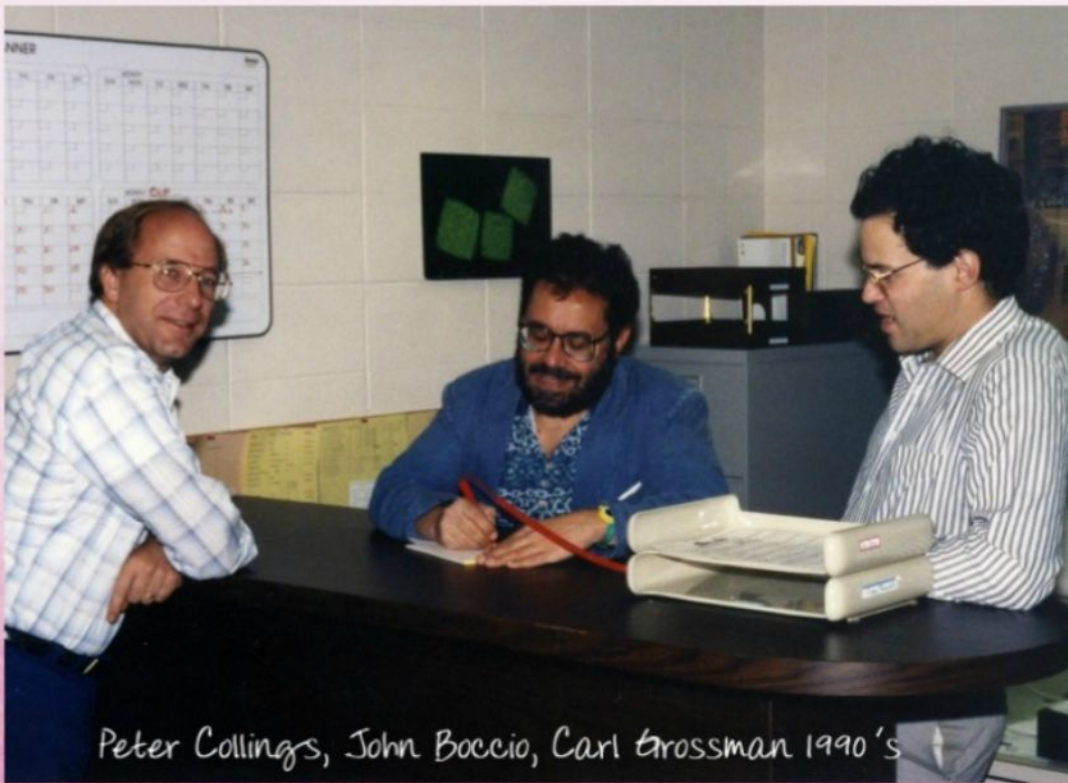
2008 Holiday Party

FR: Carolyn Warfel, Carl Grossman, John Boccio, Mary Ann Klassen

BR: Tim Gray, Mike Brown, Catherine Crouch, Frank Moscatelli, Dave Klassen, Adam Neat

Department of Physics and Astronomy, May, 2010





Peter Collings, John Boccio, Carl Grossman 1990's



Gene Klotz, Steve Palmer, John Boccio



1990's

Amy Bug, Carl Grossman, John Boccio, Tom Stephenson



Paul Crowell (Physics and Mathematics), Karen Ohi (Physics and Mathematics), Mike Pedrazzini (Physics), Peter Yim (Physics), and John Palmieri (Mathematics) 1986



*Graduation Dinner at the Moscatelli Home 2002 with Seniors:
Joanna Brown (in front), James Dolan, Rob McFarland, Kevin Setter, Lisa Larrimore, Nick Ouellete,
Rebecca Carter, Daniel Bjerre*



2007 Graduation

Tom Elverson & John



2008 Holiday Party

John, Carl, John, Amy, Catherine, & Frank



My first course with John was a seminar on general relativity. I entered a world that at once captured my attention, and has held on to it to this day. Previously "course" and "seminar" meant something tightly focused on a standard curriculum. Not here! I had never experienced such remarkable scope of John's seminar. Our discussions ranged from simultaneity to the space-time metric to parallel transport to differential geometry to cosmology to Hermitian symmetric field theories. John shaped the discussion on a vast stage of topics with a subtle and sure hand underpinned by deep understanding. And, just as critically, he had known when to let chaos reign. In one vivid moment I recall three groups of students going to the backboards to work through a calculation in different ways - we couldn't spend the time to agree on one method. This wasn't a "classroom" anymore, but a brainstorming session in an academic start-up. As the boards filled, we dug into the grocery bags full of delicious treats that John brought for seminar break. So what did you learn? John asked as we re-assembled as a whole seminar.

John's deep, almost visceral sense of the material - in one evening he presented a derivation of (Newtonian) gravitation by "tweaking the g_{00} term" - is combined with a delight in sharing the wonderful ways in which this universe works. And share he did in seminar, outside of seminar, during in the next summer and academic year. When talking with John I find myself baffled, why wouldn't everyone want to do this?

John's support was absolutely critical for me in showing a way forward, to find a spot in this world where I can continue to pursue some small bit of the world that John introduced to us in the GR seminar.

Cheers,
Seth Major '91

I remember one time that the question of what to do after graduation came up, and someone mentioned working for the defense dept. Prof. Boccio said, "I have one piece of advice: don't do it."

Best Regards,
--John Beale '88



In around 2003, while engaged in the campaign, "The Meaning of Swarthmore," the College assembled a video by the same title. It featured quite a few reflections and remembrances by alumni, including members of the Board of Managers. No faculty member was mentioned as often, or with such reverence and fondness, as John. It was very clear to me that he had a profound effect on his students, both those who went on in physics and those who went on to do completely different things. He awakened their minds, and gave them both intellectual strength and self-confidence through his tough-love, rigorous teaching.

--Paul
Paul Rablen, Professor of Chemistry, Swarthmore College



Rhymes with "orange"?

At an event like this, what are you supposed to do?
I think we're supposed to embarrass him.
I'd write a short poem, it's all I've got time for
But he probably wouldn't enjoy it at all
And besides there isn't a rhyme for... Boccio.

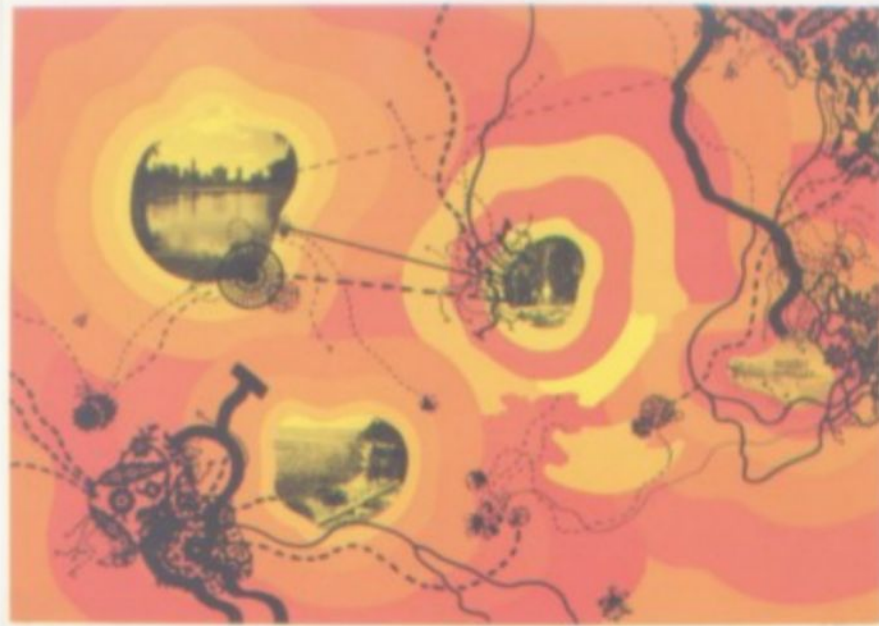
"Relativity's simple," he said with a shrug,
"You measure it here, you measure it there
It moves in between along a straight line for..."
He gave the pill on his sweater a tug
Not a bad start but I still lack a rhyme for... Boccio.

"It's simple," he said
And simple he made it.
Find the right place to stand
For the problem at hand
And watch it all fall into place

I've done a lot more than physics since then
But I still hear his voice in my head
Saying once more what before he had said,
With good theory you're perfectly primed for
Any other field. Except poetry.
Because I still lack a rhyme for... Boccio.

"Nothing hard about quantum," he said with a wave
"The short version is all you need time for"
Not writing a verse I'll regret to my grave
If only I had a good rhyme for... Boccio.

Tom Sgouros '82



John — it's hard to imagine our department without your daily presence. You have not just made a significant contribution to the physics education of two generations of Swarthmore students, but were essential to the Department's, indeed the field of theoretical physics for our students, colleagues, & College. Your legacy will certainly endure.

And I hope you will find satisfaction in the next stage of your life.

Thank you & good luck —

David



Photo: Ackermann. Edition for Pankratz 08

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David Cohen

Associate Professor of Physics, Swarthmore College





Happy Retirement John
April 27, 2013





Happy Retirement John!



Thalia Mills '00, Gil Toombes, & John Boccia



David Schaffner, Paul Jacobs, & Matt Mewes



Deborah Carney & Diane Collings



John Boccia & Cheryl Warfel



John Boccio & Chris Chyba '82



Seth Major '91 & John Boccio



Peter Collings & Rob McFarland '02



Paul Rablen, Mary Ann Klassen, & Ana Matković



Chris Chyba '82, Valerie Thomas '81, Valerie's daughter, John Boccio, & Atish Agarwala '15



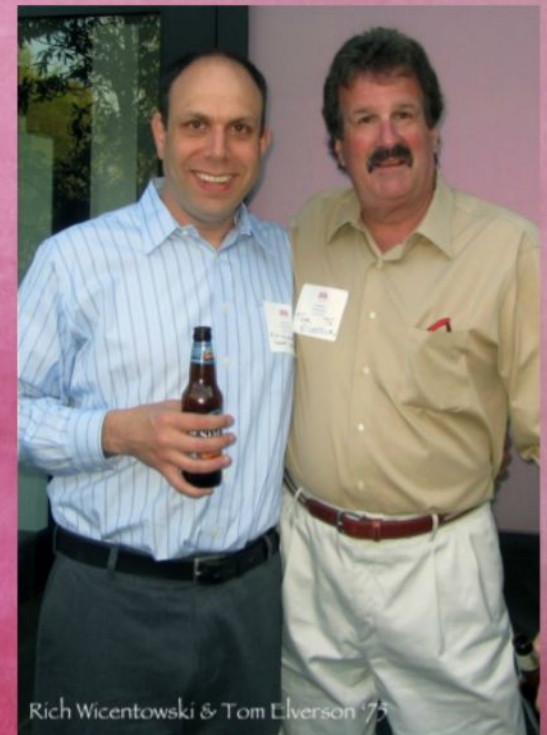
Michael & Dawn Brown



Paul Crowell '86 & Frank Moscatelli



Amy & Larry Gravis



Rich Wicentowski & Tom Elverson '75



John Boccio's Retirement Party, April 27, 2013



Frank Moscatilli and Joan Hoffman '98



Tom Sgourus '82 & Valerie Thomas '81



Steve Palmer, Raul Cuza '91, Robert McFarland '02, Atish Agarwala '13, Ward Lopes '92



A toast to John by Michael Brown



Congratulations John!











Thalia Mills '00 & Gil Toombes



Steve Palmer, John Boccio, & Thalia Mills '00



Catherine Crouch, Valerie Thomas '81, John Boccio, & Valerie's daughter



Ana Matković & Carolyn Warfel



Tom Sgouros '82



Valerie Thomas '81



Atish Agarwala '13



Catherine Crouch



Josh Lifton '98



Ward Lopes '92



Larry & Amy Graves



And there you have it John.
Your retirement send off.
Enjoy life after Swarthmore, we will miss you.

pleasant energy
equals mass times speed of light
put things in order

taught me to inquire
kindled curiosity
momentum through mire

While I don't remember all the physics I knew when I graduated from Swarthmore College in '91, I will never forget the gift you gave me. You taught me to easily access the curiosity I have about how things work on all their levels. No matter what domain I find myself working in, this ability to be curious makes the distractions and setbacks part of something bigger and more beautiful. For that I will always be grateful for having been your student.

Raúl Cuza '91





Bye John, We Will Miss You!



Swarthmore College
Department of Physics & Astronomy