

Remarks by Stephen Adler at the Memorial Symposium for Fred Goldhaber, Simons Center for Geometry and Physics, Stony Brook, April 28, 2025

Fred and I were both in the Harvard class of 1961.

I got to know Fred well between sophomore and junior years. At some point when we talked, Fred said he was going to start taking 200 level graduate courses as a junior. So I decided to do the same, and this had a big impact on my career.

A few words about the courses:

Physics 253, now quantum field theory, but then was Schwinger's advanced quantum mechanics, rather idiosyncratic -- no QFT

Physics 232a,b -- Advanced electromagnetism - Paul Martin taught one semester, Wally Gilbert (transitioning to molecular biology) the other

Senior year -- Fred and I asked Paul Martin to give us a reading course in QFT -- we read many papers from the Schwinger Dover volume on Quantum Electrodynamics (show)

There was basically no particle physics at Harvard then -- Fred and I graduated June 1961, Sidney Coleman arrived as a Corning Lecturer and Fellow in fall of 1961. Gashow and Weinberg both came to Harvard in 1966.

So Fred and I went to Princeton, where we roomed together my first year in the Old Graduate College, a 15 or 20 minute walk from Palmer Laboratory. For meals in the Grad College one still had to wear black gowns that were passed down from year to year (rather grubby, I recall).

In the Fall of my second year I got married and lived off campus; Fred was a participant in my wedding to my first wife Judith Adler.

In our first year we took courses (Treiman particle physics) -- and seminars (graduate seminar organized by Young Suh Kim and Jan Tarski). Our intention was to work for Murph Goldberger, but he went on sabbatical leave our second year, so we ended up working with Sam Treiman -- a lucky break since Sam was a weak interaction expert, and we didn't get sidetracked into the Geoff Chew program of strong interactions as 'a reciprocal bootstrap' via the Mandelstam representation etc.

Back to second year, I had written several condensed matter papers before Princeton, but my first particle physics paper was a joint PRL with Fred, spring 1963, entitled "Use of the deuteron to provide a polarized proton target" --through measurement of the spin of the recoil neutron by scattering on He₄. Not too practical, but a good learning experience.

We both did theses with Treiman -- finishing together in 1964 (along with Curt Callan, also in our graduate school class). Fred's thesis was on ``Tests of Exchange Models including Spin" mine was on a calculation of weak pion production and its use in CVC and PCAC tests.

Fred's and my paths then diverged -- I went back to Harvard in the Society of Fellows, Fred went to Berkeley as a Miller Fellow. He met Suzan while in Berkeley, and I later attended their wedding.

Our further personal encounters were through ceremonial events much later on:

Fred attended my 60th birthday conference at IAS October 16, 1999. Sam Treiman spoke at the conference dinner, but this was I believe our last encounter with him because he died from his leukemia November 30 of the same year.

Fred is pictured in several of the informal conference photos posted by Kirk McDonald. Link: <http://kirkmcd.princeton.edu/adlerfest/> [Also Google ``symmetry found and lost"]

I attended Fred's 60th birthday conference at Stony Brook two years later, in the fall of 2001. Photos were posted on the internet by Young Suh Kim. Link: <https://ysfine.com/people/goldha.html> [Also Google the opening phrase ``Fred Goldhaber became sixty years old this year (2001)"] Organized, by George Sterman, just as this current meeting! I remember conversations with Fred and Suzan and with Fred's dad Maurice Goldhaber. The conference took place just a few weeks after the 9/11 2001 attacks -- which affected people's travel. With the encouragement of the conference organizers, I drove back to Princeton in the wee hours of the morning after the conference dinner, and had no problems, but there was an unforgettable long line of bumper to bumper traffic crossing the Verzano Narrows bridge to enter NYC.

After that our contacts were Harvard related. At our 50th reunion we arranged to sit at the same table for one of the evening dinners (the organizers had thoughtfully circulated everyone's cell phone numbers). My second wife Sarah and I skipped the 55th because of other travel, but Fred and Susan attended and emailed: ``If we don't see you there we'll still be thinking of you and family, and recalling our long connection"

It has indeed been a long and very rewarding friendship for me, both at the personal and professional levels.

Thank you.