Malcolm, Tues 11 Dec 2007

I have greatly enjoyed your Spin Dynamics book and appreciate, perhaps in ways most readers don't, the effort, experience and wisdom that went into it. It is an excellent book in so many ways it would take me a long time to elaborate, but somehow I think you know all that. So instead, I will do what everybody likes to do. I will tell you a little about myself, a profile (perhaps atypical) of one of your readers.

Your opening quote from E.M. Purcell comes to mind, as it snows today in Salt Lake City. I was lucky to be taught my first real E&M class by him (circa 1967) in which he used his orange Berkeley series book. This class and book blew my socks off, and I have been looking for them ever since. I went to his office hours a few times and he was always kind and clear in his explanations of things. I knew a little about him, but your quotation made me look him up again and I now realize how many things he did, and how significant those things were. A short summary I liked is here

http://www.news.harvard.edu/gazette/1998/04.09/FacultyofArtsan.html

Probably that course launched me in the physics direction. That direction was aided (positively) by a quantum mechanics book by Saxon (with the mysterious $\psi^*\psi$ on the jacket), and (negatively) by Roberts and Caserio's organic chemistry book, all encountered around the same formative time period. Later I had many fine physics teachers, taking Goldstein mechanics from Shelley Glashow, and later at U.C. Berkeley E&M and "theory" from Dave Jackson (green book) and lots of amazing stuff from Gene Commins, the perfect teacher (weak interactions, stellar nucleosynthesis). I dabbled around, and eventually wandered into the theoretical particle physics world. This was the time of the discovery of the J/ψ particle, and the development of "the standard model" of SU(3) QCD (which I don't think has yet allowed anything to be calculated). But *I* was off roaming the world of Regge poles, pomerons, S-matrix bootstraps (with their delightful branch cuts), dispersion relations, topological expansions -- things of interest to my thesis adviser Geoff Chew. By the time I got my PhD at Berkeley around 1977, the musical chairs were well filled with Sputnik occupants who had many years of sitting still to go. Non-abelian gauge theory (infrared slavery! asymptotic freedom!) was the thing to do, and I was somewhat left up a creek without a paddle. The "lepton aristocracy" had won. The S-matrix bootstrap was a fascinating idea, but sort of ended up where string theory will soon be, which is to say, in the corner circular file of history (IMHO), but we shall see. I did one 3 year post-doc in Utah with Jim Ball, another Geoff Chew student of a previous era, and then I basically just up and quit (but the skiing was and is great). I saw that 14 year impending battle for the rare tenured "theory" job slots (a battle I suspect you went through) and the constant begging for tax-funded dollars. I was not a superstar in the current superfield so I was super SOL.

So, rather than go to Nebraska for another post-doc, I got a local newspaper, looked at the help wanted ads, and got a "real job". This ended up being in the field of digital hardware design which in turn ended up being something done almost entirely inside Xilinx chips which you undoubtedly know about. We went from hand-drawn schematics to CAD-entered schematics to hardware design languages like Verilog and VHDL. I was a corporate employee for 17 years and then became a contractor and have now, at least for the moment, "retired" from this pleasant and modestly lucrative activity.

The physics is still in there, however. I recently have invested a lot of time learning biology and molecular biology which, I have to say (but only at first blush), seems totally different in its nature from physics, math and engineering. But I see the little protein machines carrying out their appointed tasks, the receptors and ligands, everything driven by physics (which some people refer to as chemistry). The

unsolved problems are plentiful. Write a program that folds proteins and determines if there is a unique stable structure, and what that structure is, and what it might catalyze or what it might do. In molecular biology, much more so than in current theoretical physics, "the game is afoot".

My special interest in molecular biology relates to "solving" diseases, especially those in relatively young people whose lives are wrecked because we have been too stupid to figure out what is going on. We are still applying the leeches, and carpet-bombing cancer. So I guess cancers and the autoimmune diseases have my immediate interest. Regarding the latter, I know a few people suffering from MS, and have realized how important MRI is in that area. We need to see *in vivo* what all the machinery is doing because *in vitro* does not (yet) emulate the proper full environment, nor (yet) does computer simulation, which would be my ultimate direction here (with very heavy hardware boost). Of course *in vivo* really means MRI, and in particular MRI spectroscopy and related advanced methods which are moving along but need to move a lot farther along. I would like to see projected out of a *very small* voxel the time-dependent action of all the players (cells, cytokines, etc). That is, project the local molecular process field into a "pattern buffer" where it can be studied. That would certainly be an ambitious PhD thesis for someone.

So, retirement is not all that bad! This interest in MRI led me to buy your book. All that physics stuff I find is still embedded way down in my out-of-cache (non-L2, as we hardware guys say) memory, some of which appears discreetly in your book -- the Lie group generator algebras and Campbell-Hausdorf, the rotation group SU(2) representations (like "spin"). I suppose there are good books now on SO(3,1) and all that $T^{\mu}{}_{\upsilon}$ tensor notation is well documented. (Luckily, the gravity books like Weinberg's are forced to get that stuff right.) So for me, reading your book is like poking around in a large attic, and finding old friends there who have been patiently waiting for me. If nothing else, it has been very enjoyable, and who knows, maybe I will actually do something useful! Perhaps you recall Sherlock Holmes's very different comments about *his* attic, where he stores bicycle tread patterns and cigar ash characteristics.

I must add, the web has been a priceless tool to have available fast and live when reading your book, or any book; I sure wish I had it "back when". There is pretty much no detail that cannot be located with a little effort.

Hope you are getting some good revenue from your book. The saying is that the audience drops in half with each equation that appears in the text, so you are in big trouble on that score! [Did I mention how I liked your 17-page(!) annotated "list of symbols"? Have not needed it yet, but like it being there. Did I mention my appreciation of clean consistent notation? Did I mention those 2D Fourier plots? Did I mention...]

And in conclusion: Thanks for writing such a nice book. Assuming I finish it, I will be sending you another email "errata" installment some day.

Best regards,

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