ZULF EXAMINES SOME ISSUES OF OPERATOR THEORY

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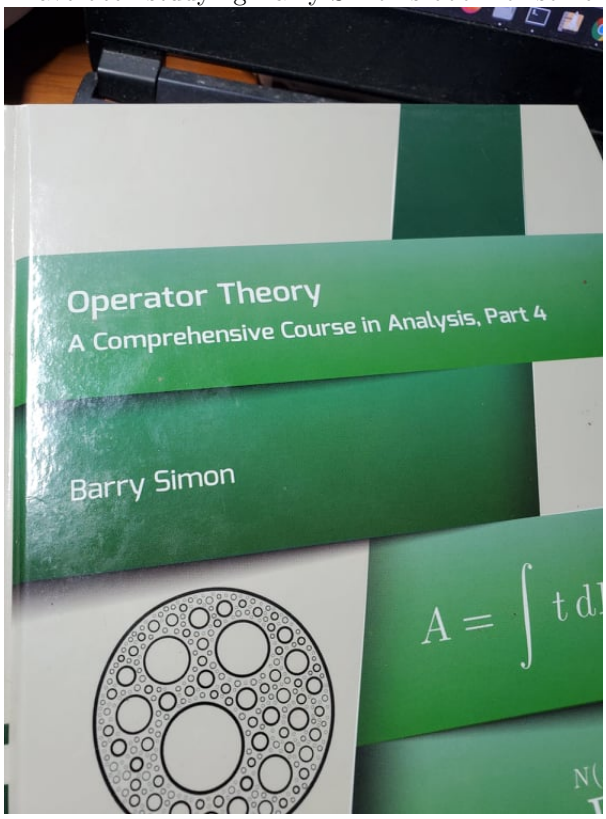
For whatever reason, I am just not extremely comfortable with strong, weak and norm topologies on $L(X)$ the bounded linear operators on a Banach space. Just today as I was working on Stanford Analysis Problems of 2015 [1].

I have been studying Barry Simon's book for some time and it's very good.



The first time I heard history of theory of operators was at Peter Sarnak's famous functional analysis course at Princeton that was attended by Terry Tao and Steven Gubser too. I got an A- in the course, which I does not displease me. This was in 1993 and I was strongly influenced by his great lectures.

I want to keep writing about the history and my understanding, as it is really valuable to me. Modern operator theory begins with a great paper of Erik Ivar Fredholm in 1900, who was a student of Mittag-Leffler. Peter Sarnak was extremely good at teaching us the sense of history and the issues that were important to this period. But I don't have the lecture notes and so I will have to attempt independent

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understanding. Now this is really interesting that Fredholm was Swedish, just like Hormander. I was not clear about this. He solved some integral equations using infinite dimensional determinants. Hilbert shifterd to analysis hearing lectures about Fredholm's work in 1901. It was Hilbert who worked on spectral theorem for compact self-adjoint operators. A true master with great taste. Bravo David Hilbert! I am glad you left the true theory of nature to myself! I used David Hilbert's spectral theorem for Four-Sphere Theory between 2008-2018. I should be more careful about exact attribution but this makes a great deal of sense to me, that it was the master's own work that I used instinctively when I examined quantisation.

Von Neumann was the pioneer of topologies beyond norm topology on operators. The norm topology is one for

$$\|A\| = \sup_{\|x\| \leq 1} \|Ax\|$$

The strong operator topology is one where we have $A_n \to A$ iff $A_n x \to Ax$ in X. Weak operator topology is one where we have $A_n \to A$ iff $A_n x \to Ax$ weakly.

The example to keep in mind is the shift operator

$$A(a_k) = (0, a_1, \dots)$$

for which A^n converges to zero in strong operator topology but $\|A^n\| = 1$ and so these do not converge to zero in the norm topology.

I want to go back to the issue that is most obvious and most intriguing, which is the remarkable success of treating functions as points in an infinite dimensional Euclidean space. It was not David Hilbert himself who introduced this point of view but Erhard Schmidt. This man is highly undervalued. He is responsible for the most basic linear algebra orthogonalisation process Gram-Schmidt and yet you can't even find his biography in Wikipedia. I found one in [2]. The man who really clarified the geometry of the Hilbert space with inner product structure was not David Hilbert himself. These sorts of things bother me because this sort of riffraff behaviour by the human race puts *my own immortality* in uncertainty. I do not like this one bit.

What does one have to do for immortality on this planet anyway. I can assure my dear reader that if I had introduced the world to orthogonality and Gram-Schmidt process and wrote down the first theory of inner product spaces with completeness, I would be quite furious if the riffraff managed to erase my immortality regardless of who is David Hilbert. That's just atrocious behaviour. Why would anyone do anything for such a people?

Historically the order for orthogonal polynomials were (a) Legendre, (b) Chebyshev, (c) Jacobi, (d) Hermite, (e) Laguerre. Erhard Schmidt's work on Hilbert space theory absorbed all these into the beautiful general infrastructure that is familiar to all students of Mathematics. You see, I was very keen to use the eigenspinor basis of the four-sphere to do any calculation at all. I was fortunate for the Fourier series theory that I could use explicit basis for spinor fields on a four-sphere. As you might correctly surmise, I am rather grateful to all the people who had contributed to finer senses for function spaces with explicit ability to represent functions on an interval, the circle, and spheres. One point that fascinates me of course is the natural understanding that these concrete bases for representing *very general class of functions* will actually produce models of Nature.

Obviously I was preceded by many great geniuses and in fact learned about these first from Courant-Hilbert's work. There is deep *mystery here*. It is the nature of many scientists and engineers to focus on technical presentations for their use in many problems, but I am doing something in *fundamental physics* using these "classical" techniques. I want to remind my dear reader that "classical" is a word that is meaningless. Everyone calls all sorts of things "classical" just so they can claim "post-modernity" for their own work. From occurrence to occurrence "classical" means totally different things. I don't consider Legendre's time to be far enough away from our own to really consider his work to be all that "classical". The human race has existed for 7-8 million years. Everything in past four centuries, to me, are extremely recent.

1. My Four-Sphere Theory Is Not "Classical"

First of all my Four-Sphere theory is not "classical". I worked on it seriously starting 2008 and I gained success after a decade of work without support in 2018. It is *Science* and it is the best Science of fundamental physics in the entire history of the world. It is, by technical terminology that is familiar, a *classical field theory*. But my aim was never to be either "classical" or "post-classical". These are not important to me. What is important to me was to understand Nature. It so happens that the techniques I used have pedigree going back past Fourier series and Hilbert Spaces to Legendre polynomials. But the actual results I use such as identification of eigenspinors of the four-sphere are much more recent. I do not understand what is gained in Science by what seems to be arbitrarily and subjectively declaring various sorts of things 'classical' and other things 'non-classical'.

This is a substansive issue and not a syntactic one. You see I *explain* quantum phenomena in the actual universe to be a consequence of spectral theorem for *compact* selfadjoint operators. The theory was perfected by David Hilbert and Erhard Schmidt in the early twentieth century in their work on integral equations which began with the famous paper of Erik Ivar Fredholm 1900 when it was announced to 1903 when it was completed. But I learned the theory from Peter Sarnak in 1993 in a Princeton course as an undergraduate, and so I had very strong intuition for why the actual universe exhibits quantisation that happened to have been borne out in more than a decade of labour.

So why is my work *classical*? It's not classical. It was done 2008-2018. I certainly would never use this language for my own work. I am absolutely certain that Einstein's (and Poincare's Special Theory of Relativity is *false* for Nature). This has not gained me accolades from people, but I am *right*. Time does not do anything other than move linearly in Nature. I can tell you why Einstein made the error. You see Einstein built his vision of Nature on the most solid ground he knew, and that is that Maxwell's equations were the solid. They are not. Maxwell's flat space equations are only approximate truth. The flatness of empty space is a major error of all past ages of physics. Einstein stood on solid ground of the Maxwell's equations' symmetries on flat empty space. This ground was not solid enough. The Lorentz transformations are only sensible for a universe where empty space is flat. Empty space – whatever that could mean – is not flat in our actual universe. So four-sphere theory with curvature $\Lambda = 1.11 \times 10^{-52} m^{-2}$ is the basic geometry of space. There is no intermingling of space and time in the actual universe.

I am indebted to R. M. Dudley for setting the hstorical record straight in *Real Analysis and Probability* p. 183–185. Gram-Schmidt orthonormalisation was discovered by the Danish mathematician P. Gram (1879, 1883) and exposition was given by E. Schmidt (1907). Legendre polynomials were introduced in work from 1785 and orthogonality of trigonometric functions also were known from this period. I am not an expert of detailed history here but roughly 240 years. My use of eigenspinors could be said to continue in this tradition. The exact computation for eigenspinors on four-sphere have purely twentieth century history as Sir Michael Atiyah and I. M. Singer were responsible for the Dirac operator I employ in their great work of the 1960s. There was never any doubt in my mind that this was the right Dirac operator for a fundamental physics already in 2008, but only later, when I examined the concepts of Spin from Sakurai's popular *Advanced Quantum Mechanics* did I realise that the established scientific theories have a deep misunderstanding of spin, and it was the Mathematical theory for spin structures that was the right model for *Nature*. I decided this without any influence from physicists and am quite sure that this is the case. Spin is *not any property of autonomous particles but rather a global property of the geometry of the universe* where particles are merely ephemeral phenomena formations of configurations in a spinor field that hold together temporarily.

2. Nobel Prizes And Accolades

I am a serious Scientist and I have immortal achievements. I do not have Nobel Prizes and accolades. I don't consider them to be substantial. I consider them fluff. You see, this is not to denigrate those who do have them; they are talented people. But what do I care if I have them? It's fluff to me. And that is rational. For people who have some of those things, they ought to value them; for people like me who don't have them, they are irrelevant fluff.

3. The Width Of Zonal Harmonics Strong Vindication of My Four-Sphere Theory

Although this note began to examine some of the history of operator theory, I constantly return to my measurement for the width of the electron from the four-sphere model of geometry of space with $R = 3075.69$ Mpc. The reason for this match is obvious, that I am right about Nature and the geometry is exactly four-sphere. I made enormous efforts not to fudge the measurement and my notes give details on the match. The mathematical theory of eigenspinors of four-sphere are extremely sophisticated and there is almost no other explanation that makes any sense that the geometry of the universe is four-sphere. This is one of my pioneering discoveries and obviously I want immortality for millions of years for it. Four-sphere theory was never conceived by anyone other than me, and I was sole discoverer of the correct geometry of Nature. In order to appreciate this you have to appreciate how delicate the eigenspinors of Dirac are analytically, how precise the zonal harmonics are and their properties are mathematically derived. A large amount of sophistication in *pure mathematics* then leads to structure and localisation of zonal harmonics of a four-sphere. Almost all other explanations of electron width will fail to compete with mine, for this is a great advance of Man's Understanding of Nature. This did not come about by accident. It came about after labour of a decade and attention to mathematical issues. It is the success of

my labours in Four-Sphere Theory that justifies my efforts in mathematics and its connection to Nature. These issues are profound and not hobbies. Zonal harmonics on four-spheres are not mathematical entertainment; they are the *exact models of all particles that exist in Nature.*

4. For Me Individual Liberty For All People Is Sacred

For some universal Natural Right of Liberty is a matter of political ideology. For me it is not political ideology but sacred spiritual faith. I am strongly influenced by Percy Bysshe Shelley and the Romantics, and as a result I am extremely reluctant to contrain the Natural Rights of others – except for malignant pathogens such as Bill Gates whose destruction I promote as a moral imperative for all those who believe that Evil criminals ought not be allowed to harm the peoples of the world. This is why despite my convictions about the fundamental truth of my Four-Sphere Theory , I do not believe that others should be restricted to pursue whatever their heart desires. Time and history will clear up who has the best Science and this is not achieved by authority and coercive means.

The great enlightenment and hopes of the Romantic period were dashed by Realist drabness and then after that Modernism in Europe that accompanied the bloodshed of First World War. I believe in the lofty hopes of the Romantics, and that will give some sense to who I am.

5. Examining History of Functional Analysis

A great of impetus for the development of functional analysis in the 1920s was influenced by efforts to put quantum mechanics on firm mathematical footing. I am challenging both quantum mechanics and quantum field theory with my Four-Sphere Theory, but this is an effort that I began in 2008. I used to own a copy of Jon Von Neumann's On The Mathematical Foundations Of Quantum Mechanics.

References

[1] https://stanford.app.box.com/v/pastqualifyingexams
[2] https://mathshistory.st-andrews.ac.uk/Biographies/Schmidt/