

SERGEI L. SOBOLEV AND DISTRIBUTION THEORY

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Today is January 25 2021. And today, after some preliminary rhetoric for seeking a higher Social Status in American Society, a nation of 330 million than the wretched hick illiterate charlatan *Bill Gates*, I turn to more productive activities.

First of all my heart is heavy with worry for my baby, my precious *Four-Sphere Theory* and it is filled with apprehension, that perhaps it will not survive for thousands of years as Man's Final Theory of (Macroscopic) Nature. I cannot bear the thought of it ever perishing. And so I examine the history of Mathematics, to try to find various things in that history that will allow my precious Four-Sphere Theory to survive and prosper, and stand as a beacon of light against darkness and ignorance, and to be the proud monument of Man's Quest for Understanding of Existence, the certainty that comes from millenia of struggles, the final answers that even the Hitchhiker's Guide to the Galaxy did not provide.

As you, my beloved people the human race might be well aware, my vision is quite constrained. Sweet Thames, run softly till I end my song. Sweet Thames, run softly for I speak not loud nor long. Having made my invocations I begin to understand something of this mystery of what had led to the theory of generalised functions.

Let us quickly pause to get our bearings. We are finite beings, fleeting beings, and within finite number of seconds we will have ended our lives, and we pine for immortality. We cannot, therefore consider every possible function and mathematical object in detail. The uncountability of the real numbers we handle deftly in concepts and not in excessive detail. We use various symbols to hide the frightening details because they are too much for us.

We return to 1936-1937 to Sergei L. Sobolev's great achievement, the birthing of distributions. For it was *not Laurent Schwartz* who invented these but Sergei L. Sobolev. But let us use Laurent Schwartz' symbolism and language.

We have multiple aims in our simple note here. On one hand we do care about why Mr. Sobolev and his various illustrious colleagues cared to do such a thing. We do care, and since Mr. Sobolev is more famous than myself, this appeal is more likely to be popular. But we have another, more selfish, agenda. We want to have some sense of this space.

$$\mathcal{D}'(S^4).$$

These are scalar valued distributions on the four-sphere. We also want

$$\mathcal{D}'(\Gamma\Sigma S^4)$$

These are the distributional spinor fields on the four-sphere. They are defined as duals to $C^\infty(S^4)$ and $\Gamma\Sigma S^4$, i.e. smooth functions and smooth spinor fields.

The beautiful thing about Mr. Sergei L. Sobolev's work and the more elaborate work of Laurent Schwartz is that their particular infrastructure translates quite smoothly to the case of four-spheres.

Hold on, don't disturb the man. The man is interested in a slight examination of just how much I can just pass off work of Sobolev and Schwartz to four-spheres without doing any work of my own and then claim all of this as part of four-sphere theory and seem quite sophisticated in the end. Is this really deceiving the audience? No. It is in a sense a tribute to Sergei Sobolev and Laurent Schwartz.

I mean their back-breaking struggles to bring me the fruits of their considerations where I smoothly absorb all of it with minor modifications and gain great renown for my great polished technical infrastructure for four-sphere *theoretical physics* is normal. They deserve the credit for the technical mumbo-jumbo, ermm, the precise mathematical notions I mean, for my soft and gentle monopoly over all processes of Nature.

1. THERE IS NO DIFFERENCE IN CONCEPTS BETWEEN PHYSICS AND MATHEMATICS FOR DISTRIBUTIONS IN FOUR-SPHERE THEORY

I am not interested here in technical challenges in either physics or mathematics. Distribution theory has been worked out in Mathematical Analysis from 1935-1936. Instead I will emphasize that the mathematical concepts are *identical* to the physical concepts in four-sphere theory without any subtle difference but *exactly identical*.

My dear reader might be quite confused. The reader might point out, quite irritated, "Zulf, you have been making such hue and cry about the fundamental difference between Science and Mathematics. Why are you suddenly flipping and flopping here and saying that the Mathematical Concepts are identical to the Physical Concepts?"

This is a good question and important one. You see, four-sphere theory is based on the exact geometry of four-sphere being the actual geometry of space, and so in my theoretical physics, all mathematical structures examined for four-spheres are *exact physically interesting objects* without even a tiny change. That is one of the central principles I have followed. In other words, I do not ask whether $u \in \mathcal{D}'(\Gamma\Sigma S^4)$ has been found experimentally in Nature. Instead, I say, "Everything that has any natural mathematical construction related to four-spheres is my scientific prediction about Nature." If it has not been found, then I claim it as a scientific prediction on which all the experimental physicists ought to be busy finding in Nature. I am the theoretical physicist here, not them. So I implore experimental physicists to redouble their efforts and find all things imaginable for four-sphere and find them in Nature pronto. And call all of them Zulfikar Moinuddin Ahmed predictions please.

You say this is cheating, because I should be fine tuned? There is no law of Nature that prevents me from predicting all possible things associated with four-sphere of radius $R = 3075.69 Mpc$ as feature of Nature. And so I make this prediction right here.

2. ZULF GIVES GENUINE PRAISE AND GRATITUDE TO LEE SMOLIN

I just heard Bill Gates demand that white physicists take credit for my broad identification prediction to Mr. Lee Smolin. I want the world today and posterity to know my own opinion about Mr. Smolin, and let this note be historical record

of January 25 2022. Mr. Lee Smolin is a man of integrity, a great theoretical physicist and a gift to the world. He is a great leader of theoretical physics and I am personally honoured and gratified to have come to his notice. He accepted that my prediction here is valid, and he did not accept the horrible, low, disgusting, dishonourable suggestions of the wretched vicious criminal man Bill Gates. It is the wisdom and virtues of people like Mr. Lee Smolin that allows human race to reach better states and it is the vicious ugly evil criminality of people like Bill Gates that is the cause of all bad events. Bill Gates ought to be vicious physically beaten, denied all assets and burned at the stake for his insolence.

3. ROUGH OVERVIEW OF HOW SERGEI SOBOLEV BEGAN DISTRIBUTION THEORY

I examined a short note about Sobolev [1]. The year of birth of distribution theory is 1935, and it was really Sergei Sobolev who first used them. Various adventures happen and Sobolev solves the Cauchy problem for hyperbolic differential equations with variable coefficients on the space of functionals, that's roughly the story.

This is very good, because we first notice that it was wave equation that led to these distributions. I, Zulfikar Moinuddin Ahmed, am wise and immediately declare $\mathcal{D}'(S^4)$ and $\mathcal{D}'(\Gamma\Sigma S^4)$ as objects of extreme importance in physics, at least in four-sphere theory.

Why would I do that? Well I am wise, and notice that bright people like Sergei Sobolev worked on wave equations, and they were naturally led to distributions. When that happens, I don't worry about all sorts of experimental checks. The S4 Electromagnetic Law, the Ahmed-d'Alembert Law is a wave equation, and so distributions are physically important.

Look, you are not dealing with a fool exactly. If bright people like Sobolev were trying to solve wave equations and I tell you that the fundamental law of Nature is a wave equation, then obviously these distributions are physically important. You don't get it do you? You see physics, the external world, it is a priori governed by who knows what mysterious things of Nature. So why shouldn't distributions be part of Nature? Distributions are part of Nature if Zulf says they are, alright. This Sergei Sobolev had genius in seeing what to do with them. I'll give him some small kudos for preparing things for me and put Distributions as Zulf's Authorised part of Nature. Any questions?

4. ZULF'S PRINCIPLE

Four-Sphere Theory focuses on fixed four-sphere geometry and spinor fields that are functions. But it is very clear to me that distributions are part of Nature too. I am including *all distributions* in the four-sphere theory.

In the future various distributions that are not smooth or measurable spinor fields can be tested by clever experimented. I will predict that they will be found to be physically real. You see, unlike Maxwell or Einstein or others I don't think Nature is constrained by our set-theoretic notions of function. Nature could be producing distributional solutions all day and all night and we could just have been blinded by our own prejudices for centuries and did not look for them.

I encourage experimental physicists to come up with all manner of clever experiments to find non-function distributions in Nature. I will be surprised if there is failure to find a lot of them.

5. NATURE MAY NEVER HAVE CARED ABOUT REAL-VALUED FUNCTIONS AT ALL

I want to point out something that is very simple and clear to me now. You see, Nature has been around for trillions of years in the past (and expansion and big bang are fantasies). Nature was doing Nature's thing, mysterious and enigmatic. Nature might have noticed that Leonhard Euler is confused about whether functions are analytic expressions or whether they are mappings of real numbers in 1740s. Nature might have peeked at the notebooks of Augustin Louis Cauchy and the struggle to define continuous functions. Nature might have smiled in a sort of paternal manner at his antics. Nature was governed by whatever mysterious manner for trillions of years. Nature *was never actually beholden* to our concepts of fields and functions at all. And so there is nothing strange if we find that distributions on four-sphere give us a lot more of nature's actual phenomena.

The idea that functions are *physical* but distributions are not is our prejudice. I will propose that distributions – and non-function distributions in $\mathcal{D}'(\Gamma\Sigma S^4)$ are just ordinary part of Nature and we didn't know this because of our own prejudices. This is fairly intuitively clear to me. You see when nature's fundamental law, the Ahmed-d'Alembert Law is a wave equation, then distributions are most likely just underneath in *Nature* because four-sphere geometry is what holds things together.

I do implore all experimental physicists to thoroughly seek distributions on smooth spinor fields of four-sphere of radius $R = 3075.69Mpc$. Seek, and ye shall find.

6. MY STRONG INTUITIVE SENSE IS NON-FUNCTION DISTRIBUTIONS ARE PART OF NATURE

My strong sense of intuition tells me at least $\mathcal{D}'(S^4)$ and the analogue for smooth spinor fields is just part of Nature. Great analytical geniuses like Sergei Sobolev do not invent things without necessity. Wave equation is the fundamental law of Nature, so I expect that distributions are just part of Nature itself. Nature has no obligation to conform to the functional relations on functions; the wave kernel itself is distributional. These suggest that Nature will have ubiquitous never-sought-for distributions that are not functions.

Experiments have to test my bold prediction. They arise from looking at history of analysis. You look at the broad expanse of mathematics from 1742 when d'Alembert first wrote down the wave equation to this very day late January 2022, and you see struggle of Man to find the right sort of thing to understand both Mathematics and Natural Laws, and it would be strange if Nature respected our all-too-human efforts and our organisation of development. Seek distributions that are not functions. They are most likely to be found not just in exceptional situations but everywhere all the time because they are natural. Wave equations like distributions a lot. The universe is a vibrating membrane, a four-sphere that is constantly vibrating to live and to evolve, and so distributions ought to be everywhere.

7. THE WRONG INTUITION OF MAX PLANCK

The Max Planck intuition of 1900 was that the entire universe is filled with innumerable one-dimensional harmonic oscillators. We're essentially saying, "No, Max Planck, you're on the right track but wrong. There is one gigantic oscillator that is the four-sphere itself." And in addition, the fundamental law of (macroscopic) universe is a wave equation on spinor fields. So the entire universe is composed with all manner of solutions of the wave equation.

It's not natural to consider only function solutions of wave equations, i.e. classical. They are some of the things in Heaven or Earth, but other things not dreamt in the function philosophy are distribution solutions. And I am putting all of those things into the four-sphere theory as physical and not formal. They ought to be ubiquitous simply not measured or noticed.

8. CONSEQUENCES OF WAVE EQUATION BEING THE FUNDAMENTAL LAW OF NATURE

I have laboured very hard for more than a decade to establish the concepts that *there is a single macroscopic law of Nature and only one law, and that law is a wave equation on spinor fields of four-sphere.*

One of the major consequences of these concepts, truths rather, is that the center of physics is wave equation and not some other sort of equation, and therefore distributional solutions are *part of physics* and not merely technicality. If *Nature* follows wave equations, then it will be *Nature* that contains solutions that are not classical.

This is natural to expect because there is nothing sacrosanct about ordinary functions at all a priori for Science of Nature.

Note that I am not promoting the view that functions are not important. Functions have done well for our physics and will continue to be most important for most situations. However, as fundamental theoretical physics, we have to expand *physical objects* to include distributions not out of penchant for making things unnecessarily complicated, but to allow Nature to breathe and be Nature and not attempt to constrain Nature.

Attempts to constrain Nature will fail. Nature does not actually care about our narcissistic impulses. Distributions arise naturally for wave equations, so we ought to be wise and incorporate them into our fundamental theoretical physics.

REFERENCES

- [1] http://www.math.nsc.ru/LBRT/g2/english/ssk/sobolev-schwartz_e.html