Notes on My Death March

1. *18-July-2016.*

I have worked on Continuity in Jester Notation (cont_-short.lzt) for a while, it was a very useful exercise. I came to that from pointillistic.idraw and Gather/continuity. At that point I am immersed in Lebesque integration, which led to the next visit to continuity, topology, etc. It also lead to another visit to infinitesimals and this time finally Ultrafilter constructions (having conceptually understood formal logic and gotten in peace with the axiom of choice). The ultrafilter visit was nice because there is an axiomatic approach to topology using Ultrafilters so the topic is related to two things of interest.

The approach of Jester notation also helped with conceptually cracking variational calculus by extracting the 'idea' of change and extremum to a certain conceptual and 'axiomatic' level which can then be applied anywhere where it is possible. This conceptualizes 'norm' and since we can take the 'norm' of a functional, we might be able to do 'calculus' on that, and we can, for me it was important that the concept 'variaional derivative' is not treated as 'cornerstone', but conceptually is given the above. The calculus conceptualization is still on paper notes though.

The above triggered a path recheck of any blockers being removed, indeed 'ghosts and machines' is now almost cracked, the same as the variaional approach to physics. Thanks to this view of set theory as the incredible vista, and the axiomatizations as picking and isolating certain parts, along with our theory of 'translation' (see the 'real world' continuity in cont_short), we are now much readier to deal with all the axiomatizations of classical mechanics. Note the equiv (not implication) of variational or least action to Newton is never proven. A very good memory refresher in case of memory problems on the really big pictures of those multiple theories is 'On Virtual Displacement and Virtual Work in Lagrangian Dynamics'. In any case, we found

the great 'russian style' Landau/Lifschitz series, which is simply great. The mechanics volume is beautiful and provides at least one almost fully rigorous (while still basic unlike Arnold's or Fraenkel's) approach. arring a few mentions of infinitesimals. We still need to write a 'how to read' on those in physics. A useful path is probably that of 'translating', 'modelling', a way of putting a 'number system' within a 'number system', expounding that the first level numbers 'reals' are black boxes or approximations, within which 'things can happen' while 'keeping the equations, predicates, etc.' the same (e.g infinitesimal variation, instantaneous velocity, etc.) and second level numbers which represent that 'black box' internal state. Alternatively, meaning 'is valid for seqs tending to zero' might also be possible. Apart from that it is a good strategy to study Landau in parallel with Arnold and also Fraenkel, it provides the conceptual and easy to 'understand' grounding of the mathematically higher versions. Landau also provides a path to all theorems through what seem like real 'essentials' and that is good (e.g conseqs of absoltue time, etc.), it can be taken as a basis to compare other approaches with and not be confused by them. Landau's next relativity volume is also approachable. We are interested in the other volumes, since the quantum one seems to far out of reach, the missing link being the historic and experimental part relating to the nature of the electron, photon, etc. and the contadictions in electrodynamic theories of the electron needing infinite 'rest-energy'. For now, we stop this stroll with the tag session least_action and continue with the work stared in the first paragraph.

Hestens' treatment is another intersting one, but Landau should come first. 'Clifford Algebra and the Interpretation of Quantum Mechanics' is very telling as it tells a human story.

What actually triggered the above paragraph is the usual Lagrange multiplier justification by 'internal

forces do no work' (e.g in Baraff). How exactly does one imply the other?

In addition, we had another visit to PBD and stabilization (bookmarks)

The (non-rigorous?, non-modern) passage to multipliers from constraint forces is in one instance illustrated in whittaker, p.215. This seems to be the kind of argumentation that Baraff is relying on. Is this a 'physicist' version of a Lagrange multiplier proof?

> The forces ... are unknown : but they are such that, in any displacement consistent with the instantaneous constraints, they do no work. It follows that the quantity ...