SPECULATIVE READING, SPECULATIVE PHYSICS

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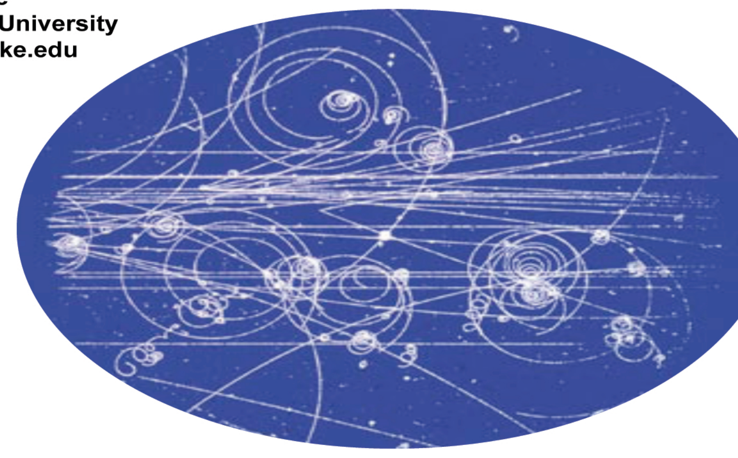
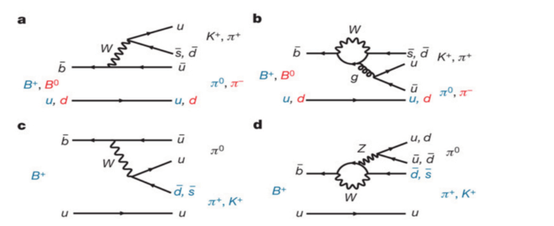


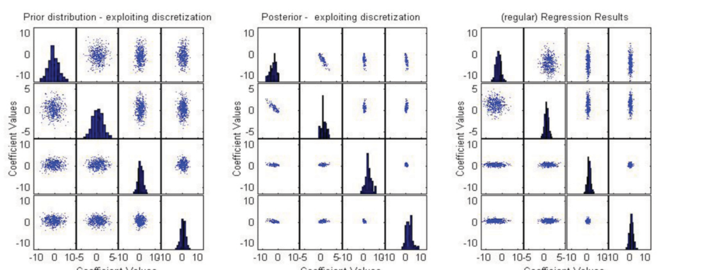
Reading Nature's Semiotics – Meson Tracks

Ontological Reading

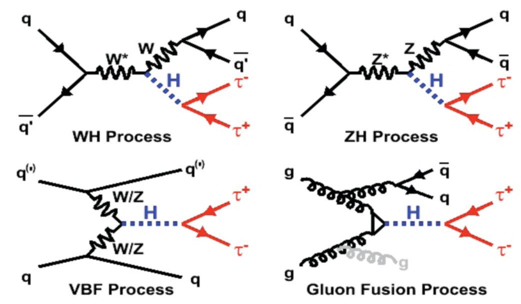
This primary stage of reading represents deep level reading that breaks down the signs of the text being read into its most rudimentary blocks. In physics, this may mean reading into the tacit knowledge, 'sense-experience' and affectivity forming the reasoning behind various epistemological commitments such as wave-corpuscularity, unification of forces, theory of relativity, counterfactual definiteness, unitarity, pointer states, decoherence, structure of the Standard Model, and symmetrical representations, among other intervention into the physical state.

Ontological reading can also include the not-yet-properly critiqued 'intuitive' or sense-directed reading. What is constructed as 'intuitive' forms of knowledge is probably the most fundamental aspect of ontology while also the hardest to discern because of its self-reflexivity (due to a combination of abductive reasoning and 'irrational' insight that are only retroactively rationalized).



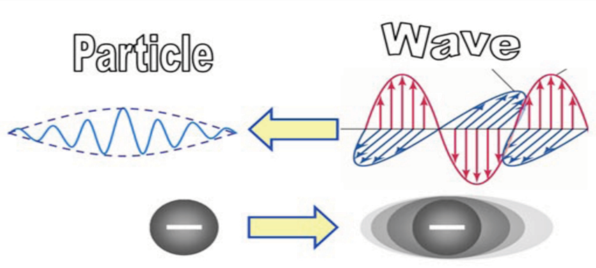


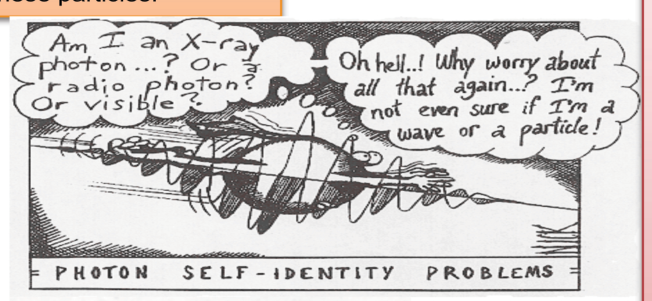
An example of Bayesian Inference Using Poisson Statistics– the process of inference forming is tied to ontological reading.



Ontological readings take place at the level of objective and subjective. The objective here represents real observables that are replicable and accessible from more than one pathway , but whose probabilities can be added to a whole. Subjective reading, especially the reading of physically entangled states and Bayesian networks, enables access to the ontic. Ontic-level interpretation in physics looks into incomplete theories and narratives forming most physical structures whereby one can discern points of rupture, misapprehension and phenomenal paradoxes (that represent mis-recognition and boot-strapping of epistemic formations). An example of this is the history behind the construction of the Standard Model.

Ontological reading encompasses surface-layer (epidermic-level) reading and also deep-layer reading. When reading at the surface level, one first ascertains what are the signifying epistemics involved, while also marking and defining the boundary of semiotics embodying particular concepts, physical states, or specific macro representations of micro-physics. Deep-layer reading means discerning and teasing out the microscopic phenomena that are manifested at the macro-level but do not belong to the macrostate. The Feynman diagrams above are representative of the deep reading of complex integration functions representing characteristics of the sub-atoms, even as these arcane equations are boundary markers defining the sub-structures of the sub-worlds of these particles.

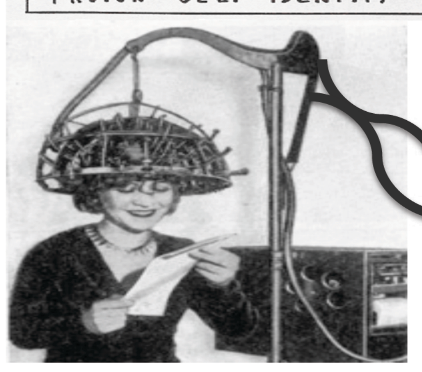


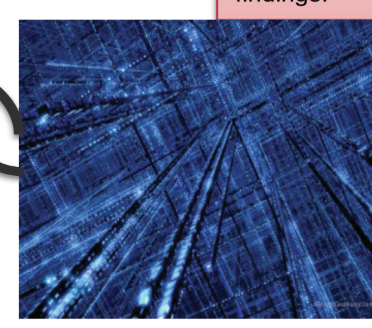


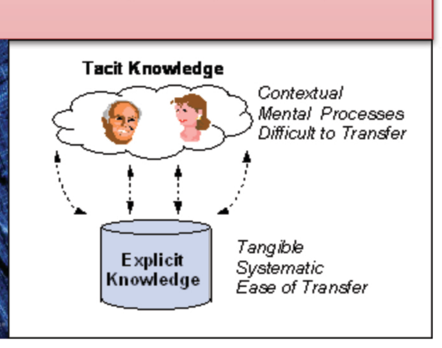
Epistemological Reading

It is an open secret that how one reads empirical evidence is conditioned by the world paradigm one subscribes to: classical, quantum and a mixture of both at varying degrees. I argue that the epistemological is consistent with Bayesian subjectivity of multivariate outcomes that consist of multiple conditions. Epistemological reading also concerns a form of reading that is referred to as comparative reading since there is a need for constant comparisons between existing knowledge paradigms and newly acquired facts/ interpretations as a result of analyzing newly acquired data that may, or not, confirm previous findings.

Comparative reading also takes place when one is reading between different subfields, either to transfer knowledge acquired within one's own subfield to another, or vice versa. It is in the process of epistemological reading that one is able to uncover a crisis or knowledge gap surrounding existing paradigms because epistemological reading involves the reading of experimental data or even simulated data against predictions and other existing models that are either popularly, or not, accepted.

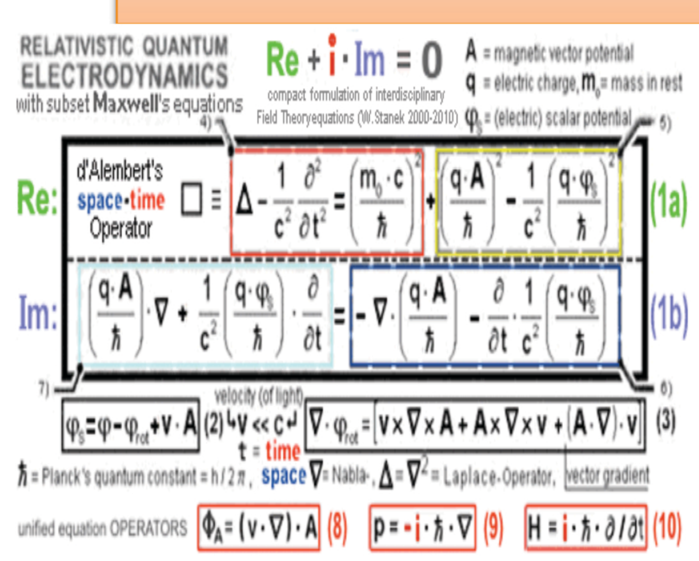






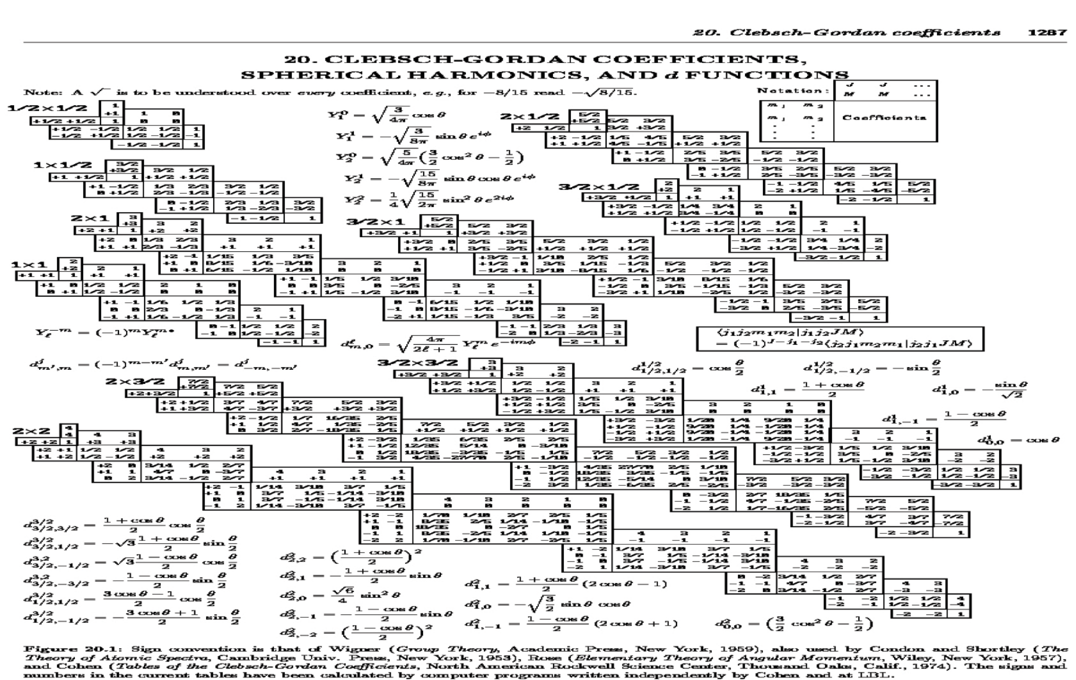
Entangled Readings

Epistemological reading complements ontological reading since each form of reading works inseparably from one another, as the examples below will demonstrate. It is by understanding how they work separately and in connection to each other so that we can better understand the process by which we build the narrative of quantitative and qualitative knowledge.



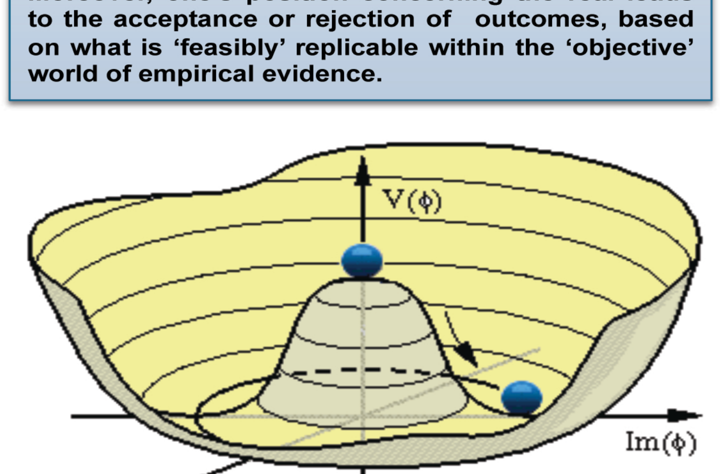
Mathematical-Symbolic Reading

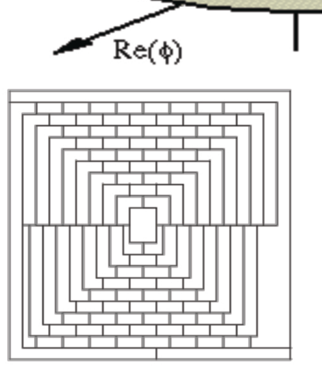
Interpretation of the mathematics behind the physics structure is an example of ontological reading that is permeated with epistemological engineering. In order to understand the relationship between the different microphysical objects and elements in connection to space and time, especially when dealing with their manipulations of a space-time that is outside one's intuitive boundary, tensors and Dirac equations are used. They operate at the intersection of geometrical and algebraic visualization of interacting particles in n-dimensional space by acting as the 'markers' for reading the 'action-map' of a universe constituting the signifying acts of scalars, vectors, spinors, and operators embodied in matrices, wave propagators and line functions. The equations utilized (from Schrödinger to Dirac to Klein-Gordon) demonstrate the possibility of more than one potential outcome, whereby some of these outcomes may be less than 'realistically' possible, in the sense that the outcome may be operating wholly within a 'virtual' realm that cannot be 'actualized'.

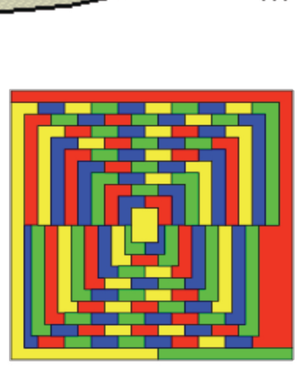


By deriving and calculating the range of possibilities (through probabilities), the physicists are inscribing the path that can be taken by the 'narrative' provided by line-paths and integration of vertex points, which are also the inscription of particulate decay. The question is whether the mathematical 'diagramming,' or model-making, is an act of defamiliarisation (acting as forms of distantiation through the suspension of the familiar) to augment one's access to the ontic, differentiate auxiliary events from primary narratives within the phenomenological processes, and create a paradigm of realism that is not based on anthropomorphic structures. It is at this juncture that the notion of the 'real' becomes problematic due to the different possibilities that the term offers. Moreover, one's position concerning the real leads to the acceptance or rejection of outcomes, based on what is 'feasibly' replicable within the 'objective' world of empirical evidence.

Therefore, how does then one argue for interactions describing micro-phenomena that are 'hidden' and 'covered' over by their more visible macro counterparts, and how do we trust the veracity of knowledge presented only because it seemingly produces the desired results? One can argue that there is a relationship between mathematical inscription, expert readers of mathematical symbolism, and the mathematics of mechanical reproduction in a bid to provide 'machine' logic to the data before subjecting them to sophisticated mathematically-mediated theoretical testing in a bid to reconstruct the theories of the universe. Many black boxes are involved in the modular construction of the machine. So, what aspects of the information are really available to us and how does that influence the final interpretation?

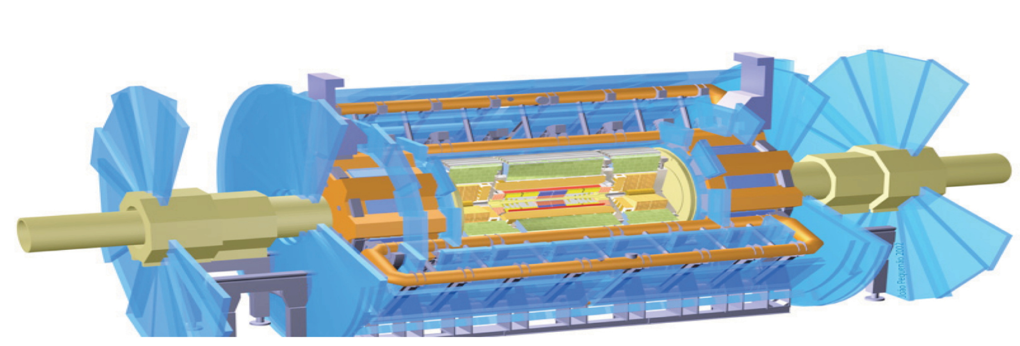




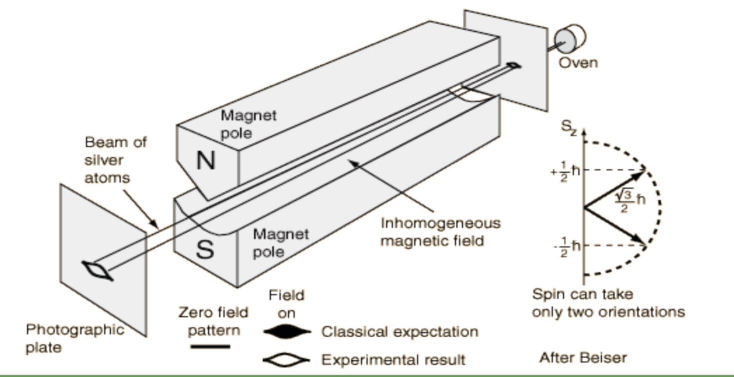


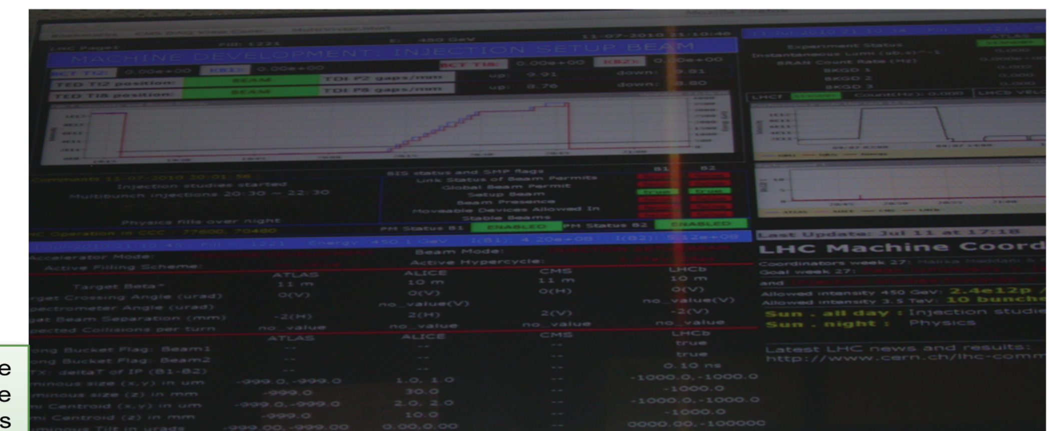
Mathematical modeling seemingly provides an objective base by which one can then work through subjective interpretations based on evidence arranged within different theoretical and epistemic paradigms. The expert reader's need to provide a visual mapping (not unlike a topographic map) of the terrain under examination as hidden behind the scene is the act of privileging one set of mathematical apparatuses over that of another. The choice is also determined by the mathematics' ability to provide a 'reasonable' framework for illustrating data patterns or filling in narrative gaps in the theory. This is determined by the cognitive deixis of the expert reader and the shared cognitive map of the said reader's colleagues for being able to arrive at similar conclusions based on their own reading and subsequent analytic attempts. In addition, outcomes derived mathematically that do not fit the logical picture of acceptable results have to be philosophically and inductively (or abductively) explained. The modeling and simulation of thought experiments enable that high-level speculation that expensive experimental tools cannot, because corporeality limits the performance of certain actions. However, in building these fictional tools that also harness the power of mathematical narrative, the limits of explorations broaden.

Epistemological reading involves the interpretation of information that has already passed through various mediating instruments, whereby a 'de-naturing' process occurs when data is broken down into different sections for tracking at different points and segments (measurements of electromagnetic energy and deposited hadronic energy deposited, track momenta, muon track-segments; also, there are measurements in ionizing gas and quarks constituting certain hadrons). The separate parts that constitute information contained within a single data packet is read by separate sub-detectors that perform separate analyses with each 'strand' of the datum, later put together to illustrate development in physical apprehension and ontological agreements.

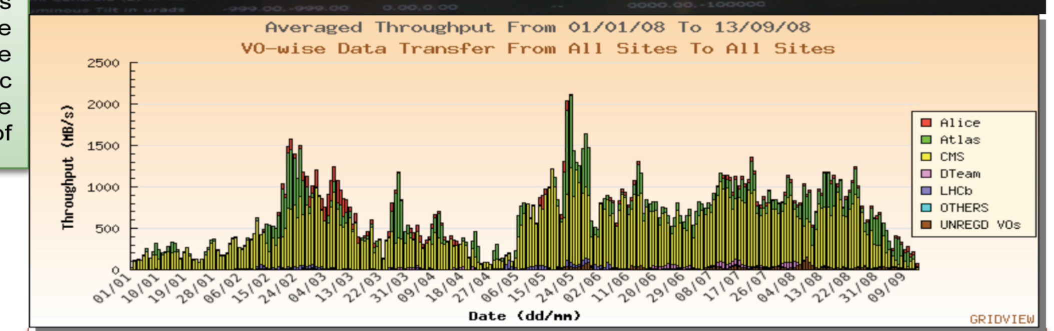


ATLAS's detector with sub-detectors within





Epistemological reading is the reading of uncertain and indeterminate information, as one cannot know in advance the exact route of the informational path beyond that which has been set before us. However, as with any fiction that one reads, there is always an expectation that the indeterminacy can add-up to a determinate outcome (of 1). One's cognitive praxis, and the boundary of possibilities, is determined by the scientific ideology one subscribes to, even if the ideology can be as simple as the theory or mathematical method one chooses. Hence, one's perspective of the outcome is influenced by that choice.

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Event listing (summary)

   I   particle/jet KS        KF  orig     p_x       p_y       p_z
E          m

   1   (u)         A   12       2     0    0.000     0.000    10.000
10.000    0.006
   2   (ubar)      V   11      -2     0    0.000     0.000   -10.000
10.000    0.006
   3   (string)        11      92     1    0.000     0.000     0.000
20.000   20.000
   4   (rho+)          11     213     3    0.098    -0.154     2.710
2.856    0.885
   5   (rho-)          11    -213     3   -0.227     0.145     6.538
6.590    0.781
   6   pi+              1     211     3    0.125    -0.266     0.097
0.339    0.140
   7  (Sigma0)       11    3212     3  -0.254
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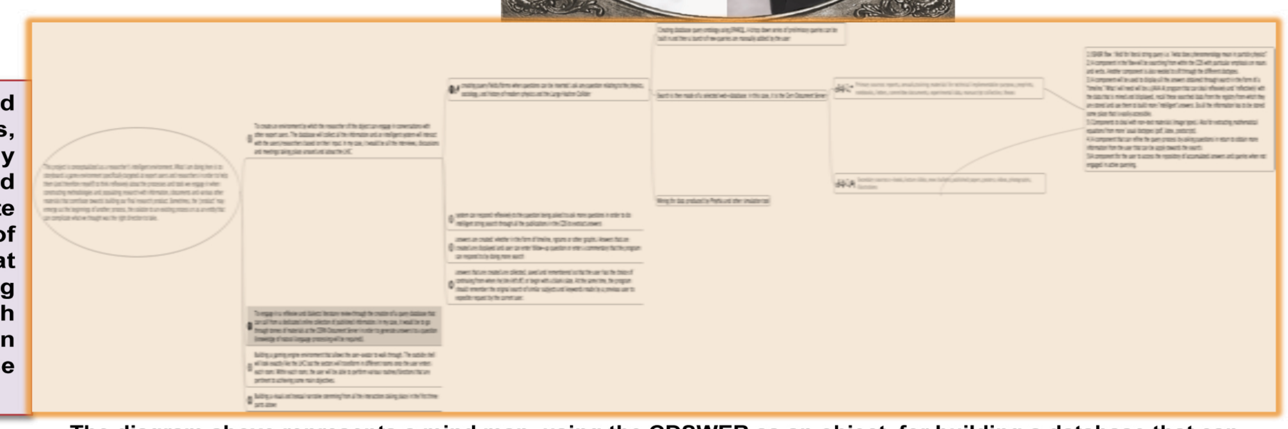
Epistemological reading entails reading information obtained from events that have made through the final cut, mainly because there are many more events than that which are tracked. Based on reading the data against accepted frameworks, are we therefore narrowing the range of possibilities for new discoveries?

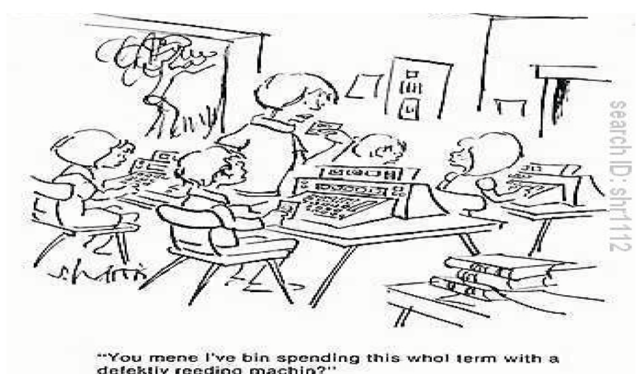
Is it possible that this is circumvented through pure theoretical reasoning, 'fictionalizing,' and thought-experiments that enable the expansion of a series of what-ifs? More importantly, can one put these predictions into an iteration of comparisons with Monte Carlo data obtained by plugging in theoretically determined parameters? Nevertheless, that does not yet solve the problem relating to the reading process driven by one's foundational affiliation and philosophical logic.

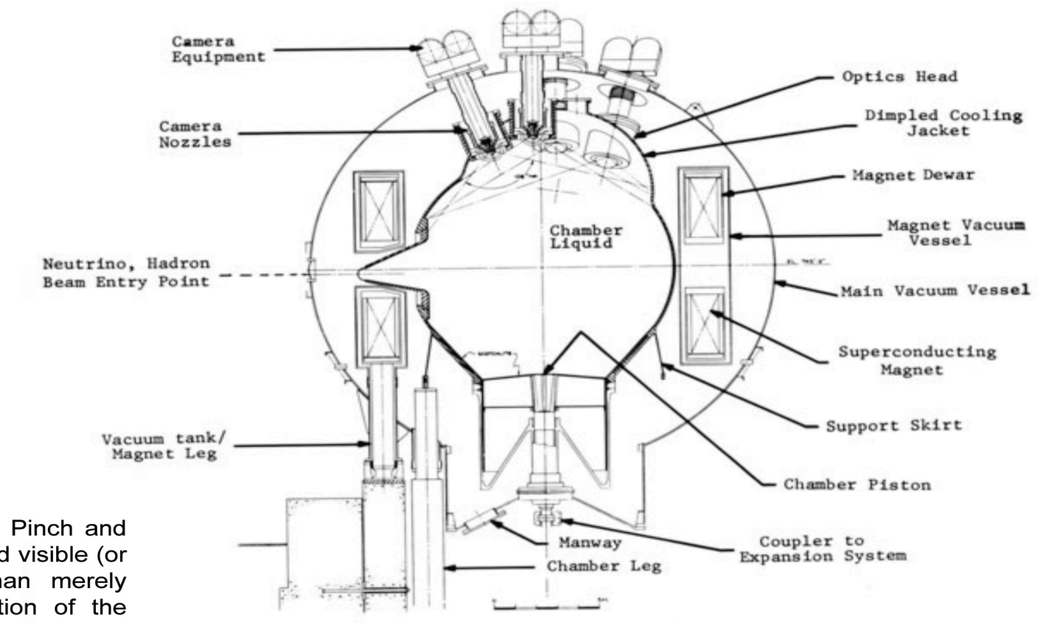
Virtual versus actual knowledge. When two sets of particles or molecules are almost similar math-wise, or are chirals, how do you decide how to differentiate them?

While publications of any discovery build upon the work of previous experiments, research and interpretations, the ideology that connects these works are often buried in affirmative reports that mainly state certain assumptions made about any set of variables; so, one will have to follow that trail of cited publications in hope of finding the cause that initially sets the research program. Of course, when a publication attempts to dispute another one, that cause is more evidently foregrounded.



The diagram above represents a mind map, using the CDSWEB as an object, for building a database that can interact reflexively with the end-user, who is a researcher looking for ways to visualize and create a comprehensive map of different existing epistemic commitments and situate causality. A readable version can be found at http://www.duke.edu/~cal33/Researcher_Tool/mindmap%20for%20LHC%20digital%20project_ClarissaLee_1.html

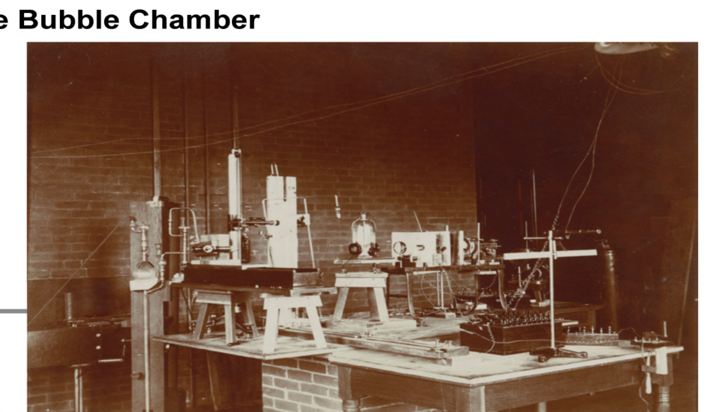




Flight of the Bubble Chamber

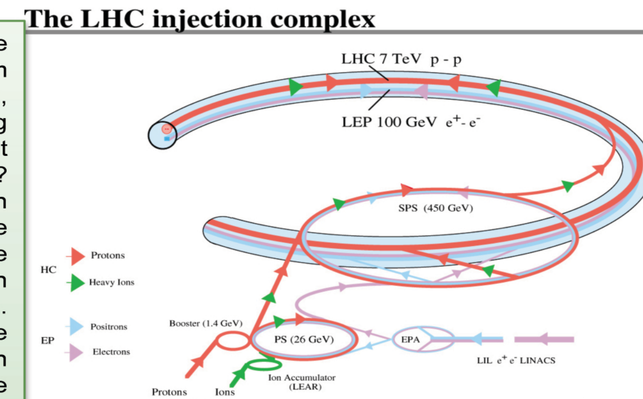
Machine Reading

In the introduction to *The Uses of Experiment*, Gooding, Pinch and Schaffer pointed out how the effects of nature are rendered visible (or "realized") through "active instrument work" rather than merely passively observed in nature (4). Hence, the selection of the instrument is as much dictated by theory-choice as by accepted 'standards' that dictate the calibration of the instrument. One may argue therefore that one can observe what has been calibrated to be obtained through theoretical-predictions; however, one may also return with results that are unexpected, or results that fail to obtain any measurable effects at all. But then, what if one wants to obtain that which lies outside the range of calibrated expectations (outside the 95% confidence level)? Can we be certain that the theory of choice is flexible enough to accommodate possibilities that may fall outside the constructed model?



Even if we find a way to observe the entire reading process, can we refrain from influencing the outcome of the reading, specifically since our understanding of reading is mediated by our perception of what that machine does, or is self-awareness sufficient? What if we are able to translate, into human language, all the raw data the detectors are able to collect and collate; data that are gibberish to us prior to instrumental translation and mediation, even to a well-trained eye. Can we presume that the machine language is merely an abstracted version of human language, or are there points where translations cannot take place, bringing about informational 'holes'? When we read the various monitors that tells us what the machine is seeing or feeling, we only read what has been processed. What about all the unprocessed material? What can be read at the very point of material contact between machine and nature, and what does the machine do to make sense of that can be crucial to helping us deal with ontological reading, for this is the point just before epistemic formations. This remains a point of speculation and yet is interesting to decode.

The LHC injection complex



Collisions inscribed by the injector

Volumes have been written on machine inscription and instrumentally produced inscriptions that are evidential traces of data. However, we have not found a useful way to observe how a machine, or that assemblage of machines called the Large Hadron Collider, performs that act of reading. Certainly, we have access to all the data that the computers present to us. However, beyond our rationale based on the blueprint of the machine, we cannot follow every microscopic detail of the trail of injections and collisions to comprehend absolutely what goes on, which is a process of direct machine-reading, because to do so, would be equivalent to the situation of quantum wave collapse that prevents us from observing causality. Therefore, can one consider the process of machine reading as a process of effectual production?

It is possible that a close-reading of how the Monte Carlo simulator reads its programmed script is a form of reading into the mimetic aesthetics of nature's onticity. It involves, too, the comparison between the method by which the scientist reads from the LHC and of the LHC reading from nature's book, with gestures towards the historical development that have changed the manner in which we engage with scientific knowledge – from close encounters that include the modeling of experiments through direct interaction with nature to mathematically/code-mediated experiments. Has the reading process based on current forms of machine-human relationship become more enigmatic than in the past?