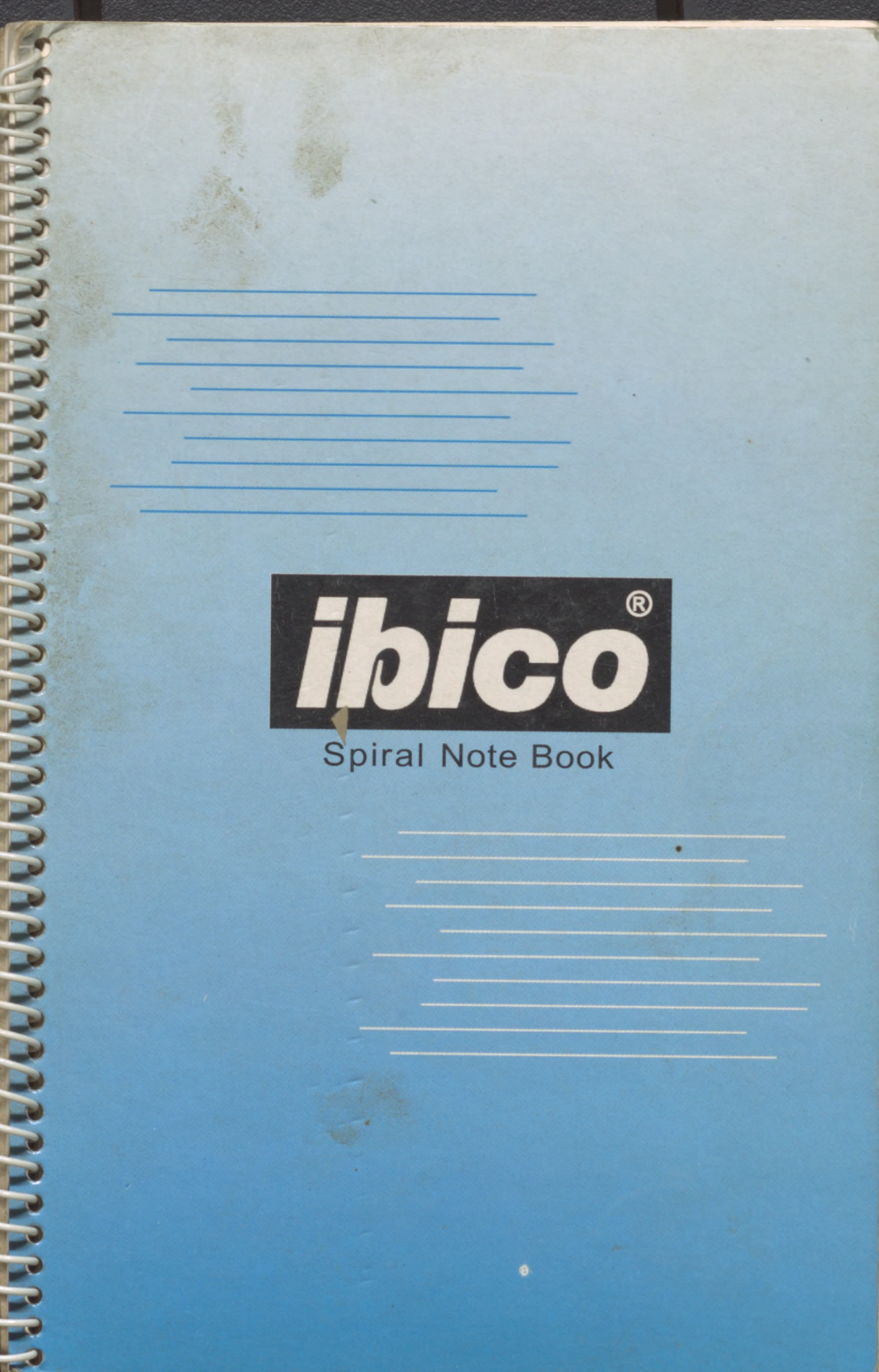

ibico®
Spiral Note Book

LET MERIT OF THE WORK speak for itself

Consciousness { According to our experience
= Basis of all experience, edifies physical, mental.
No experience

Consciousness – According to philosophy
- Western = mind
- Eastern – matter to basis of everything.

Consciousness – According to Science
" to Biosciences
" to Physical
" to Chemical
" to physiology

Relation between Consciousness and mind-body
" " world-cosmos
" " self Reality –

" How Fundamental can you get in Scientific explanations "

1. Experience is the basis of all our knowledge of the external world through the senses and internal world through the mind.

2. Experience is self-evident and needs no further explanation

3. "Consciousness" is necessary to have any experience of any kind.

4. For when we are unconscious, we have no experience of anything.

5. All philosophy and all science is essentially for understanding the phenomena we experience in the external world and the internal world.

6. Understanding is based on concepts — space, time, matter, ~~force~~, causality, formulated initially on the basis of everyday experience which results in common sense.

(7) Philosophy Concerned with
(i) Origins -
(ii) Sustainance -
(iii) Decay -
} → Concept of God.

(8) Origins of (i) the earth (matter - universe)
(ii) of Life
(iii) of Consciousness

(9) Sustainance brought in the Concept of "Energy" -

(10) Decay - Concept of passage of time

(11) Purpose? - Why all this? Leela

Science - emerged from philosophy
crafts - food, habitat, protection etc

What is Life? Mind and Matter

Erwin Schrödinger ~~Cambridge University Press~~ Cambridge University Press

plus Sherrington:

"Matter and Energy seem granular in structure and so does 'life' but not mind."

① one world crystallizing out of many minds

② one mind based ostensibly on many cell-lives or in another key of the manifold of several ~~sub-minds~~ sub-brains each of which seems to have considerable dignity proper to itself that we feel impelled to associate a sub-mind with it

Sch: I believe that both these paradoxes can be resolved by assimilating to our Western field of science the Eastern doctrine of Identity. Mind by its very nature a singular tantum - The over all number of mind is ONE

from FABRIC OF COSMOS
p65-67

p

"Look deep into Nature. Then you will understand everything better"

'Gravity and accelerated motion are two sides of the same coin"
This is the principle of Equivalence.

If you feel gravity influencing, then you are accelerating.

Only observers who feel no force including gravity are justified in declaring that they are not accelerating.

You and the earth and all other things are usually think of as stationary are accelerating upwards

* Einstein loved saying that it was Newton's head that pushed us to invent the apple, not the other way around.

Matter here causes Space to warp there
which causes matter to move, and Space
over there to warp more and so on
"General Relativity provides the Choreography
for an entwined Cosmic dance of
Space, time, matter and energy."

(p 74-75)

"From Newton's absolute Space and absolute time
to Leibniz's and then Mach's relational
Conception to Einstein's realization in Special
Relativity that Space and time are relative
and your then union for an absolute
Spacetime, to his subsequent discovery in General
Relativity that Space-time is a Dynamic
player in the Unfolding Cosmos."

Does the invisible, the abstract, the
untouchable stuff of Space — and
Spacetime more generally provide the
ultimate referent for far-motion?

Yes. Spacetime is a Something,
↳
Metrical Spacetime is a Something

Even though individual electrons are tiny particles of matter, each and every one also embodies a wavelike character.

If an individual electron is also a wave, then what is it that is waving? Is it all smeared out?

No. When we locate an electron, we always find all of its mass and all of its charge in one tiny point like region.

- Max Born: The wave is a probability wave.
- According to Quantum Mechanics, every probability wave extends throughout space, throughout the universe.
- Quantum Mechanics explains what you see but prevents from seeing the explanation itself

Why is Common Sense physics holds in the case of a large quantum phenomena that we observe?

For large objects, the one single path given by Newton's laws - the probability value of that is for large compound & the other Feynmans path - that the laboratory Never seen in experiments.

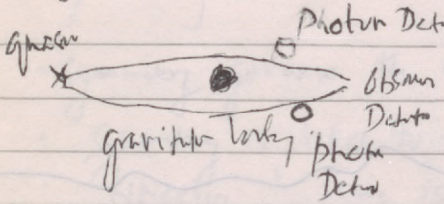
your observation prunes the branches of history and you get the classical path. Why?

Wheeler's Delayed Choice Effect

- Does the past depend on the Future?

Hybrid of possibilities - IS that the reality?

You do not the truth until you have made the observation. -



Does the observation decide the photon travelled for billions of years as a wave or particle?

If the photon detectors are included then it can say by which path the photon arrived. -

You cannot influence the past; But information about the past is different.

p20a

"Quantum Mechanics is tapping into the hidden reality that underlies the workings of the universe."
Brian Greene

Heisenberg:
Abandon the view that wave functions are objective features of quantum reality, and instead view them merely as an embodiment of what we know about reality.
The abrupt collapse of the wave function by observation results in the abrupt change in our knowledge

Everett - Many-Worlds Universe

"Hidden Variable"

Quantum Physics and physics more generally obliged only to account for features of the world that can be measured.
Neither Bohm, Einstein, Podolsky nor Rosen would have agreed that measurements can be done. Instead they argued that particles possess features forbidden by the Uncertainty Principle

even though we can never know explicitly their values. Such features have come to be known as "hidden features" or more commonly "hidden variables"

Bell's theorem: (p186)

Even if you can't actually determine the spin of a particle, about more than one axis, still if in fact it has a definite spin about all axes then there are testable and observable consequences of the spin

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Symmetry and Time (p224)

- Symmetry governs the laws of nature
- Symmetry is vital to the concept of time
- Wheeler: 'Time is nature's way of keeping everything — all change that is — from happening at once.'

Time means change. ∴ absence of a symmetry

Universe is 14 billion years old.
According to which clock?

Uniformity of microwave background over the entire universe - less than 10^{-3} variation

∴ young universe homogeneous . ∴ Low Entropy
→ beginning of time - and arrow of time

This gives a concept of time - applicable to the whole universe.

Time stands at the cross roads of Symmetry
If the universe had perfect temporal symmetry
if it were completely unchanging it would be hard to define what time means.
On the other hand if the universe did not have symmetry in space, if the background radiation had completely haphazard having widely different temperatures at different places then in a cosmological sense time would have little meaning.
* Time does not have too much symmetry but enough symmetry for the physical laws of the universe

Expanding Universe - Most profound discovery in history.
Hubble's Discovery - Einstein's General Theory of Relativity
Stretching of the fabric.
Our location does not occupy a special place in the universe - Not anthropocentric

General theory of Relativity establishes flexibility of space and time and how they are dependent on matter and energy (ii) fabric of space ~~never~~ should be stretching or contracting - cannot remain stationary.

** The outward motion is not an explosion but a relentless stretching - swelling of space itself. - Expanding balloon analogy in a Dutch Nobel prize winner's thesis in 1930.

* Is the rate of flow of time same in all galaxies?

YES. The galaxies are not ~~moving~~ moving in space. But it is the space that is expanding. There could be different rates of flow due to motion between space in the galaxy itself.

For the same reason galaxies at the edge of the universe can move faster than the velocity of light.

First moments of the Universe -

Interplay between heat and Symmetry

Rethink on notias of Empty Space and Nothingness

Realisation of the dream of unification.

phase transitions of the Universe -

* The "Substance" that Condensed or froze when the Universe Cooled Through particular temperatures is a field - more precisely a Higgs Field

Forces: EM, GRAVITY
WEAK, STRONG

Strong and Weak nuclear force fields are called Yang Mills Fields ⇒ Gluons (W±, Z)

Field Frame work of Matter -

Probability waves of QM may themselves be thought as Space-filling fields that provide the probability of some or other particles of matter is at some or other location

Higgs Field

"The entire Universe is permeated by an Ocean of Higgs Field — cold relic of the Big Bang — that is responsible for many of the properties of the particles that make up you, me and everything else in the Universe"

Brian Greene

~

Fields respond to temperature as well. Higher the temp the more violent the value of the field fluctuates.

At 10^{-43} s temperature is 10^{32}° K.

As the Universe expands and Cools most of the fields go to a stage where they fluctuate around zero both positive and negative values — this is the stage of emptiness.

BUT Higgs Field Condensed into a Non-Zero Field — non zero expectation value — This is the Higgs Ocean

First Moments of Creation

Cosmic Quest
Kalu

When the Universe was perhaps only 10^{-43} s., and only 10^{-33} cms across matter and energy consisted of (unbroken strings?).

Quantum Gravity as described by the Super String was the <u>only</u> force.

At 10^{32} K – Gravity Separates from all other forces

At this stage, the Universe was doubling its size every 10^{-36} Sc. Because the Law of Bowling Ball

When the Universe reached a temperature of 10^{15} o – that is 10^{-9} sc after Creation the Electro-weak force broke in to EM force and weak force.

The Universe was a Soup of quarks, leptons and photons.

When the Universe Could further the Yang Mills fields Condensed into "gluons" that bind the quarks

Finally the quarks Condensed into protons and Neutrons and Eventually formed Nuclei – that is 3 minutes later.

300,000 years later first atoms formed.
The temperature was 3000°K
Universe became transparent.

Physics and Creation of the Universe
interplay between Relativity and Quantum mechanics
Superstring theory –
Beginning of the Universe – Big Bang is the Collapse of 10 dimensional Universe into 4 dimensional Universe

Einstein's equation in 1917 showed that the solution to this equation meant the Universe is expanding. At this time the Universe was thought to be static.

Einstein added a fudge factor λ to counteract this expansion
In 1922 – Friedman found the simplest solution to Einstein's equation that gave the most elegant description of the expanding Universe. No one took them seriously.

In 1929 – Edwin Hubble discovered the expanding Universe

When the universe was 10^{-35} to 10^{-33},
it underwent rapid expansion - inflation
the radius increased by a factor of 10^{50}
This explained flatness and homogeneity.

Laws of Nature:

Matter always searches for the lowest energy state
(= the vacuum state)
Our entire universe may be sitting in a
'false vacuum state' heading to ours, it
may make a sudden transition to
a true vacuum state any time - that
would be a catastrophe! In that new
vacuum state - the laws could be different.
This our universe reached the lowest energy state
Laws as happen to

The original universe might have been
10 dimensions and it made this
transition and so this is the 3+1 universe

Steinger's book
Quantum Gold
p 29-87

contents of the Universe

0.5 % Visible Matter (all glowing stars, galaxies etc)

3.5 % Non-luminous chemical matter dust, rocks, planets, and stars

20 % Dark Matter (unidentified form)

70 % Dark Energy – has negative or repulsive gravity

[In his general Relativity theory – Einstein found that repulsive gravity is possible when the medium has a ~~Negative Pressure~~ Surprisingly Negative Pressure –

Cosmological Constant – Einstein also introduced that is called the Cosmological Constant which is the curvature of empty space and is equivalent to a a fourth or Negative pressure and Negative gravity

[The Law Matter and gravity.
= Nature hates. Nothing Super Natural]

P83

(?)

[It is important to keep in mind, that the Universe has no fundamental direction of time. Effects can precede causes and the whole idea of creation which has built in assumption on the direction of time needs to be rethought]

HYPER SPACE

Kaku (Lib)

Riemann:

- Physical laws simplify in higher dimensions of space.
- Force was a consequence of geometry.
- A force has no independent life of its own. It is only an apparent effect caused by distortion of geometry.

Higher dimensions have a purpose - to unify the principles of nature

Einstein was guided by the conviction and physical intuition that higher dimensions unite physical concepts that in three dimensions would appear to have no connection - { matter-energy / space-time

Equivalence Principle:

Laws of Nature in a gravitional field = those in an accelerating frame