Cosmology

Hugues GENVRIN

January 30, 2026

MATHEMATICAL MODEL

The symbol $\Subset$ will refer to an encapsulation or an embedding.
The symbol NA will design the level of agraindissement.

Topology of the fine-grain - Radial dilation

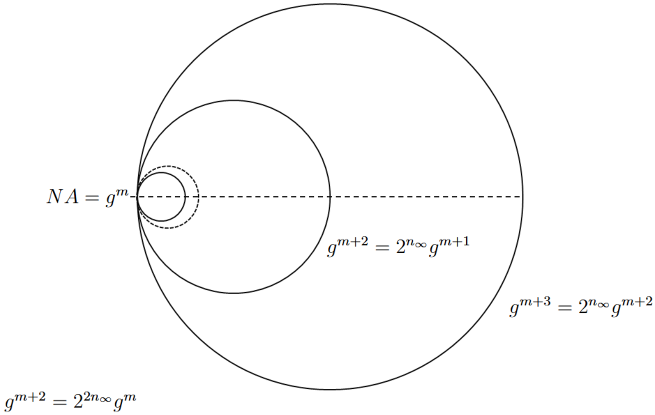


Figure: Homothetic view by grain effect. Measure of length of the grains are null: $\forall k, \mu(g^{m+k}) = 0$

Mathematical approach Quantum mechanic Cosmology

Natural Numbers

The cardinal of the continuum $[0;1[$ is $\aleph_1 = 2^{\aleph_0} = 2^{n_\infty}$

Figure: Free fall experience $\Rightarrow 2^{n_\infty}, n_\infty$ are achieved.

Real Numbers

Relative measure from level of agraindissement : *NA*

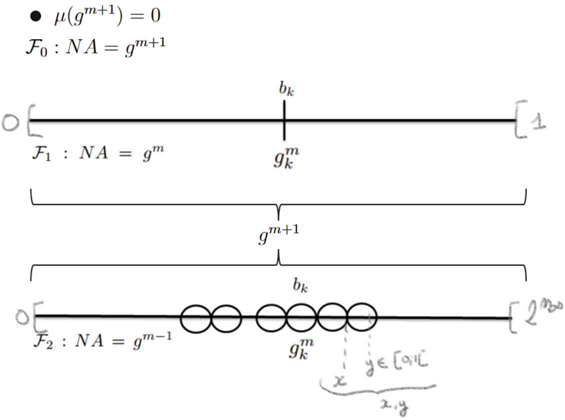


Figure: Real.

The real straight line extended

By this process, we are numbering all the grains $g_{k,p}^{m-1}$ of $\mathcal{F}_3$. We can represent the real straight line :

- $\delta = (-n_\infty; n_\infty)$ as a restriction of $]-2^{n_\infty}; 0] \cup [0; 2^{n_\infty}[$.
- or $]-2^{n_\infty}; 0] \cup [0; 2^{n_\infty}[$ as a continuation of the straight line $\delta = (-n_\infty; n_\infty)$.

Theorem

$1 \cong 2^{n_\infty} \mod (NA = g^m \longmapsto NA = g^{m-1})$

Finite topology of the grain

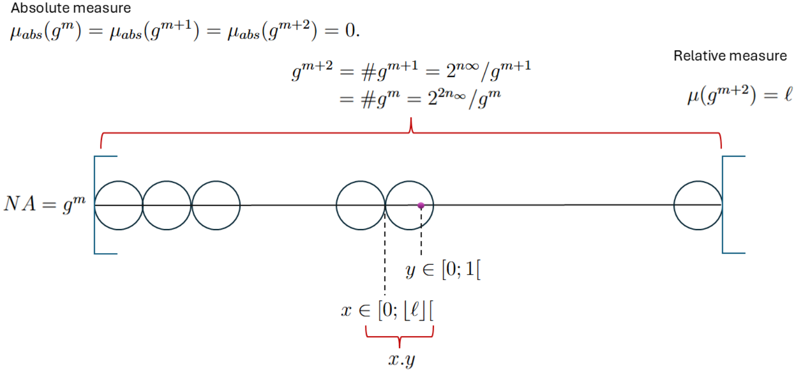


Figure: Finite topology

Rectification of infinite half-circle

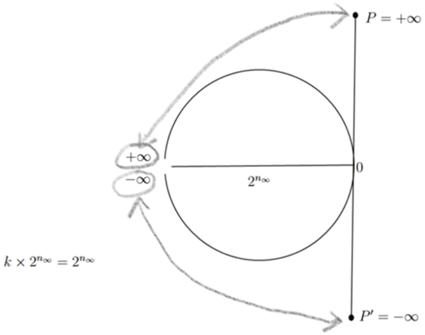


Figure: Rectification of half-circles.

Topological equivalence of infinite

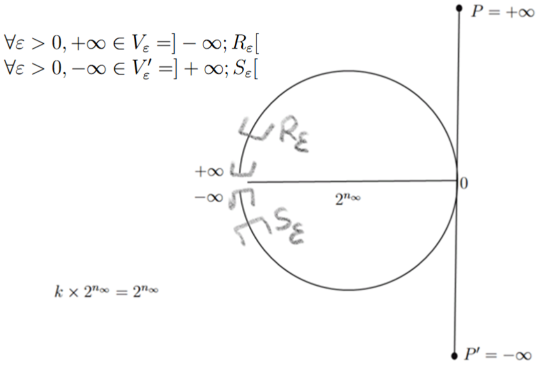


Figure: Topological equivalence of $+\infty$ and ∞.

Squared and Rounded grain

Ad infinite

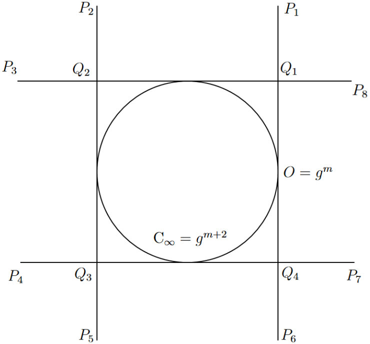


Figure: $\mathcal{F}_3$.

With $NA = g^m, 4g_\circ^{m+2} \simeq g_\square^{m+2}, 4g_\circ^{m+1} \neq g_\square^{m+1}, 4g_\circ^m = g_\square^m$.

Deconstruction of $\mathcal{P}_{\mathbb{C}}$

$\mathcal{P}_{\mathbb{C}} \to 0$

Let $\mathcal{P}_{\mathbb{C}}|z = x + \imath y$. We apply a rotation $Rot(O, \frac{\pi}{2})$ to each y of $\Im$.

$$\begin{array}{rcl} \imath : \Im & \to & \Delta y \\ y & \mapsto & \imath y = Rot(O, \frac{\pi}{2})[y] \end{array}$$

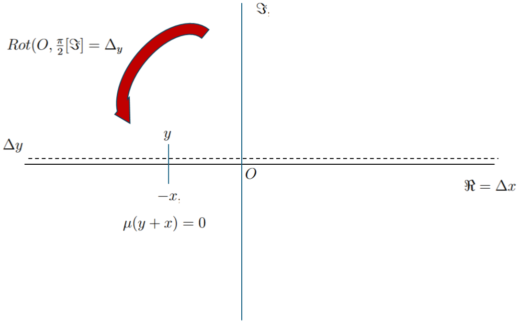


Figure: Deconstruction

Main theorem

Theorem

$\mathcal{P}_{\mathbb{C}} = 0$.

Every restriction of $\mathcal{P}_{\mathbb{C}}$ is a zero.

From $\mathcal{P}^2_{\mathbb{R}} to \mathcal{P}_{\mathbb{C}}$

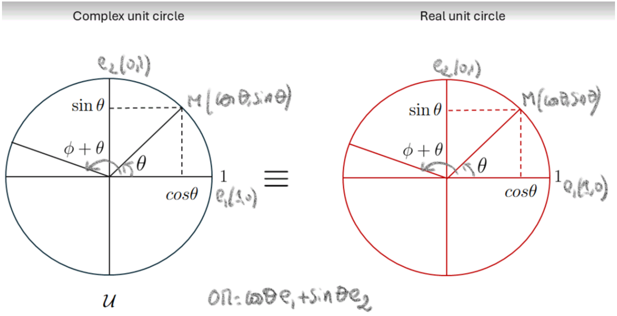


Figure: We work in the real unit circle $\mathcal{C}_1$ with polar coordinates.

First automorphism between $\mathcal{U}$ and $\mathcal{C}_1$:
$Rot(O, \phi + \theta) = Rot(O, \phi) \circ Rot(O, \theta)$.

From $\mathcal{P}_{\mathbb{R}}^2 to \mathcal{P}_{\mathbb{C}}$

In $\mathcal{P}_{\mathbb{C}}$, $e^{\imath\phi} \circ e^{\imath\theta} = e^{\imath(\phi+\theta)} = e^{\imath\phi} \times e^{\imath\theta}$. So we find an equivalent result in C_1, second automorphism :
$Rot(O, \phi + \theta) = Rot(O, \phi) \times Rot(O, \theta)$.

Then $Rot(O, \theta)[e_1] = \cos\ \theta\ e_1 + \sin\ \theta\ e_2 \Rightarrow Rot(O, 2\theta)[\mathbf{e}_1] = Rot(O, \theta) \circ Rot(O, \theta)[e_1] = (\cos\ \theta\ e_1 + \sin\ \theta\ e_2)^2$.

Pour $\theta = \frac{\pi}{2}, Rot(O, \frac{\pi}{2} + \frac{\pi}{2}) = e_2^2 = Rot(o, \pi) = -1$.

$$\boxed{e_2^2 = -1}.$$

Theorem

The real map $\mathcal{P}_{\mathbb{R}^2}$ links to the complex map $\mathcal{P}_{\mathbb{C}}$.

How to include rotate in a cosmological space ?

Complex Embedding

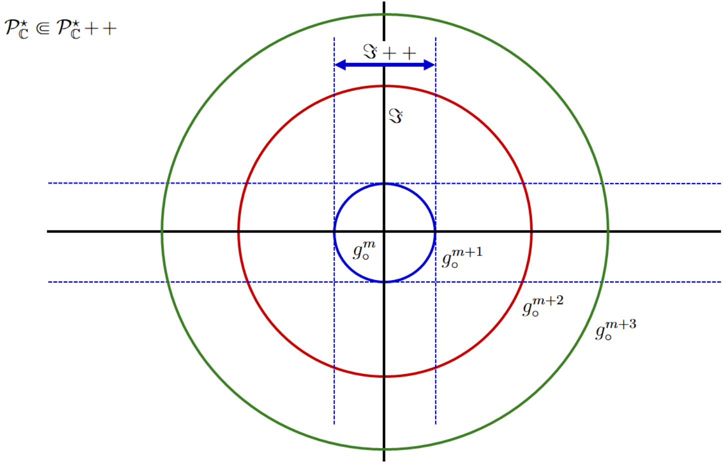


Figure: Embedding

Real Embedding

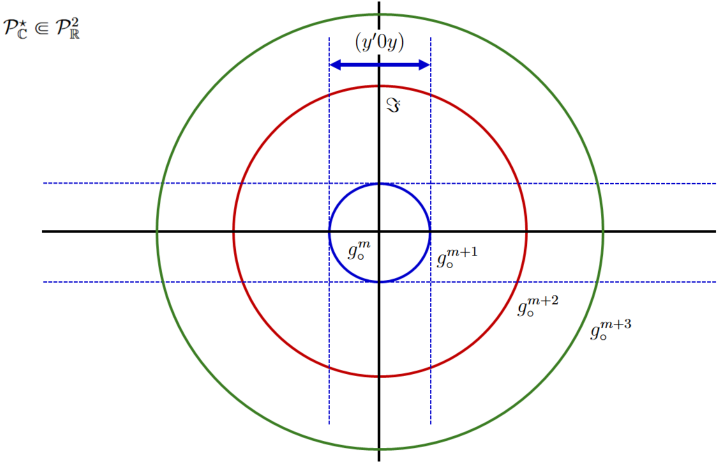


Figure: Embedding

Mathematical approach Quantum mechanic Cosmology

Complex Embedding

$\mathcal{P}^2_{\mathbb{R}} \Subset \mathcal{P}^{\star}_{\mathbb{C}}$

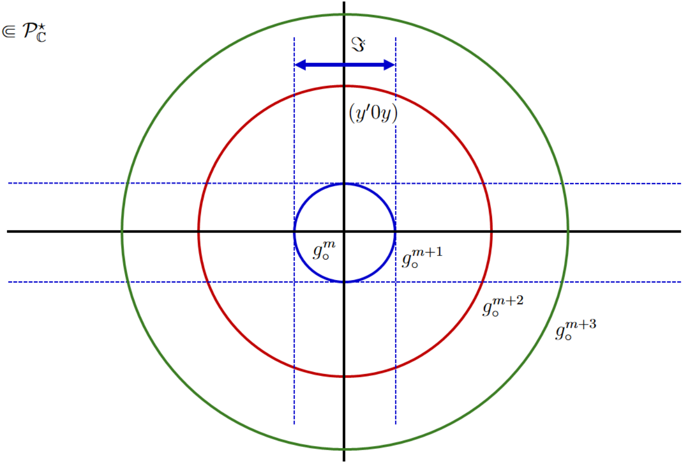


Figure: Embedding

Map structure

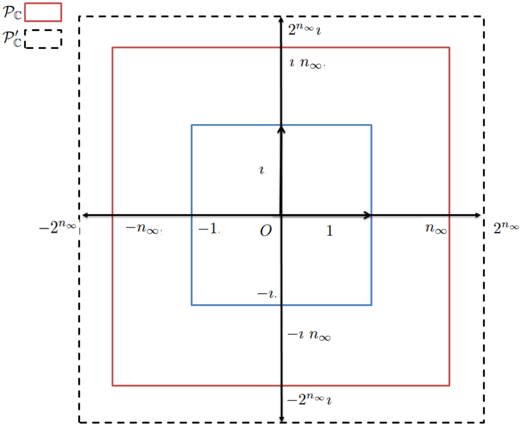


Figure: $\mathcal{F}_4$, Planar equivalence.

Toward the torus Γ^2

Two sides for the material system and informational system

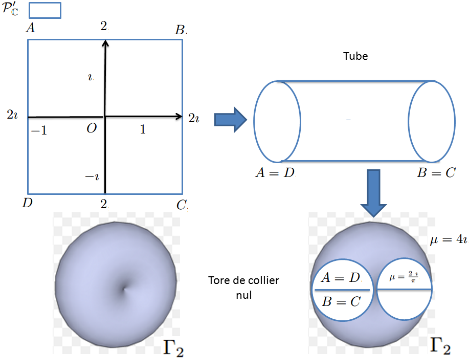


Figure: $\mathcal{F}_5$, Torus equivalence.

Natural Möbius band

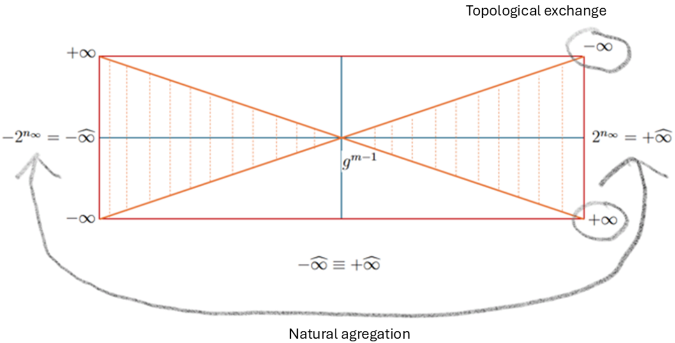


Figure: Space representant of equivalence space.

A complex map recto-back

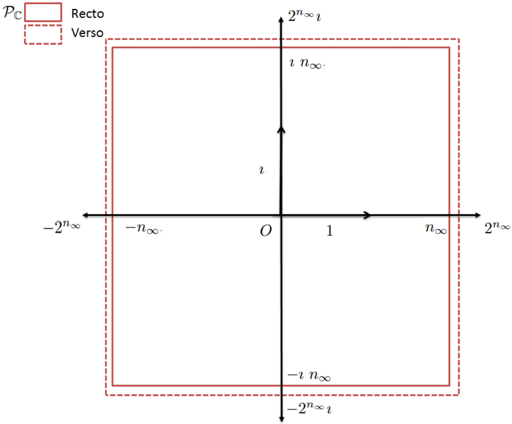


Figure: $\mathcal{F}_6$, Complex map recto-back.

QUANTUM MECHANIC

Mathematical approach Quantum mechanic Cosmology

Intrication

Experiments from Einstein Podolski Rosen (1935) - Aspect (1980-1982)

$$\mathbf{x} = x_1\mathbf{e}_1^1 + x_2\imath_1\mathbf{e}_1^2,$$
$$\mathbf{y} = y_1\mathbf{e}_2^1 + y_2\imath_2\mathbf{e}_2^2.$$

$$\mathbf{x}\otimes\mathbf{y} = x_1y_1e_1^1\otimes e_2^1 + x_1y_2\imath_2\; e_1^1\otimes e_2^2 + x_2y_1\imath_1 e_1^2\otimes e_2^1 + x_2y_2\imath_1.\imath_2 e_1^2\otimes e_2^2.$$

On a $\imath_1.\imath_2 = \frac{(\imath_1|\imath_2)}{\cos(\widehat{\imath_1;\imath_2})}$.

The basis is orthonormal,the Hilbert spaces E_1, E_2 are perpendicular. So we have an indetermination : $\imath_1 \perp \imath_2$. We pass from $\otimes_1 = \otimes$ to $\otimes_2$.

Intrication - Strictly correlated

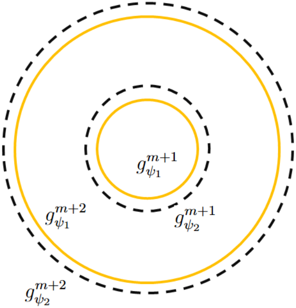


Figure: $\mathcal{F}_3$.

Entanglement - Not correlated

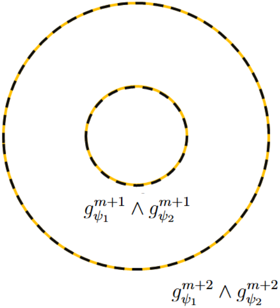


Figure: $\mathcal{F}_3$.

Parallel world

Experiments from Schrödinger's cat (1937) - Haroche (2008)

We update a condition to the intrication related to the principle of none contradiction (PNC).

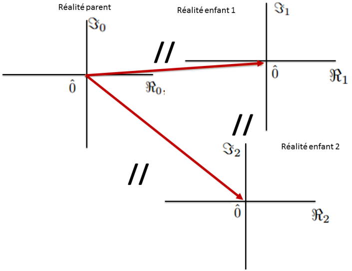


Figure: $\mathcal{F}_{12}$, Experiment from Schrödinger's cat.

Parallel world

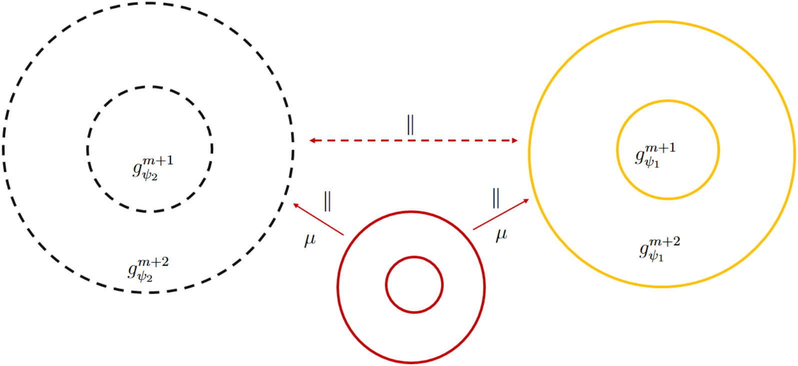


Figure: $\mathcal{F}_3$.

Parallel world

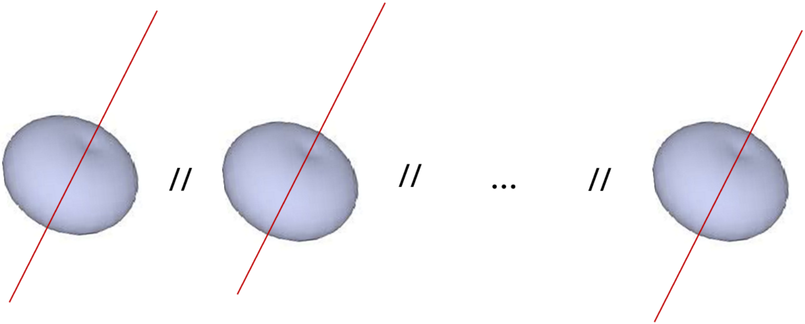


Figure: $\mathcal{F}_{13}$, Parallel worlds (Artist view)
They are in B^2

$S^3 = B^1$

Analytic approach

The unit sphere S^3 is described by $x_1^2 + x_2^2 + x_3^2 + x_4^2 = 1$. S^3 is the frontier of $B^2 : x_1^2 + x_2^2 + x_3^2 + x_4^2 \leq 1$. However we can prove that $S^3 = B^1$.

Proof.

For this, $x_1^2 + x_2^2 + x_3^2 = 1 - x_4^2$, where $0 \leq x_4 \leq 1$ is like a parameter of the radius. So $S^3 : x_1^2 + x_2^2 + x_3^2 \leq 1$ which is an inequation describing B^1. □

$S^3 = B^1$

Integral approach

$\int_\phi$  $= \int_\phi S^2 = B^1 = S^3$

$\int_\phi$  $= \int_\phi \int_V S^2 = \int_\phi B^1 = B^2 = S^4$

$$Fr(B^2) = S^3 = B^1 \qquad Fr(B^3) = S^4 = B^2$$

The space is encapsulated in $S^4 = B^2$

Figure: Expression of S^3.

Toward the Hyper-torus

$\Gamma^3 = \bigcup_{k=1}^{2^{n\infty}} \Gamma_k^2$, by fine-grain effect, $\Gamma^4 = \bigcup_{k=1}^{2^{n\infty}} \Gamma_k^3$

We have an internal couch and an external couch for the corporals system. On the other side of the corporal face we find the informational system linked.

The material and informational systems are entangled : $\Gamma^4 \otimes_2 \Gamma'^4$.

So we will study the shape of the cosmos RV as :

- A torus $\Gamma^3_{full} = \Gamma^4$ where $\Gamma^3_{full} \Subset B^2$.
- Intrication with another torus Γ'^3_{full} by $\otimes_2$.
- On which, is acting the matter by the General Theory of Relativity (GTR).

Let's take the following sequence of zero :
$\widehat{0_\circ} = \{0(g_\circ^m), 0(g_\circ^{m+1}), 0(g_\circ^{m+2}), 0(g_\circ^{m+3}), \ldots\}$.
Where :

- $\mathcal{P}_{\mathbb{C},R}^{\star,k} = \{0(g_\circ^{m+k-1}), 0(g_\circ^{m+k}), 0(g_\circ^{m+k+1})\}$.

With $\mu(0(g_\circ^{m+k}) = 0, \forall k$ et $\widehat{0_\circ} = \widehat{\mathcal{P}_{\mathbb{C},\mathcal{R}}}$. The zero are broadly width with a croissant order of k.

To pass from $\mu = 0$ à $\mu = \ell$, we are elapsing to relative measure.

- $\mu(g_\circ^{m+1}) = 1/g^m$, $\mu(g_\circ^{m+2}) = 2^{n_\infty}/g^m$.
- $\mu(g_\circ^{m+2}) = 1/g^{m+1}$, $\mu(g_\circ^{m+3}) = 2^{n_\infty}/g^{m+1}$.
- $\vdots$

Class Map superposition

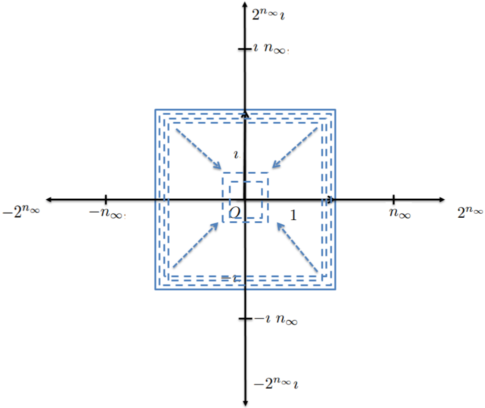


Figure: $\mathcal{F}_8$, Maps superposition.

As the torus $\Gamma_{2,k}$ are superposed, We refind in the maps structures.

Mathematical approach Quantum mechanic Cosmology

Toward the Γ^3-Hypertorus

Toward the Γ^3-Hypertorus and the S^3-Hypersphere

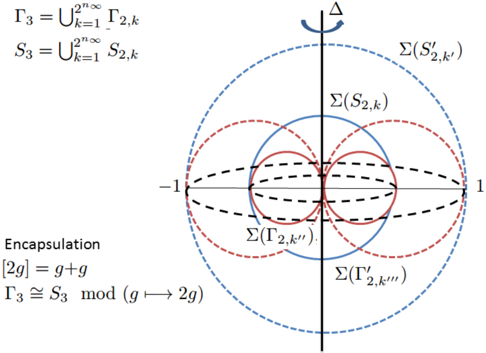


Figure: Fibration.

Rectification of the circle and fibers

Rectification of both sides

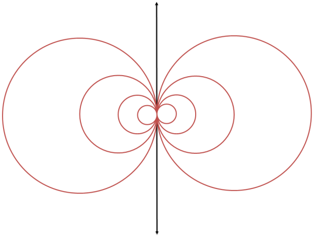


Figure: Rectifications and some fibers.

We notice that the circles are coinciding with the fibers of a transverse section of the manifold (Γ_3).

Every material system is taken in a circular fiber on one-side of the intricate space.

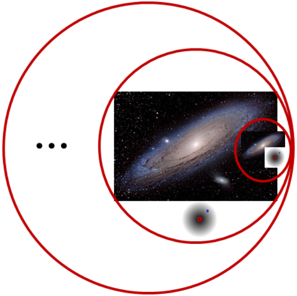


Figure: Corporal system took in a circular fiber.

Mathematical approach Quantum mechanic Cosmology

COSMOLOGY

Cosmogony

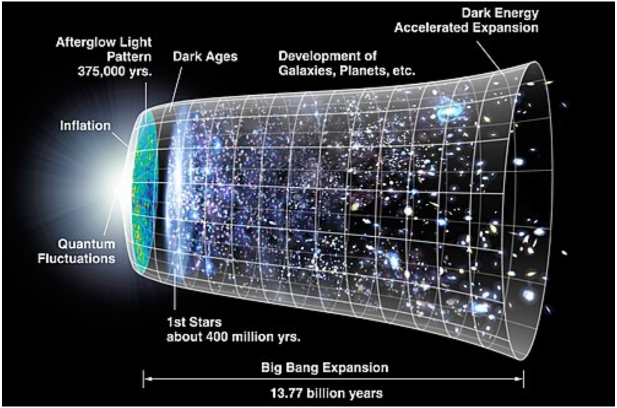


Figure: Big-bang Model

Théorie informationnelle

Nil and inforamtional system

Nil is not a corporal system. But the informational system is able to to be taken in the nil. It's a zero with an internal dimension.

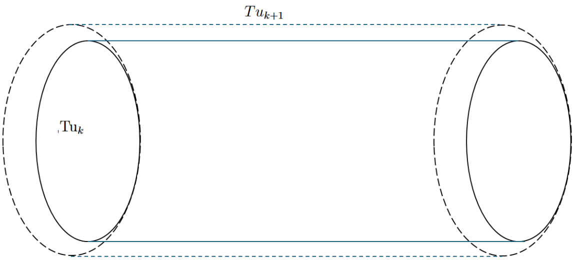


Figure: $\mathcal{P}^{\star}_{\mathbb{C}}$

Informational theory

Three successive neighbourhood

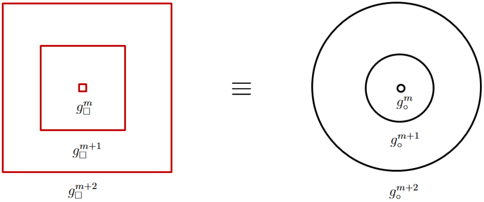


Figure: Informational system $\mathcal{P}_{\mathbb{C}}^{\star}$

Forces

Two kinf of forces By the Fundamental Relation of Dynamics generalized (FRDG) : $\mathbf{F} = \dot{\mathbf{q}}$

- In the situs axial, we find a neguentropic composition from $g^m \to g^{m+1}$ and $g^{m+1} \to g^{m+2}$ and axial force $\mathbf{F}_P$.
- On the transverse situs, we define transverse force $\mathbf{F}_T$ endowed by the variation of quantity of information defined by the affix of the grain.

Creation

Quantum fluctuation by electromagnetic force

The primitive force is acting on the information side. By a pseudo isomorphism between informational couch and corporal couch, it allow the emission of a photon. The photon propagates at the speed of the fiber.

Creation of matter

Induced by Casimir effect

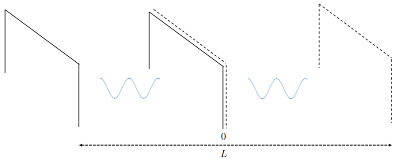


Figure: $\mathcal{P}^{\star}_{\mathbb{C}RV}$

The complex map extended, Recto-Verso set up two moving plates.
By the emission of electromagnetic radiation, they conduct electricity.

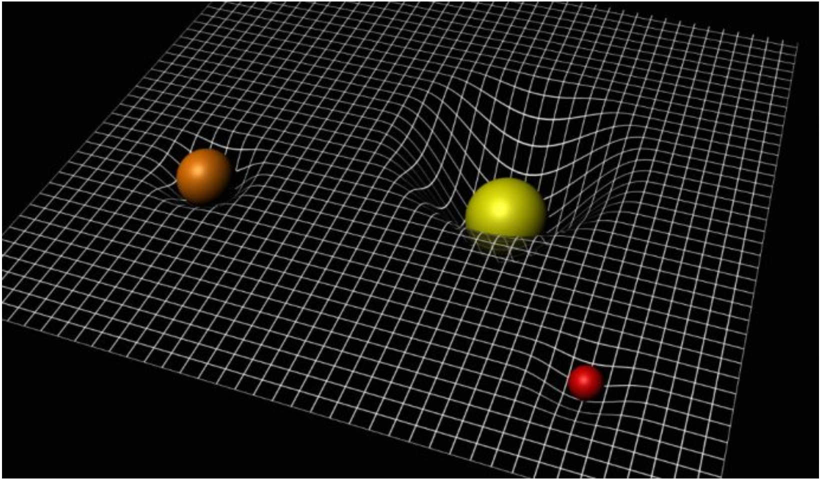


Figure: Retroaction of matter on space (GTR).

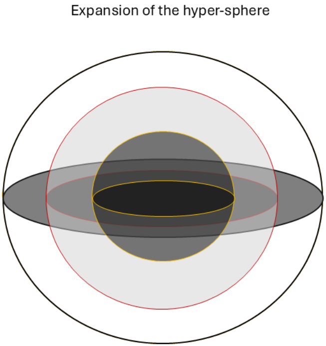
$$\boxed{\Pi^0 = \Gamma^3_{GTR} \otimes_2 \Gamma'^3_{GTR} \Subset B^1 \otimes_2 B^1}.$$

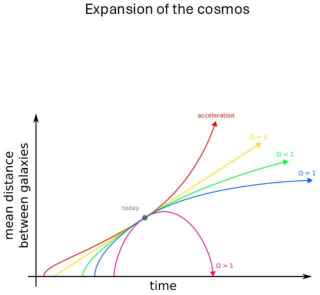
$$\boxed{\Pi^1 = \Gamma^4_{GTR} \otimes_2 \Gamma'^4_{GTR} \Subset B^2 \otimes_2 B^2}.$$

By Schrödinger's cat experience, we build a copy of Π^0, such as :

$$\boxed{\Pi^2 = |\Gamma^5_{GTR} \otimes_2 |\Gamma'^5_{GTR} \Subset |S^5 \otimes_2 |S^5}.$$

Cosmos expansion



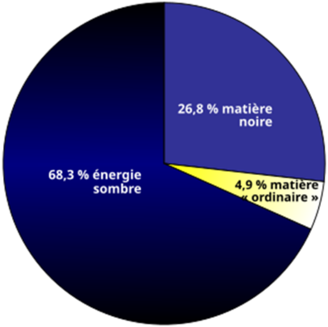


$S^3 = B^1 \qquad S^3 = \bigcup_{k=1}^{2n\infty} S^2_k$

$S^4 = B^2 = S^3_{full} = \cup_{k=1}^{2n\infty} S^2_{full} = \cup_{k=1}^{2n\infty} B^1$

Figure: Spaces.

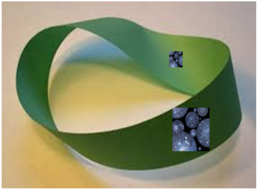
Dark matter and dark energy



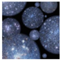
Zwiky (1933), Rubin (1970).

Figure: Spaces.

Linkage with the theory - Poisson distribution of matter



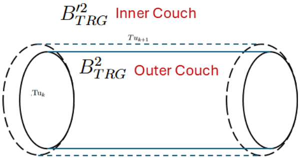
B^{2}_{TRG}

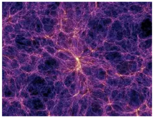


B'^{2}_{TRG}

$\mathcal{P}^{\star}_{\mathbb{C},RV=SM\times SI} \longrightarrow$ Ruban de Möbius

Sur le même bord, les deux espaces séparés.





$B^{2}_{TRG} \otimes_2 B'^{2}_{TRG}$

Figure: Spaces.

Cosmos

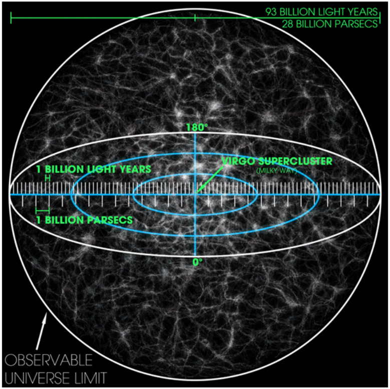


Figure: Observable universe.

Cosmos at Planck scale

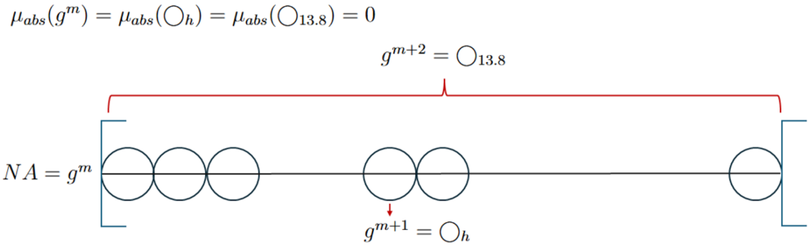


Figure: Cosmos in a level of grain.

Synthesis

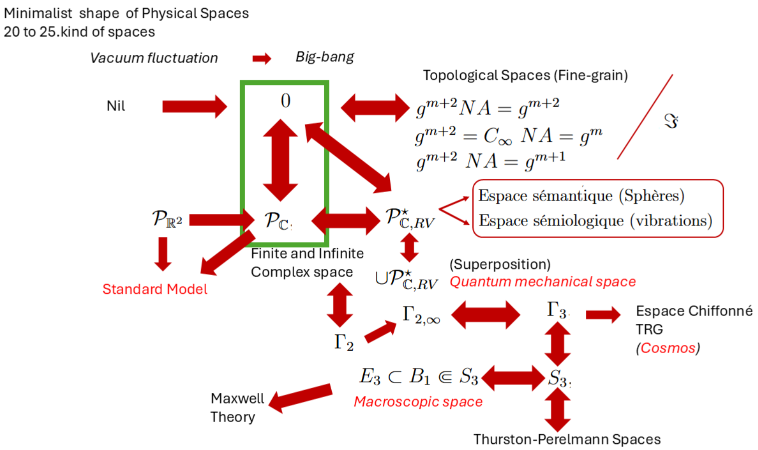


Figure: Spaces.

Back up