

Processos criativos em ciências

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Panorama

- Elementos / Dupla hélice / Panorama dos temas (C&A e SciCom)
- Experimentações vs Atividades/Entregas
- Dinâmica de grupos (temas / diversidade / logística)

*Experimentações
Artísticas*



*Comunicação
Científica*



PALAVRA



SOM

IMAGEM



VÍDEO

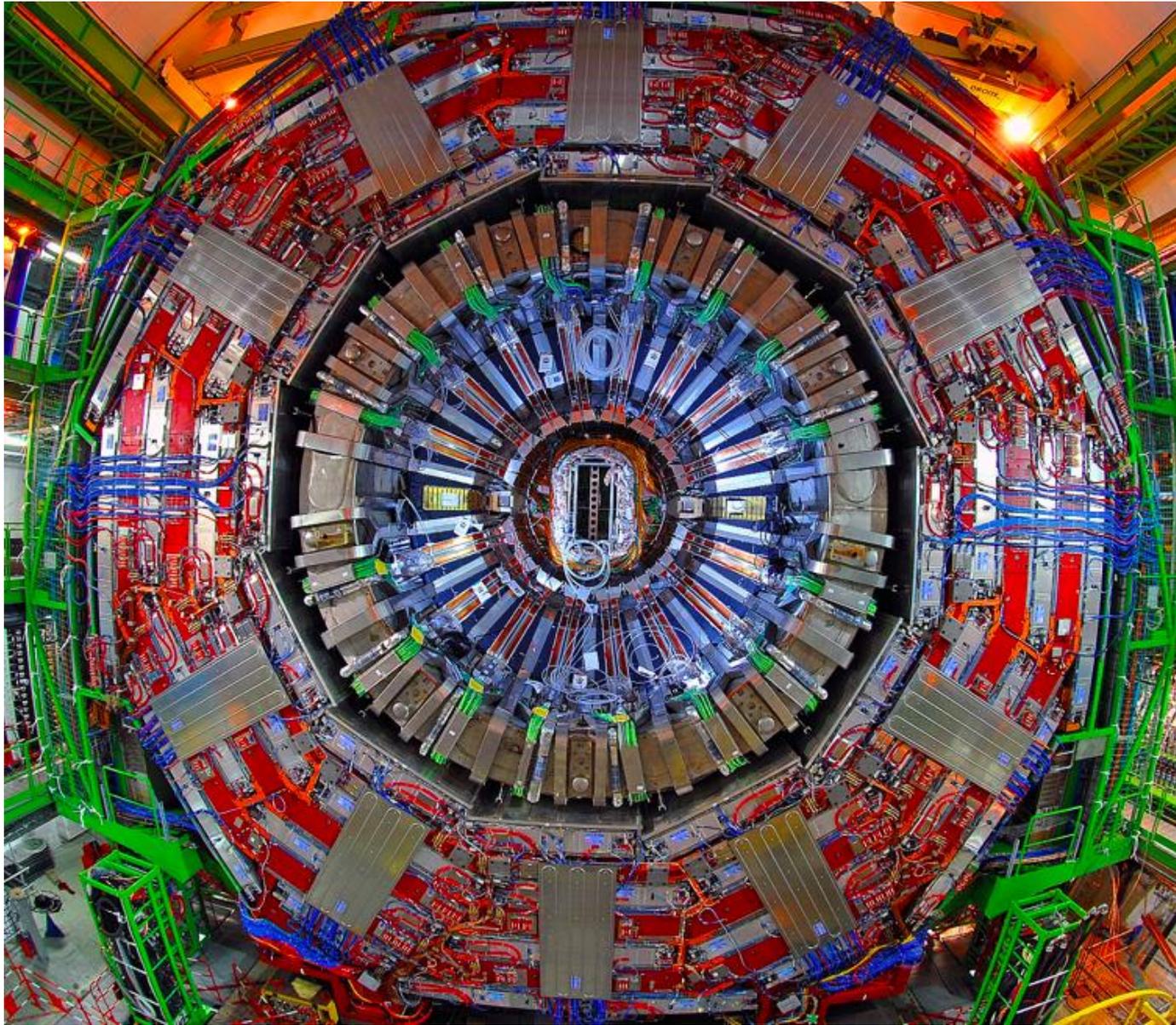
PERFORMANCE



IMERSÃO

UNIVERSOS SOB DIFERENTES PERSPECTIVAS

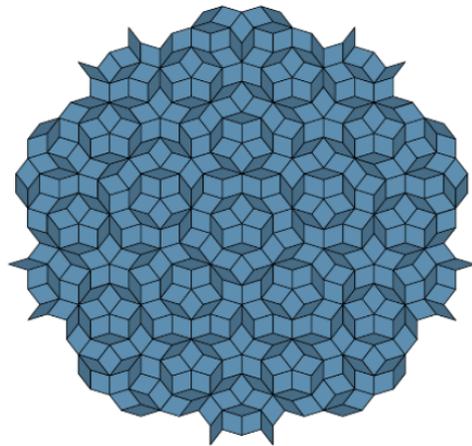
Simetria em ciência & arte



Ordem e desordem

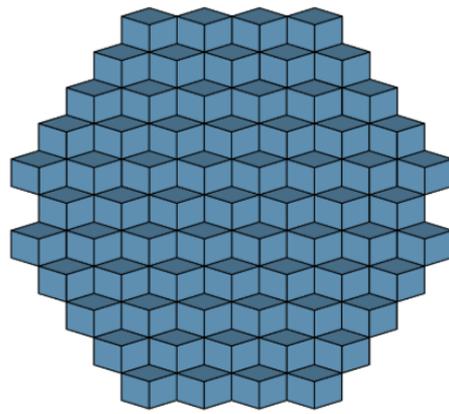


a) Dense + Regular



Quasicrystals

b) Dense + Regular + Periodic

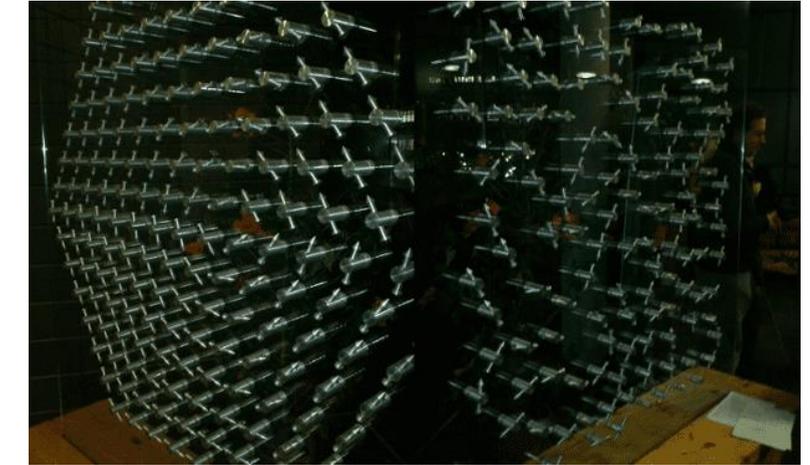
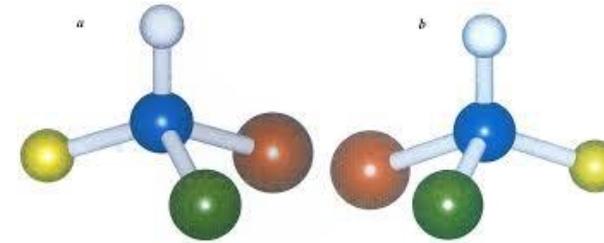


Ordinary crystals

c) Dense

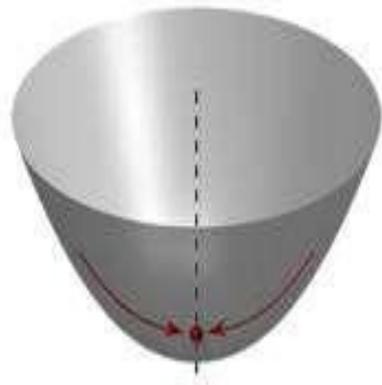


Glasses

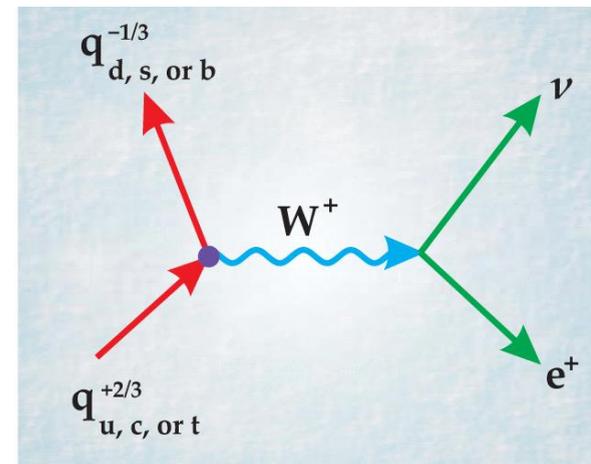
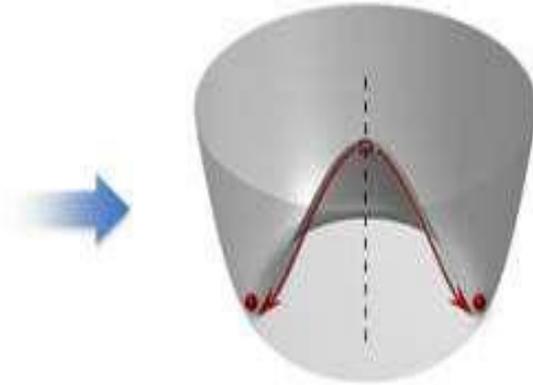


Quebra espontânea de simetria em um ferromagneto.

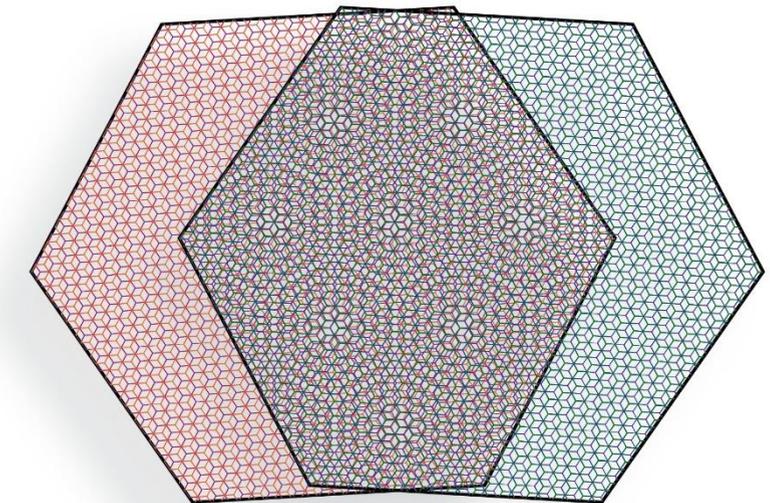
Unbroken Symmetry



Broken Symmetry

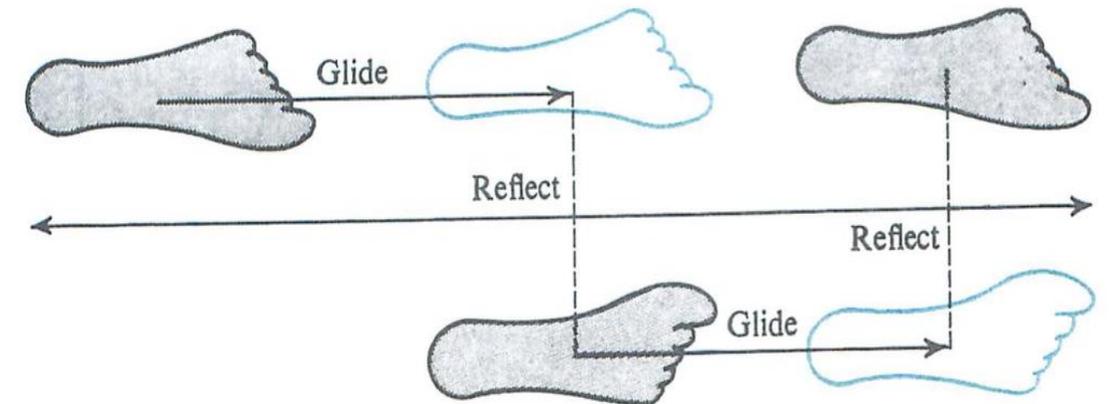
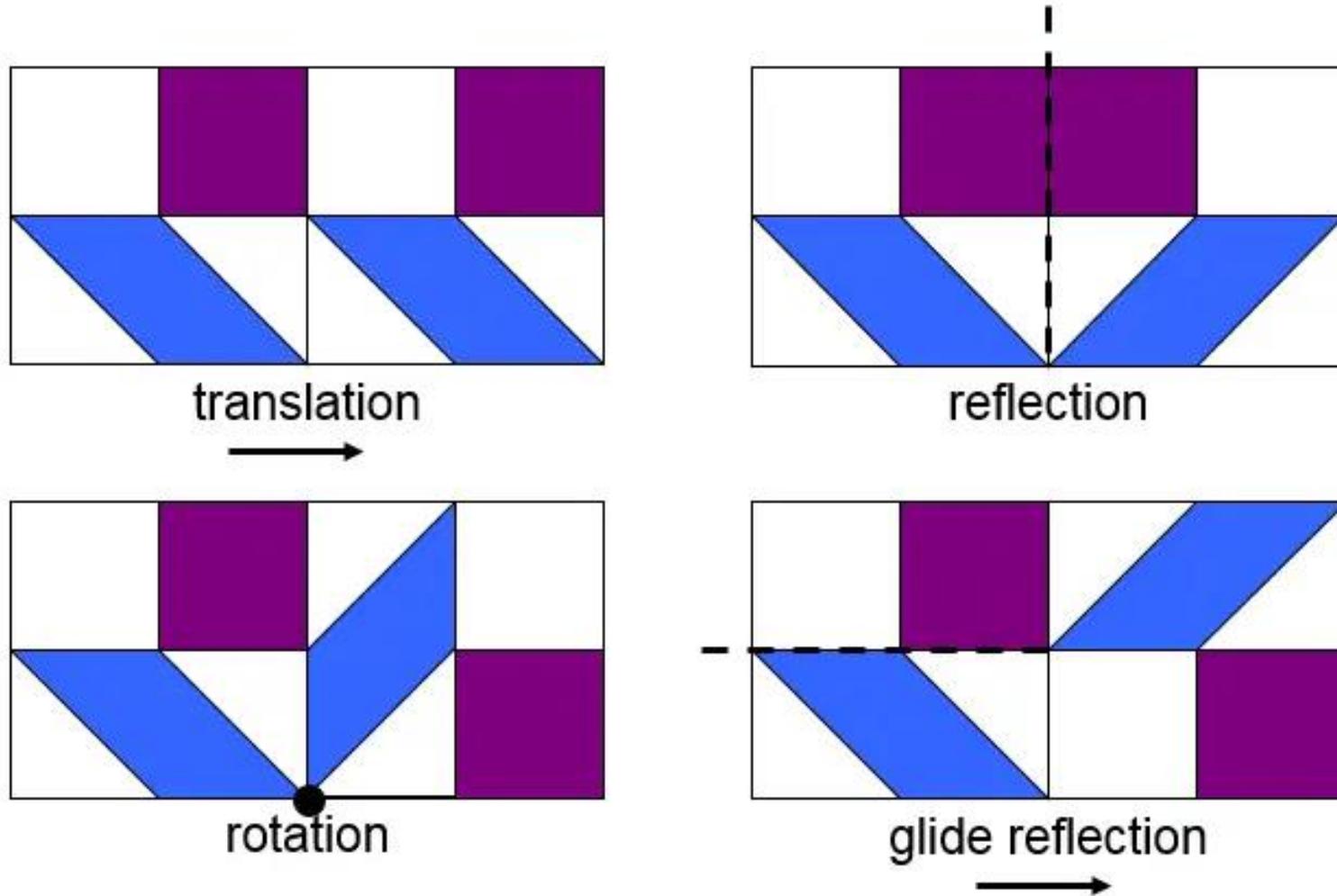


Quebra de simetria em física de partículas



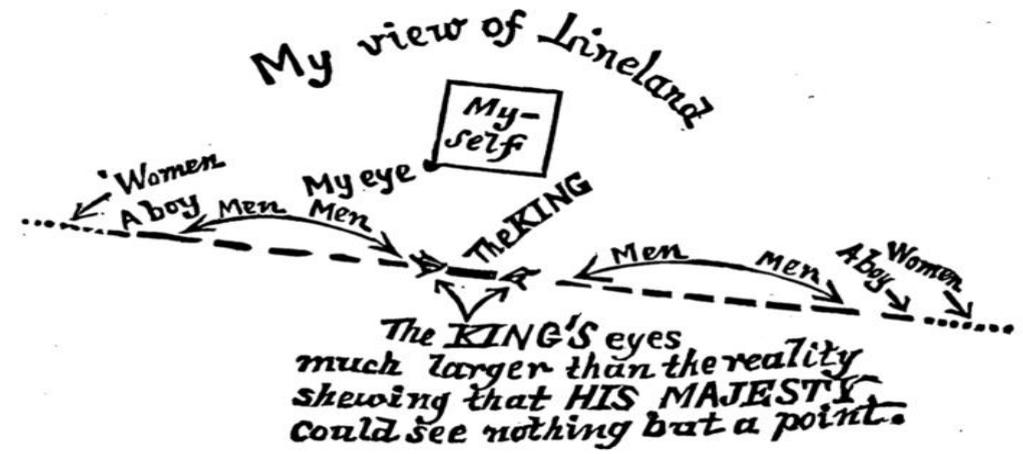
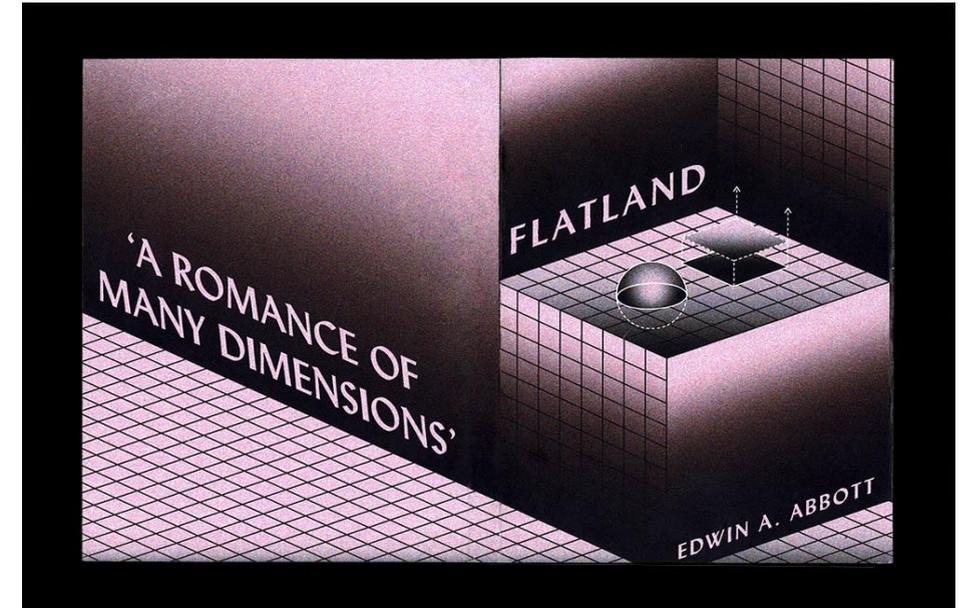
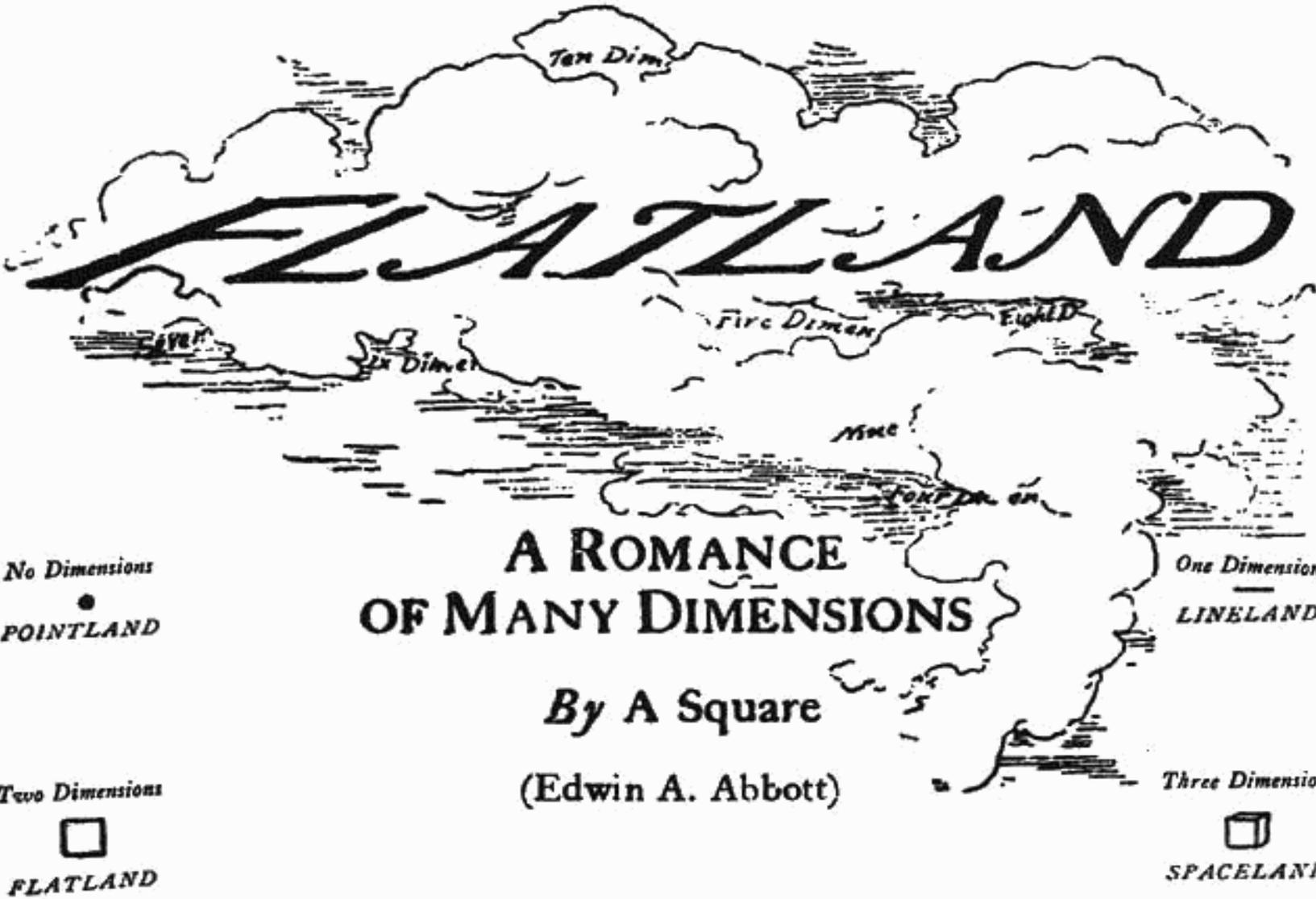
Quebra espontânea de simetria em grafeno de dupla camada torcida

Operações em simetria



Flatland

"O day and night, but this is wondrous strange"



Flatland ...



Woman



Soldier

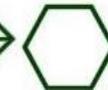
Father



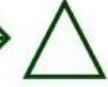
Son



Grandson



Upper classes gain stature.



Soldiers and workmen progress within class.



Noble



Gentleman

Just a point.



A woman's place.

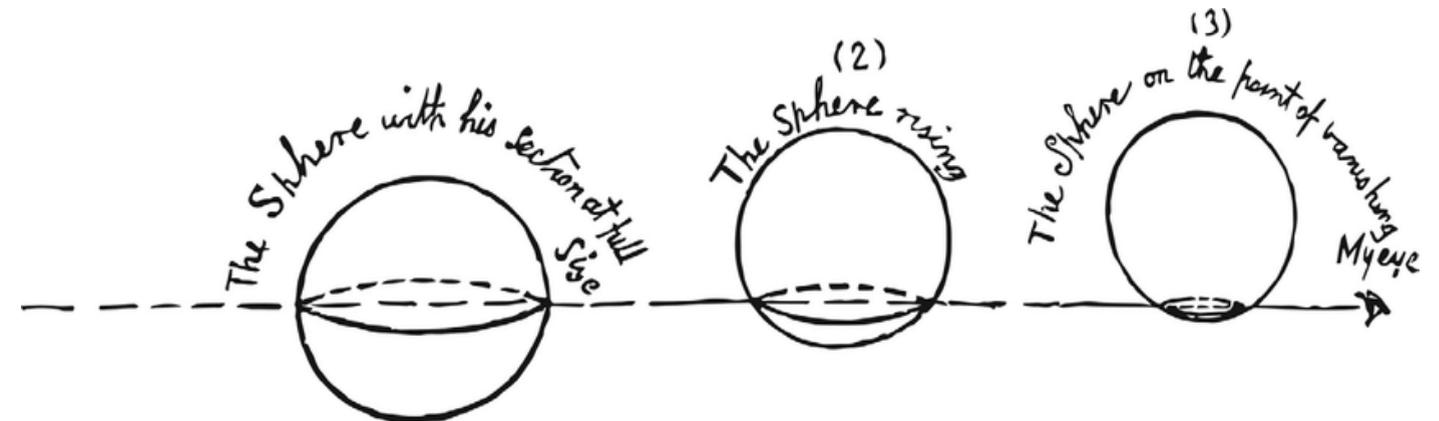
Only a line.



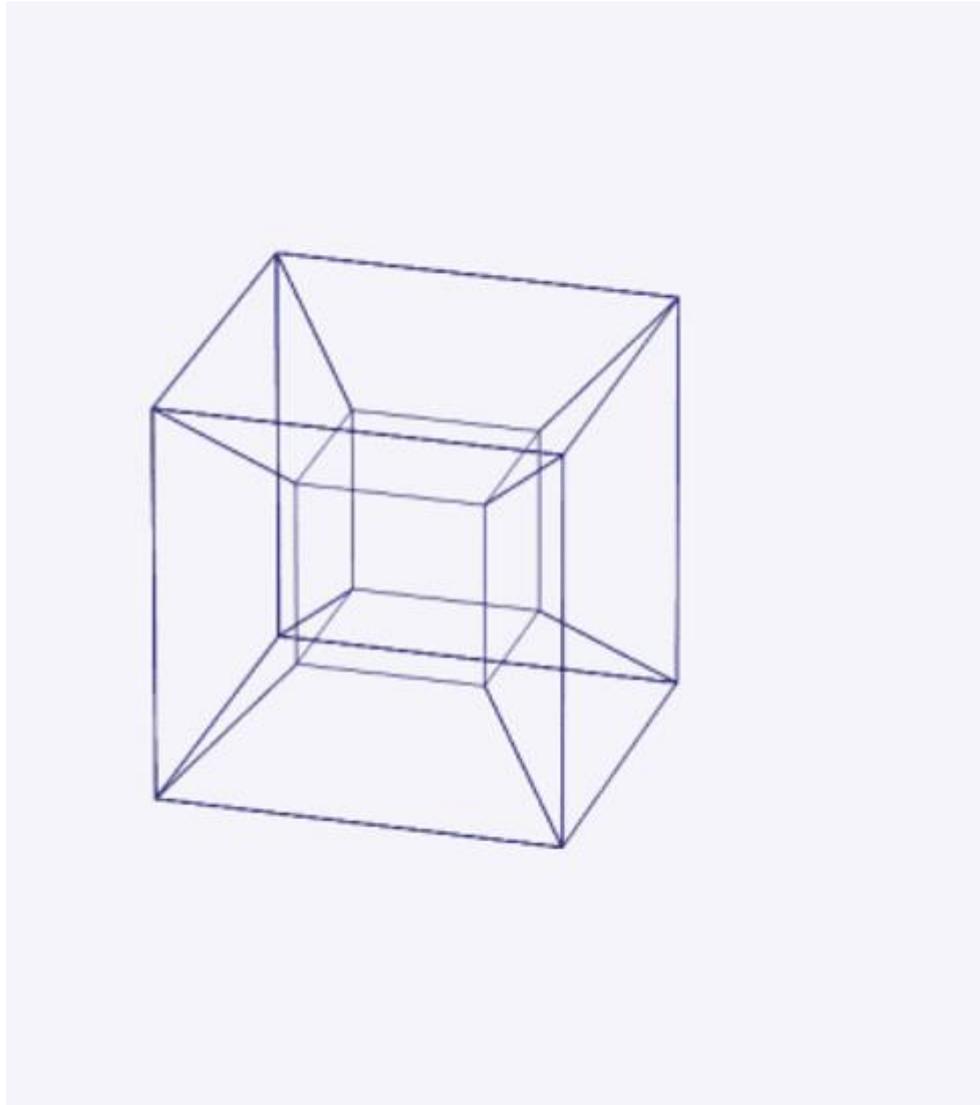
Priest



House



A quarta dimensão e o nascimento do cubismo



Tesseract

Pablo Picasso - Les demoiselles d'Avignon

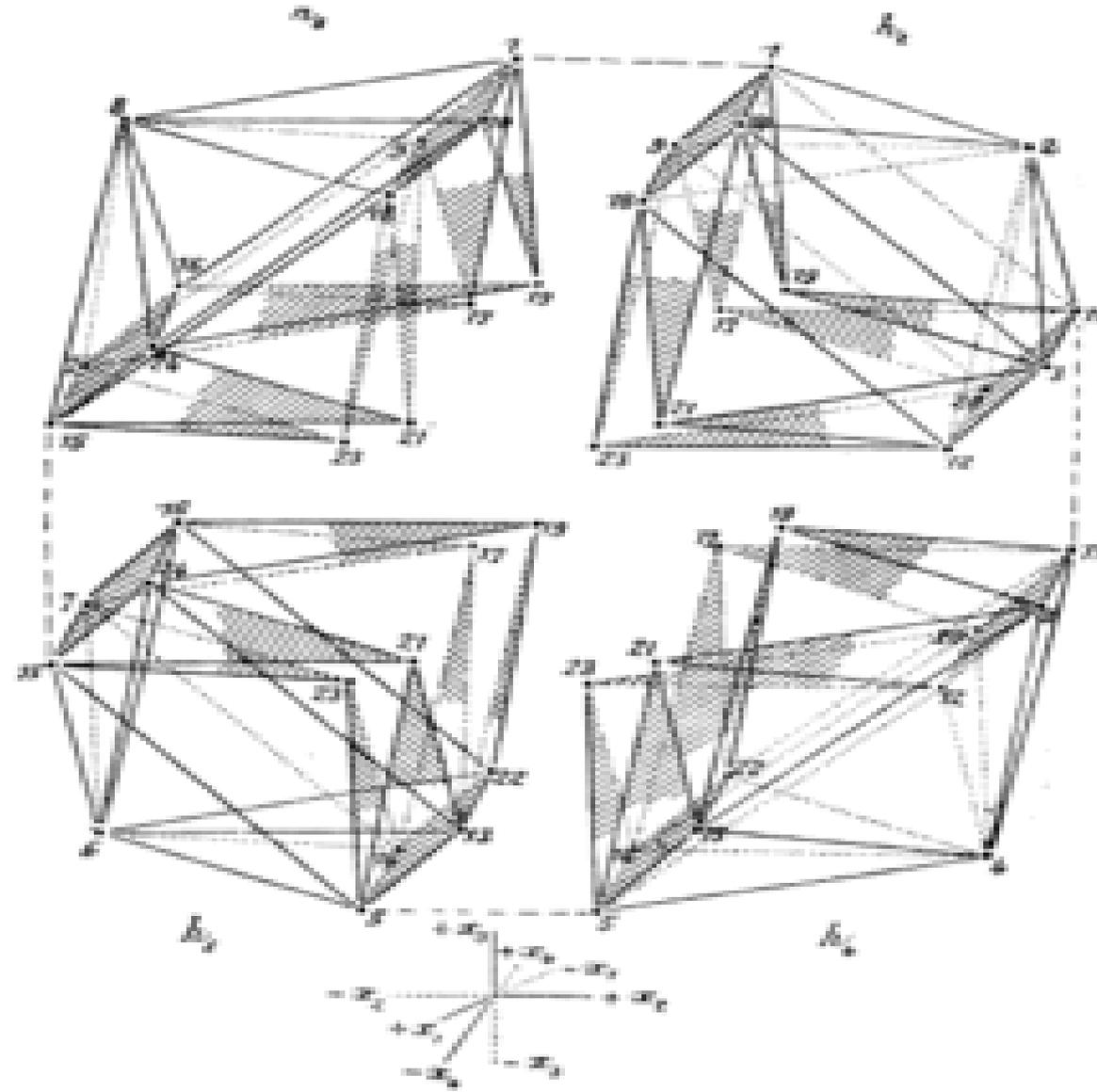
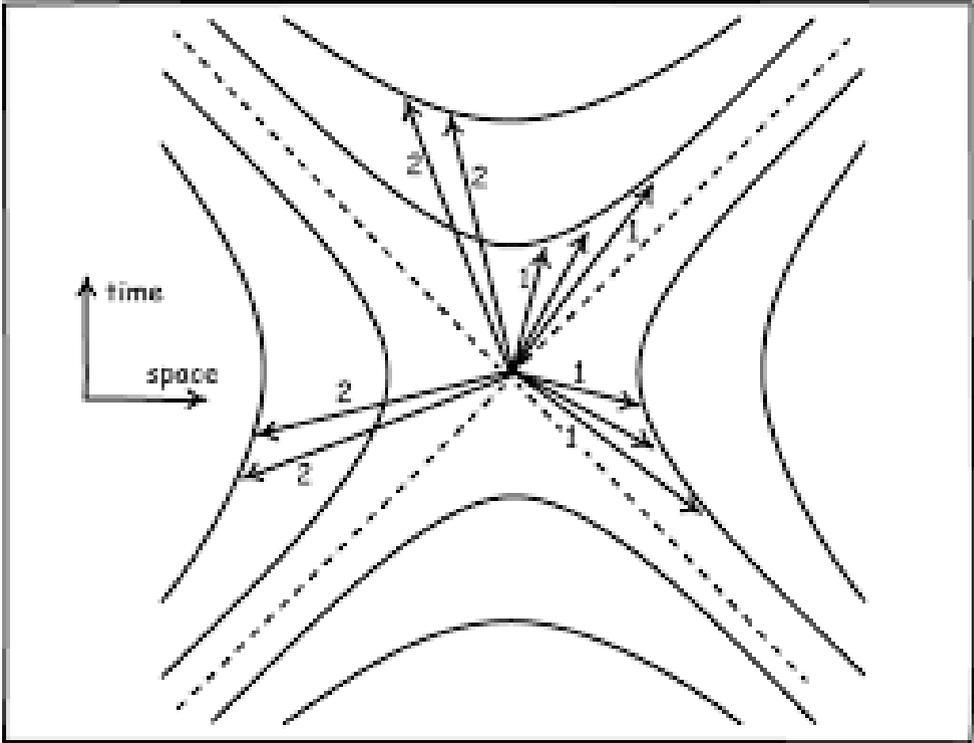
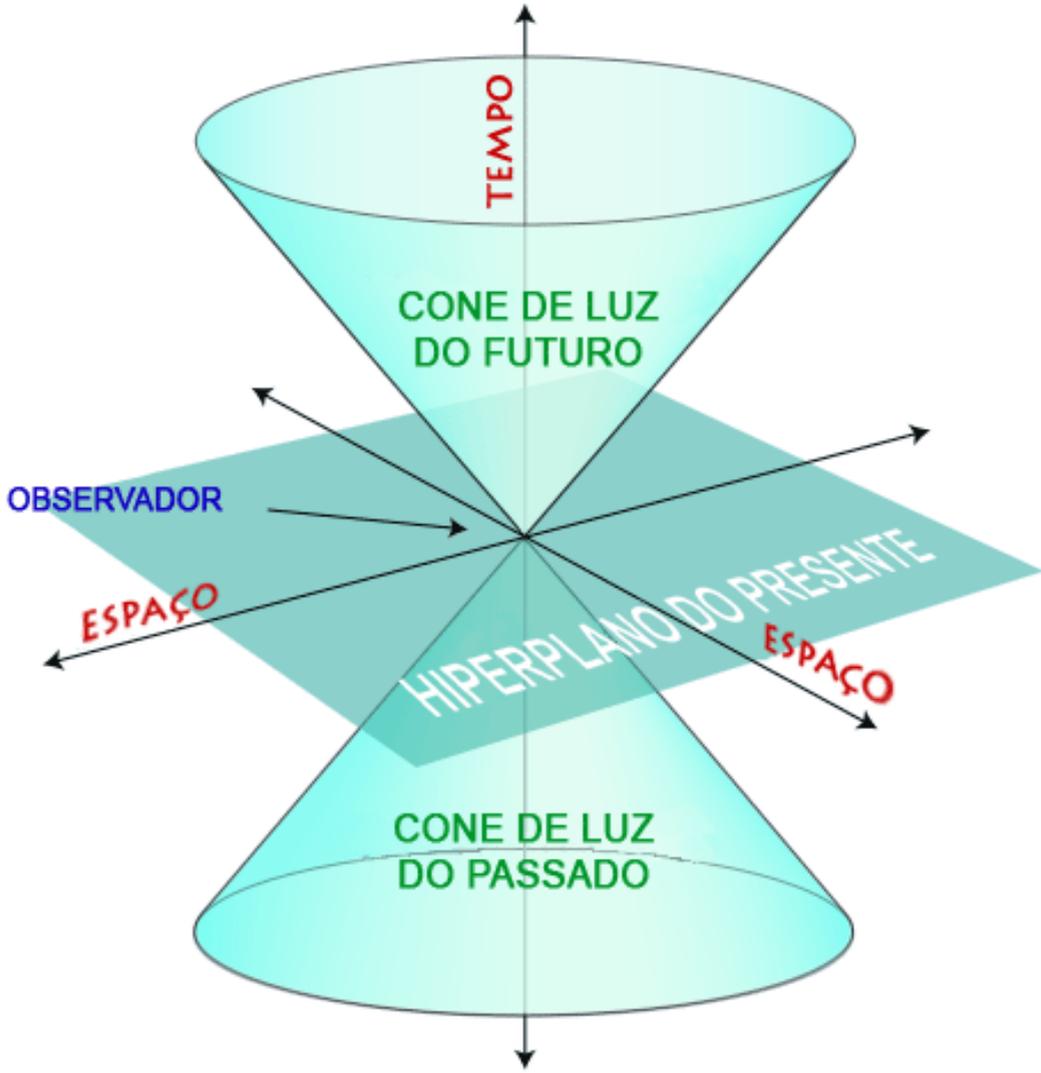


Fig. 40. — Perspective cavalière des séries octaédriques fondamentales.

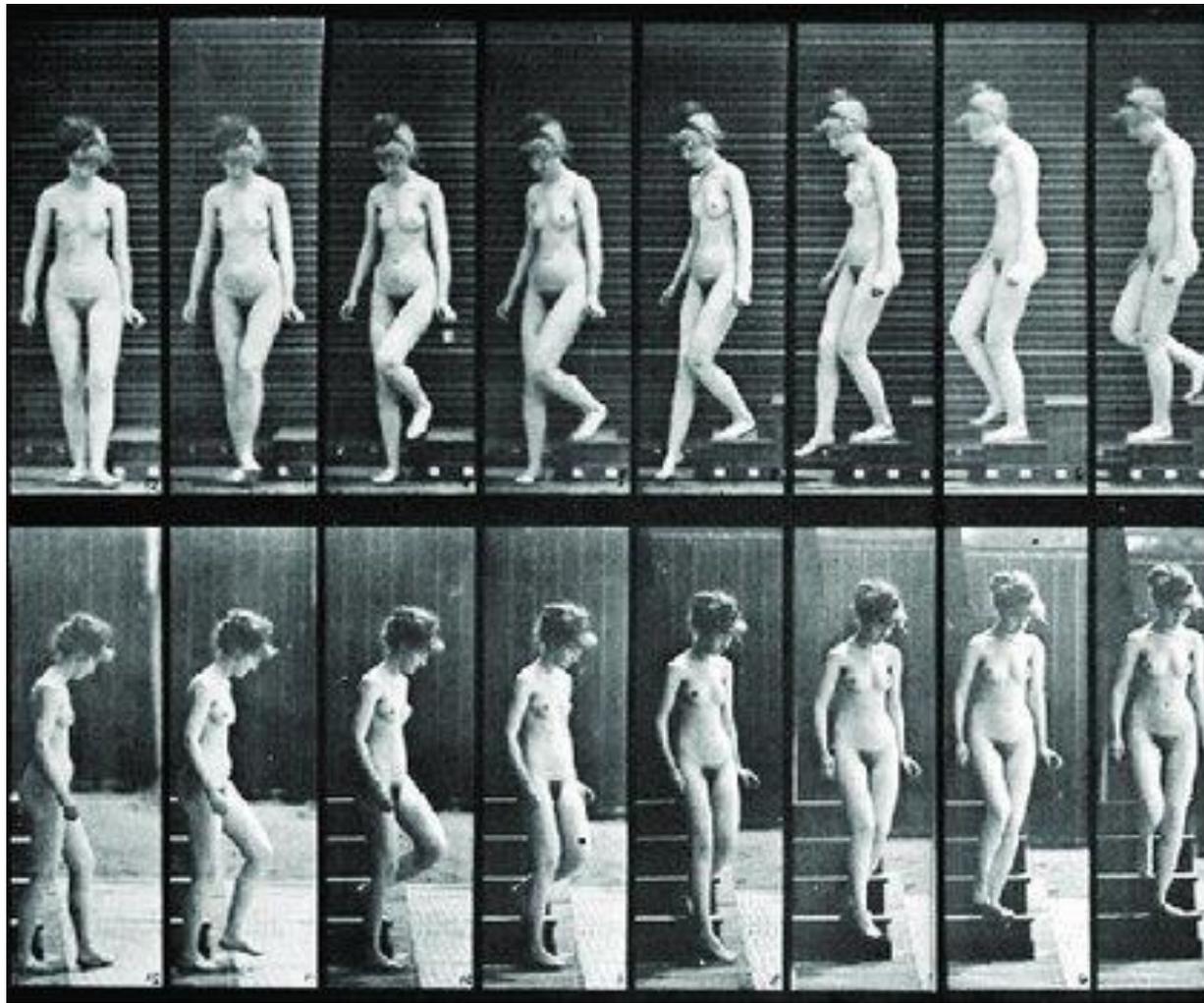


Uma ilustração do *Traité élémentaire de géométrie à quatre dimensions* de Jouffret. O livro, que influenciou Picasso, foi dado a ele por Maurice Princet (Matemático)

Diagramas espaço-tempo de Minkowski

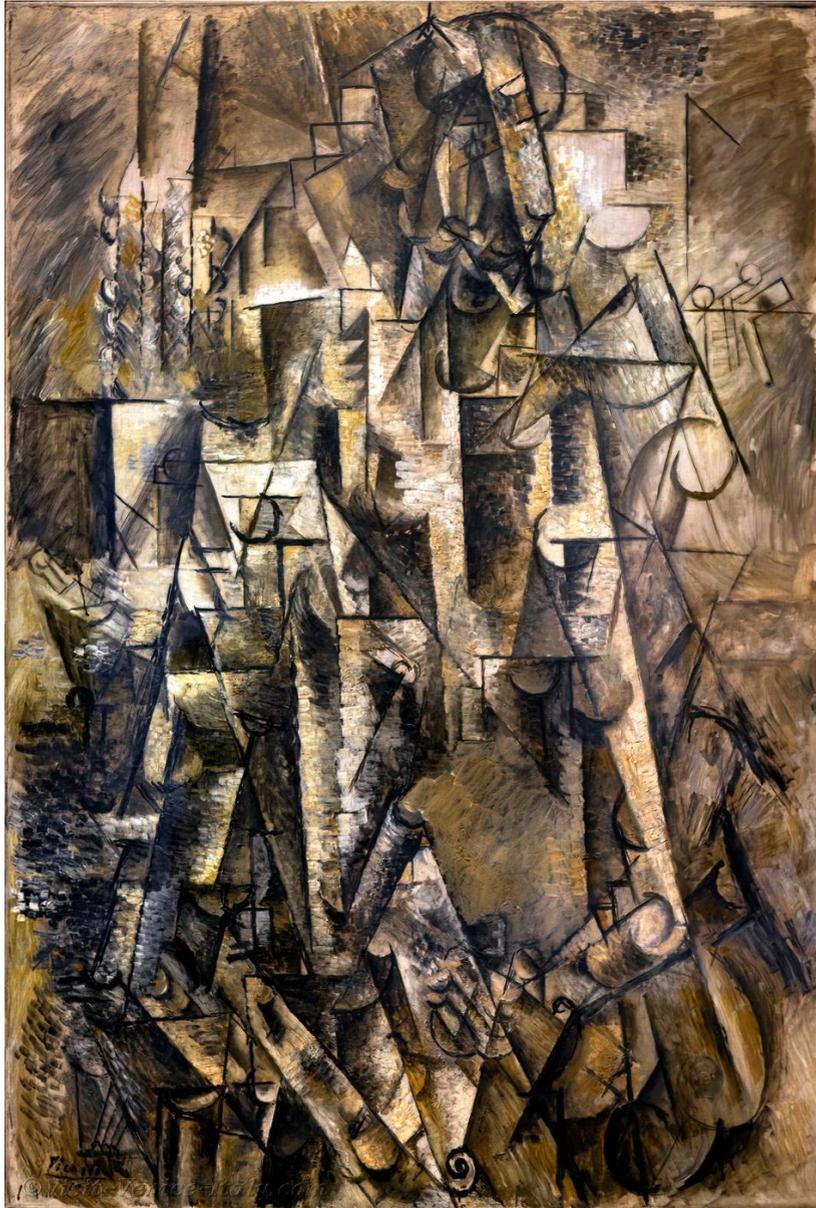


Perspectivas no tempo



Mulher descendo as escadas (Muybridge, circa 1885)
Nu descendo as escadas nº 2 (Duchamp, 1912).

Visualizações sob várias perspectivas ...

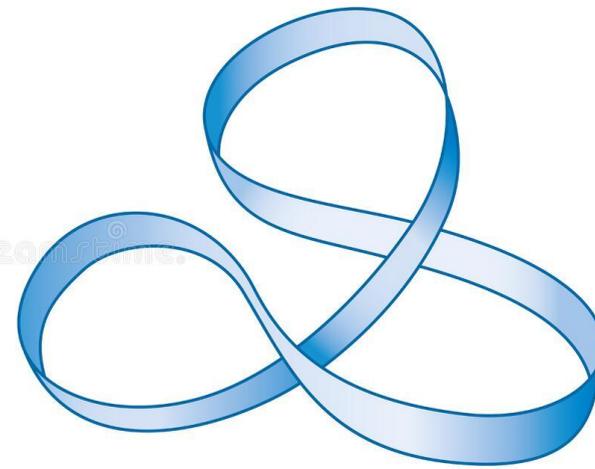
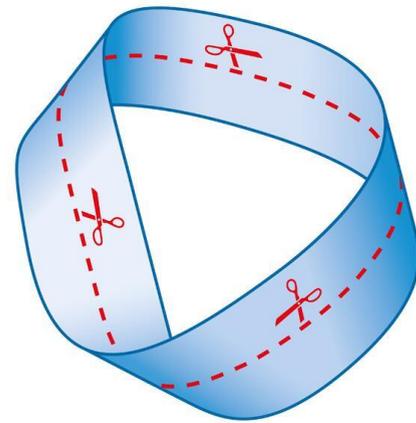
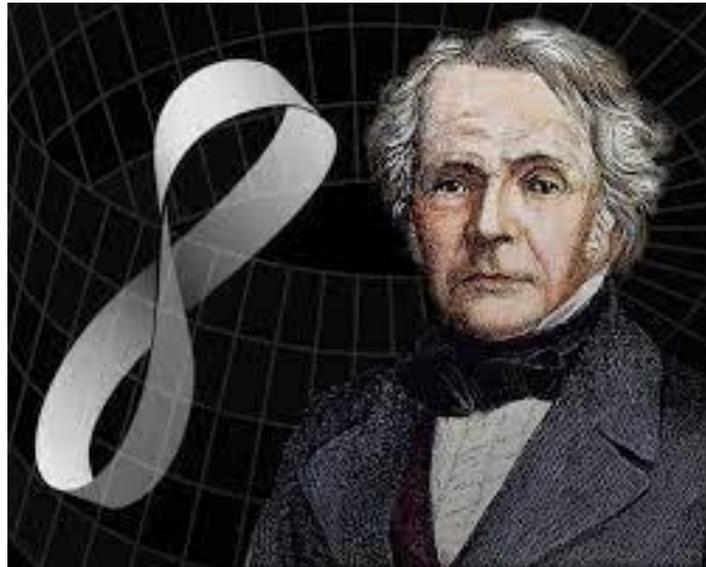


Cubismo - Reconstrução do espaço
Vistas simultâneas no espaço
Pablo Picasso, O Poeta (Le Poète) - 1911

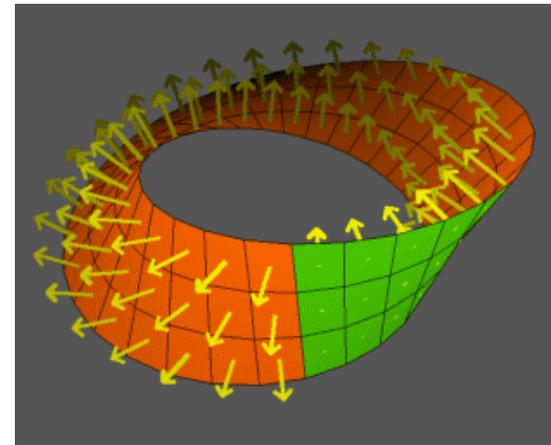
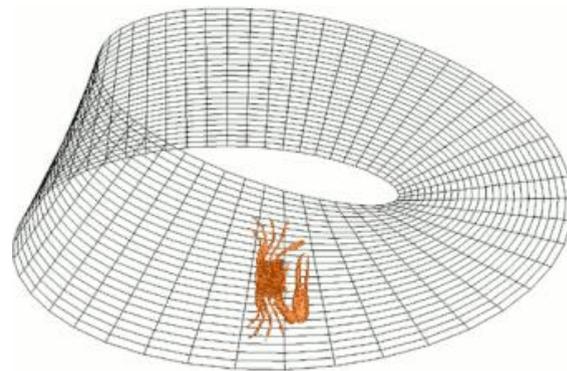


Futurismo - Análise do tempo
Visualizações simultâneas no tempo
Umberto Boccioni - Dinamismo di un ciclista - 1913

Fita de Möbius

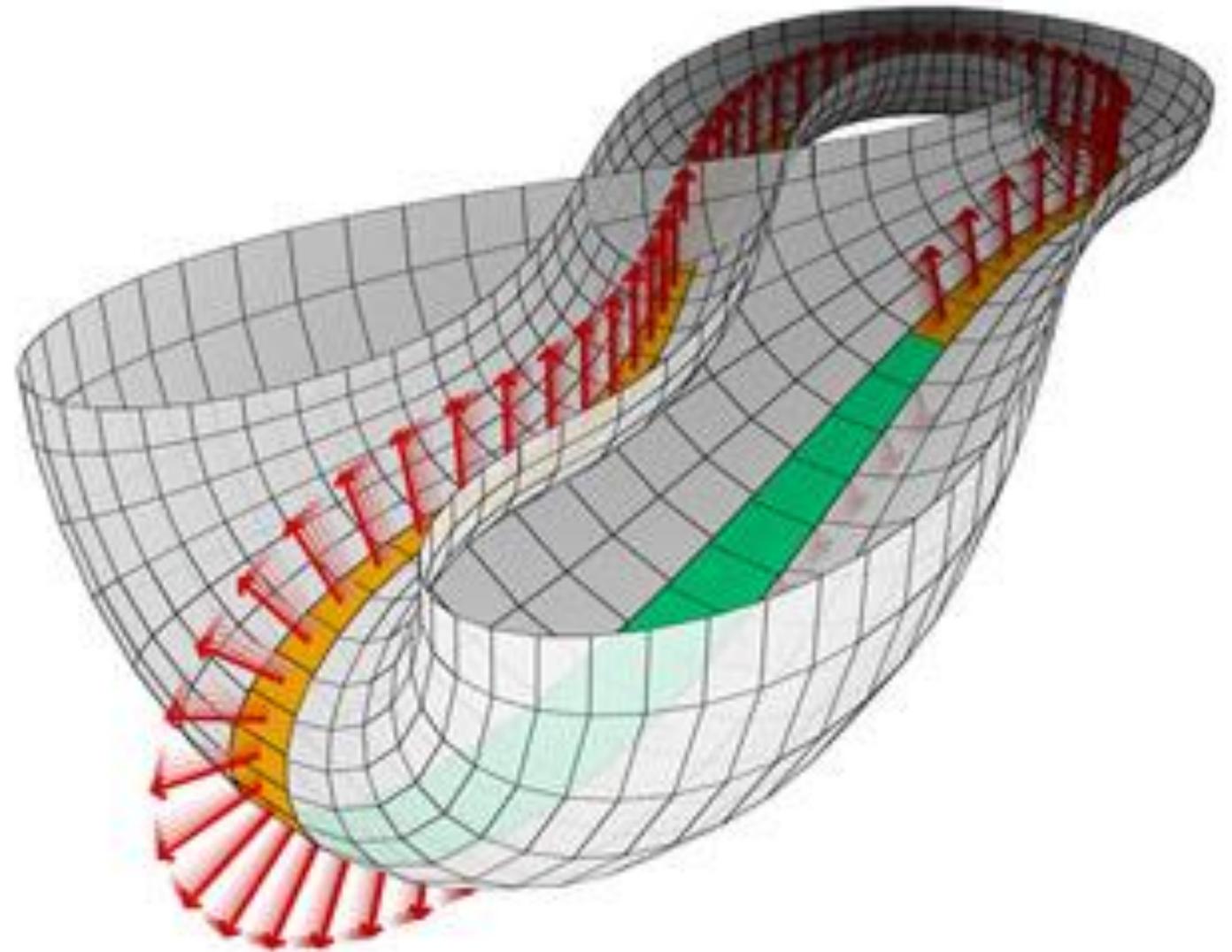


impa



| half-twists | cuts | divs. | result |
|-------------|------|-------|--------------------------|
| 1 | 1 | 2 | 1 band, length 2 |
| 1 | 1 | 3 | 1 band, length 2 |
| | | | 1 Möbius strip, length 1 |
| 1 | 2 | 4 | 2 bands, length 2 |
| 1 | 2 | 5 | 2 bands, length 2 |
| | | | 1 Möbius strip, length 1 |
| 1 | 3 | 6 | 3 bands, length 2 |
| 1 | 3 | 7 | 3 bands, length 2 |
| | | | 1 Möbius strip, length 1 |
| 2 | 1 | 2 | 2 bands, length 1 |
| 2 | 2 | 3 | 3 bands, length 1 |
| 2 | 3 | 4 | 4 bands, length 1 |

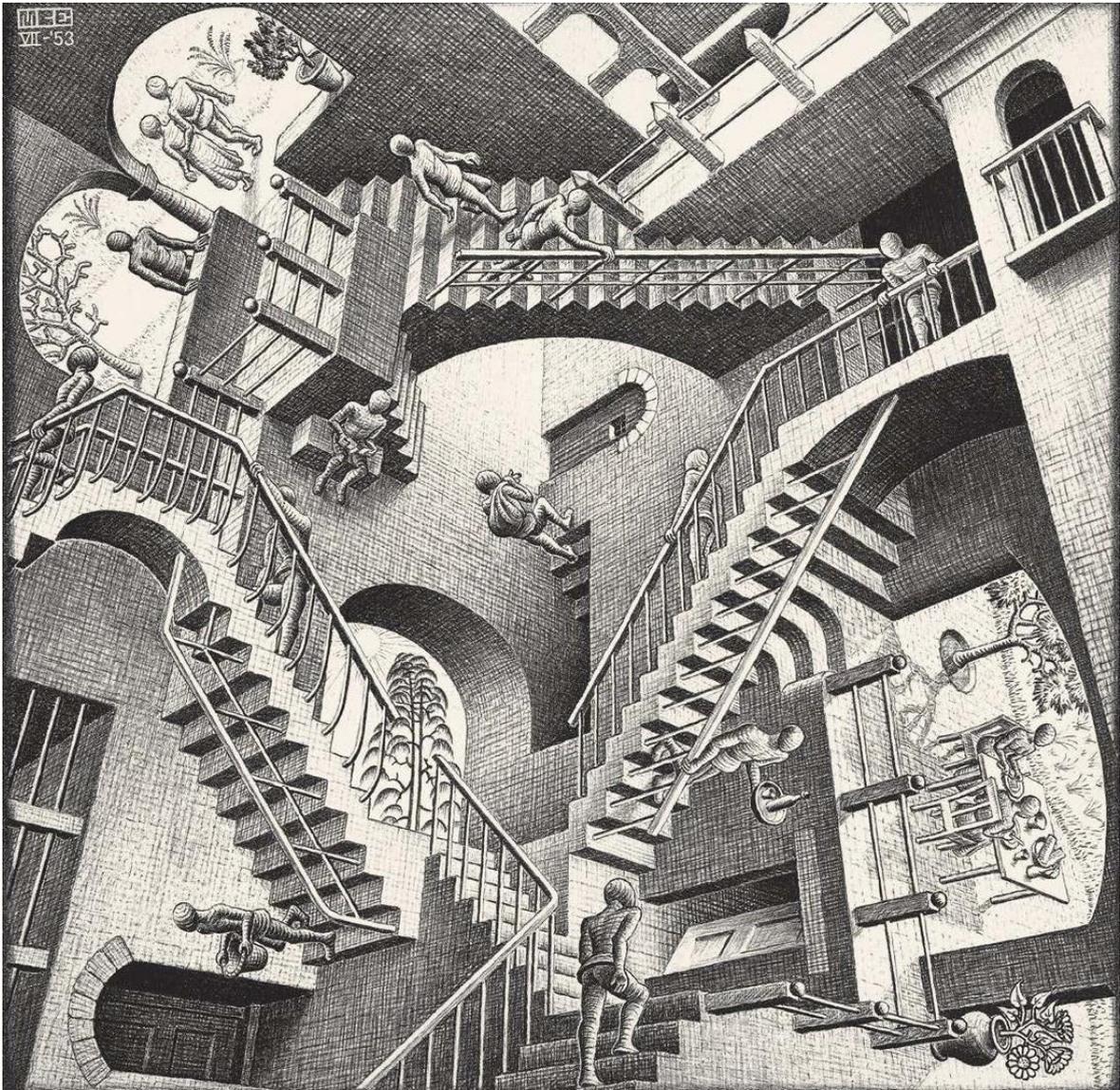
Garrafa de Klein



Escher & a fita de Möbius ...



Bond of Union, Maurits Cornelis Escher, 1956



Relativity, Maurits Cornelis Escher, 1953

Lygia Clark e a desmaterialização da obra de arte



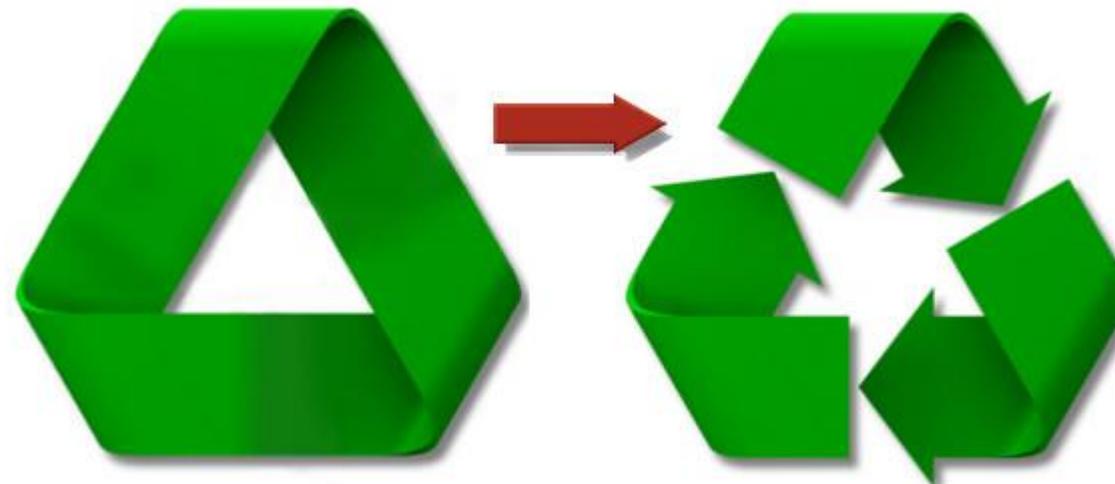
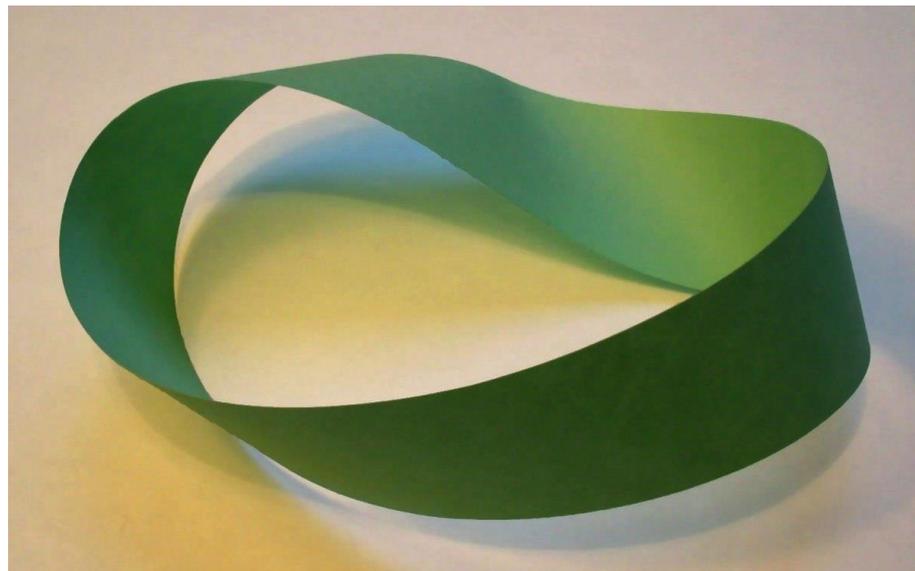
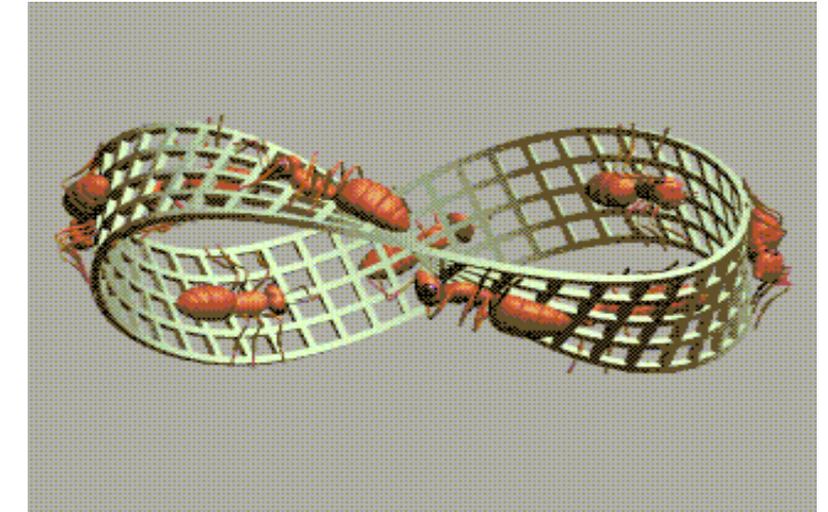
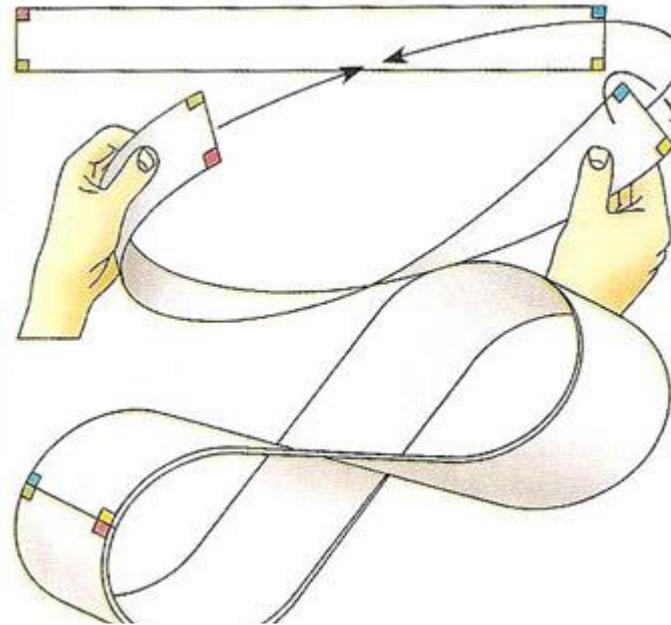
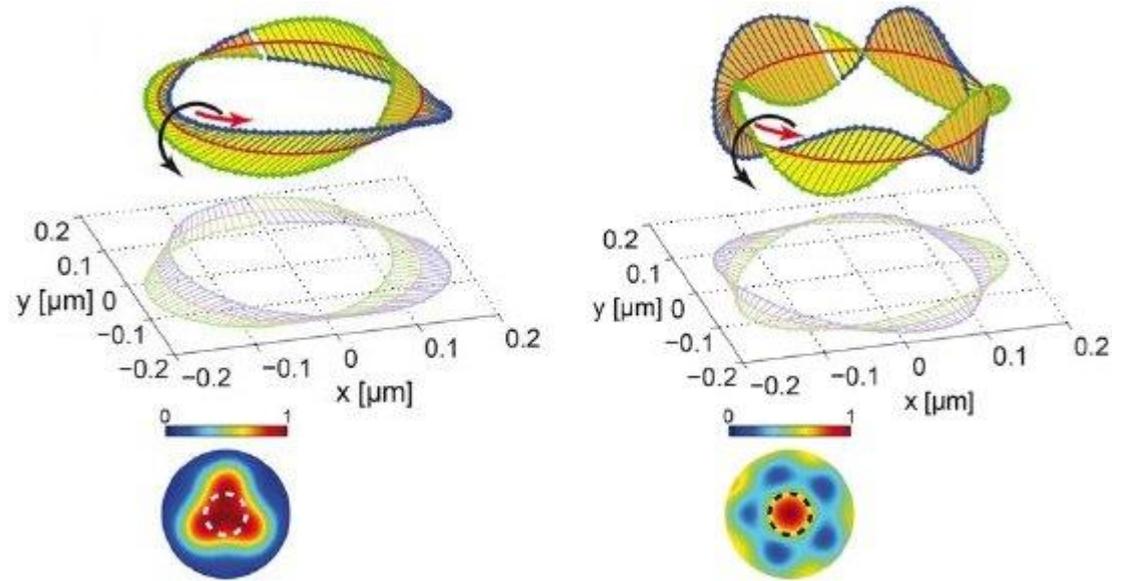
“A fita de Möbius é uma dobra de material contendo uma meia espiral, dando a ele apenas uma superfície contínua.” Moma

“Conforme a fita vai sendo cortada, ela fica mais fina e é desdobrada em entrelaçamentos. No final, o caminho é tão estreito que não pode mais ser cortado.”
L. Clark

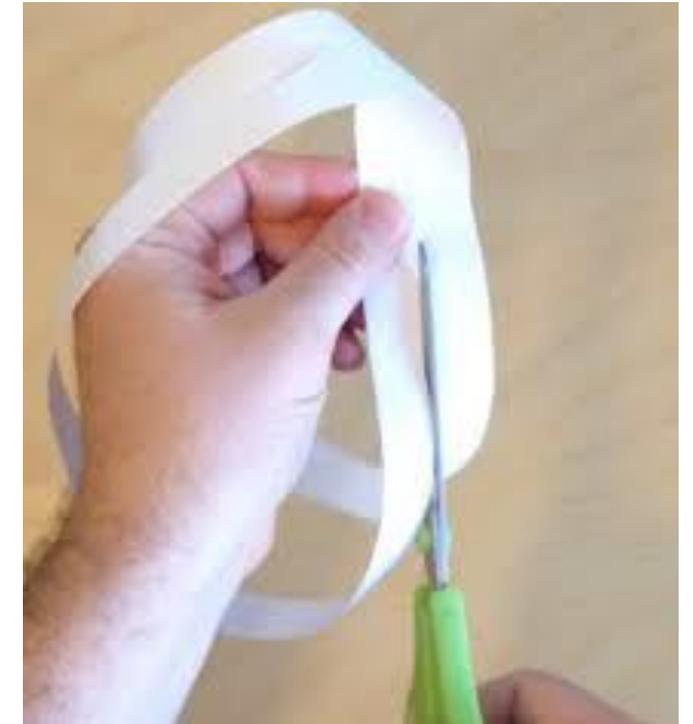
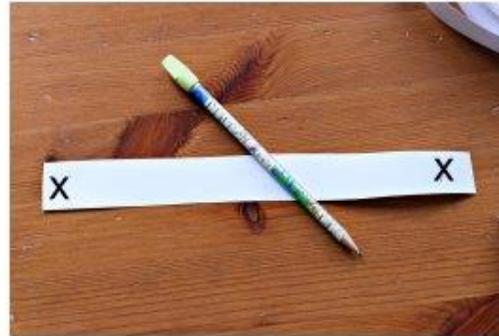
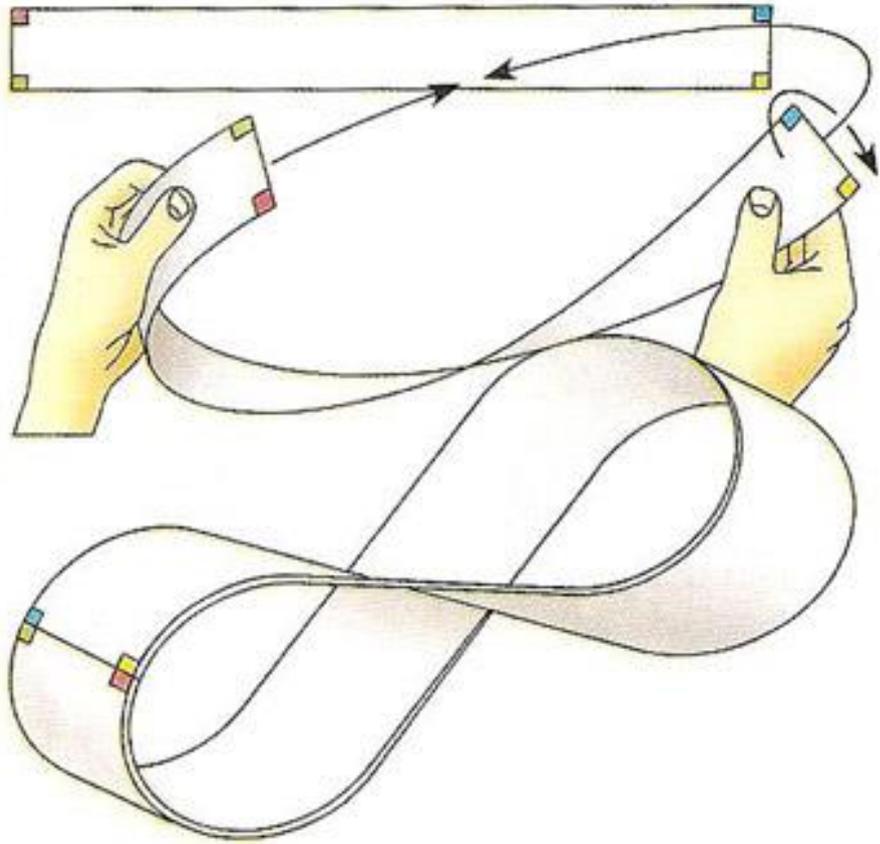
Lygia Clark. *Caminhando (Walking)*. 1963

Fase dos Bichos

Fita de Möbius



Como fazer uma fita de Möbius



Sugestões de experimentações com a Fita de Möbius

MESA 1 - Poesia

MESA 2 – Artes Visuais

MESA 3 – Música

MESA 4 - Dança

MESA 5 – Moda

MESA 6 – Arte Digital

MESA 7 – Interesse espontâneo do grupo 1

MESA 8 – Interesse espontâneo do grupo 2

MESA 9 – Interesse espontâneo do grupo 3

MESA 10 – Interesse espontâneo do grupo 4

MESA 11 – Interesse espontâneo do grupo 5

MESA 12 – Interesse espontâneo do grupo 6



Philipps Hue – Espectro de Cores



0 60 120 180 240 300 360

Sugestões de experimentações com a Fita de Möbius

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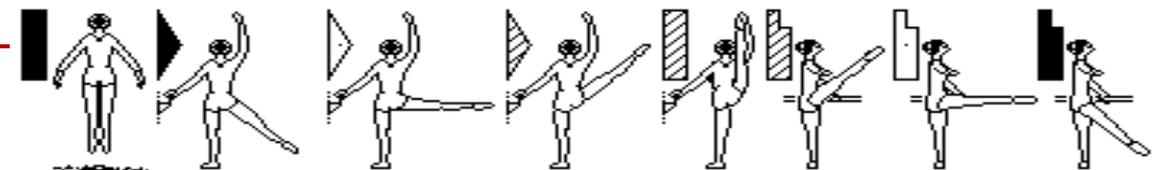
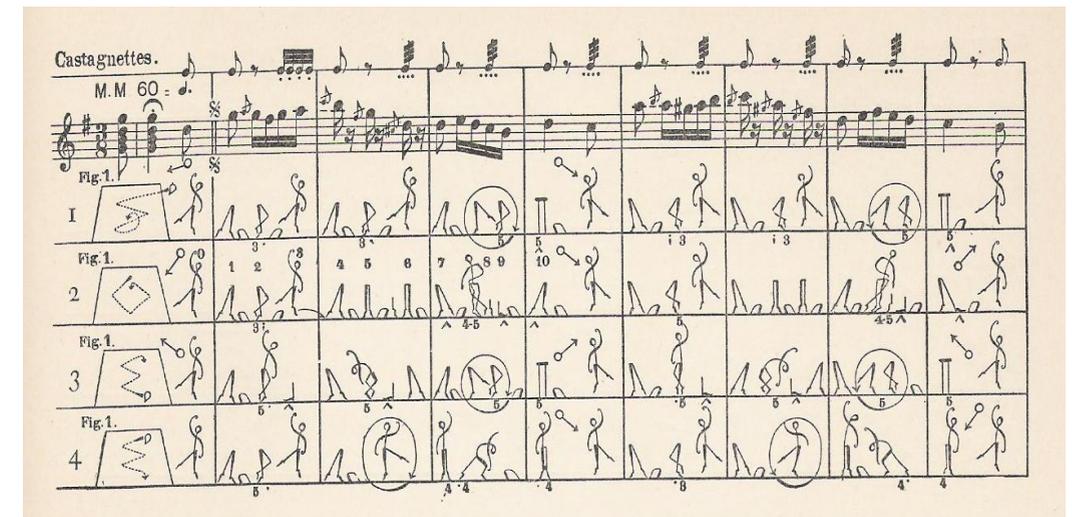
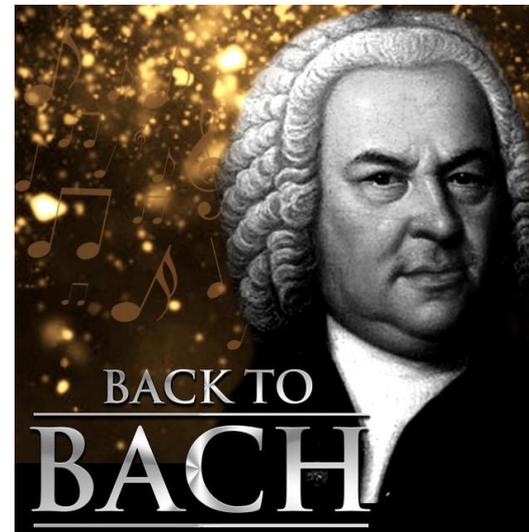
MESA 8 - Interesse espontâneo do grupo 2

MESA 9 - Interesse espontâneo do grupo 3

MESA 10 - Interesse espontâneo do grupo 4

MESA 11 - Interesse espontâneo do grupo 5

MESA 12 - Interesse espontâneo do grupo 6



Sugestões de experimentações com a Fita de Möbius

MESA 1 - Poesia

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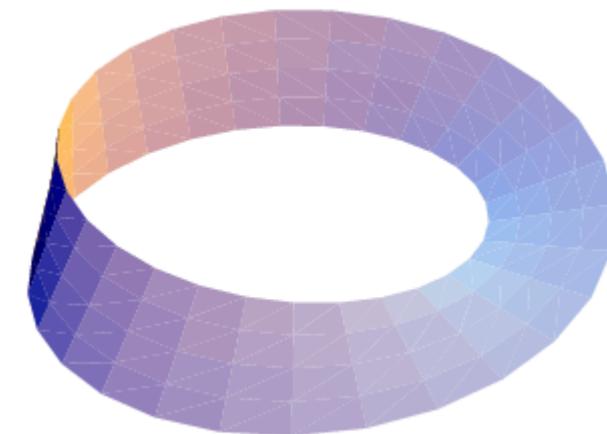
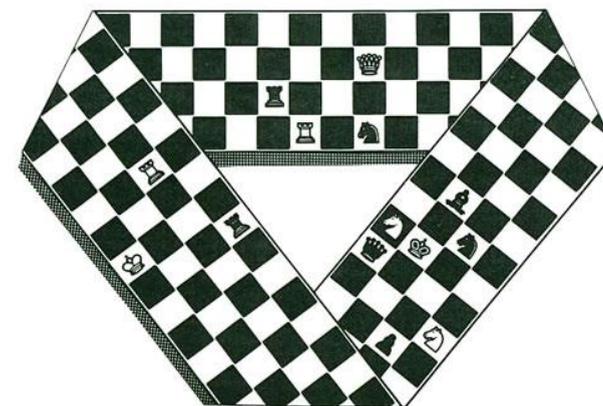
MESA 8 - Interesse espontâneo do grupo 2

MESA 9 - Interesse espontâneo do grupo 3

MESA 10 - Interesse espontâneo do grupo 4

MESA 11 - Interesse espontâneo do grupo 5

MESA 12 - Interesse espontâneo do grupo 6



<https://www.geogebra.org/m/HyPbc52S>