

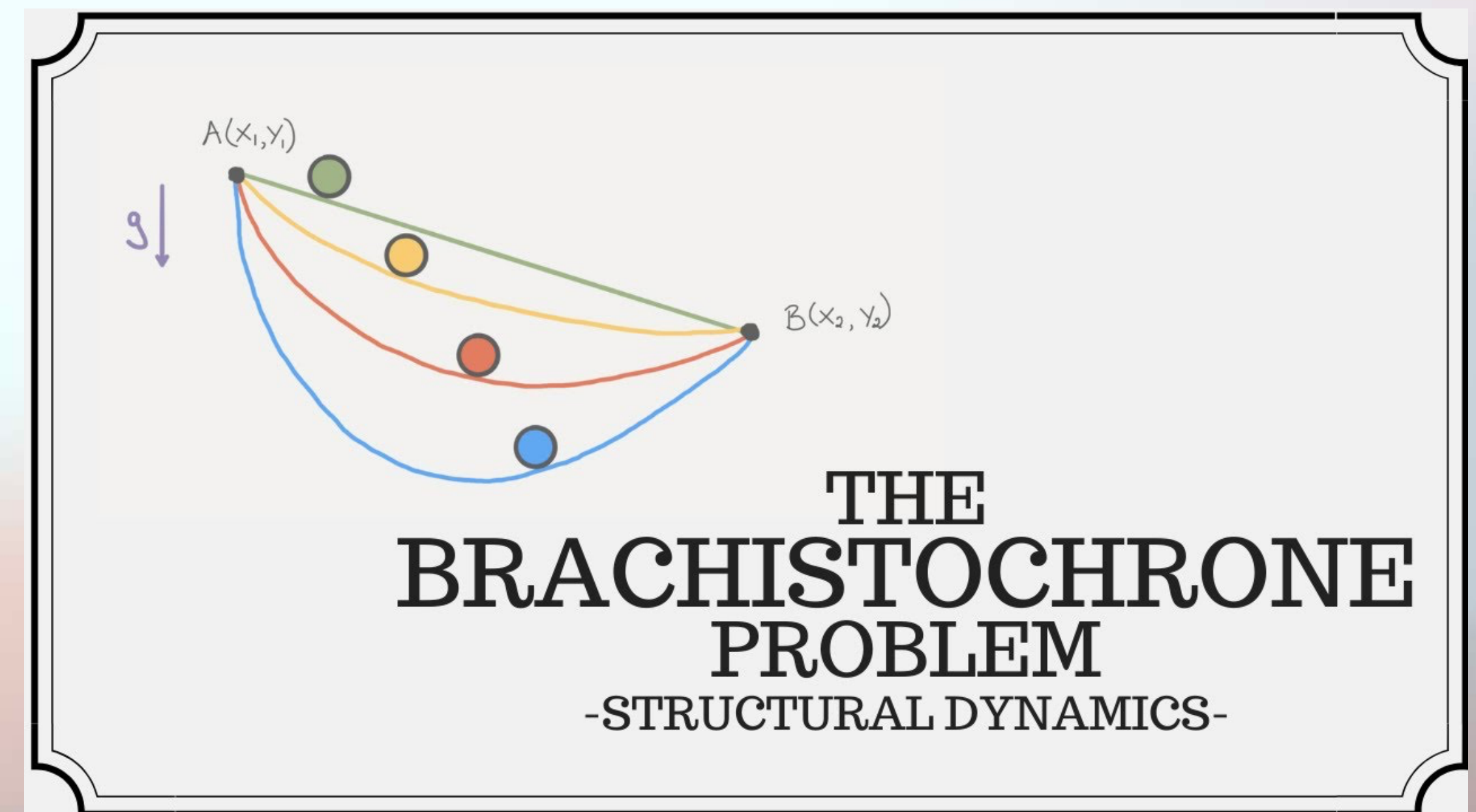
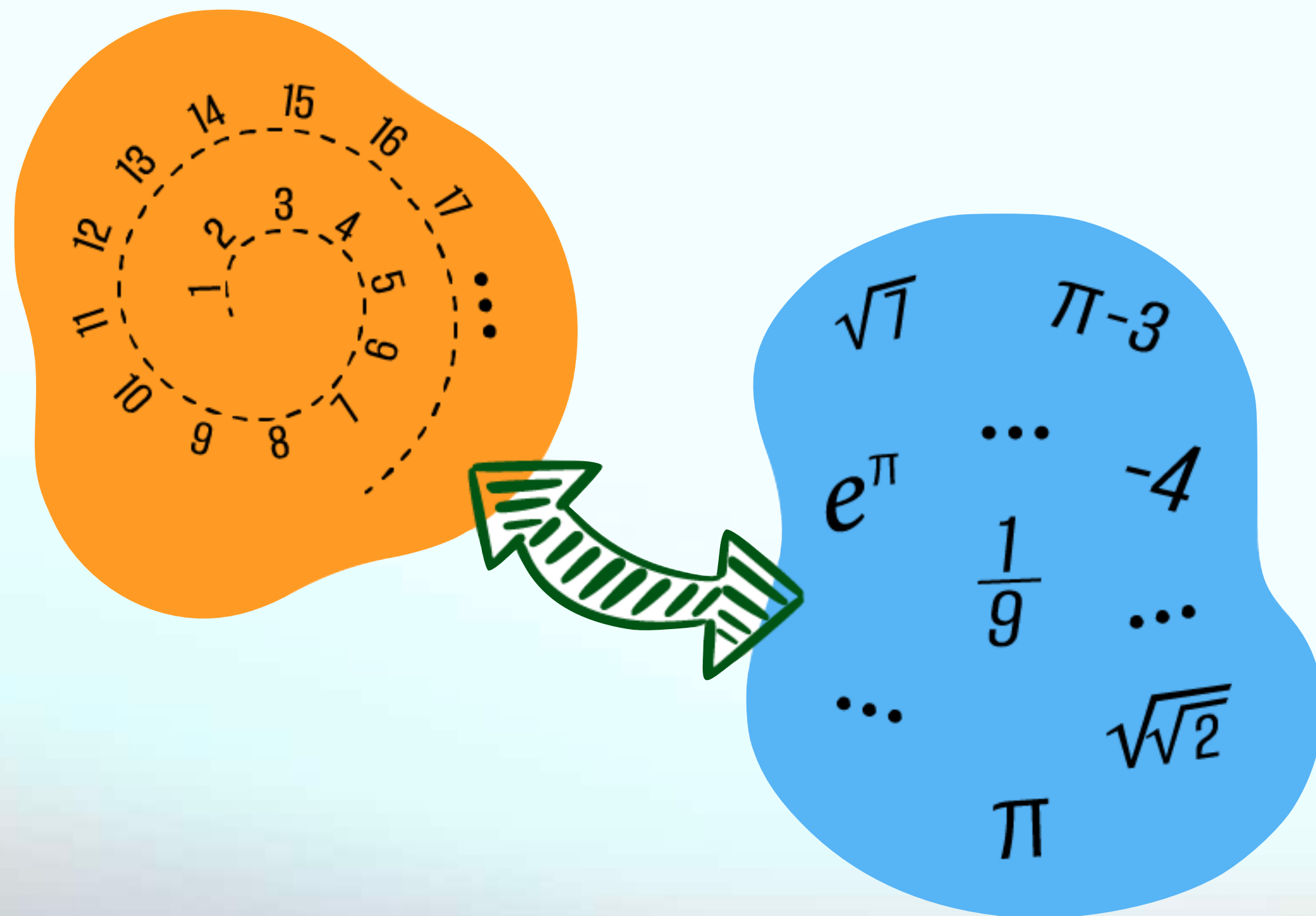
L'iperuranio della fisica teorica: le simmetrie

Assiomi

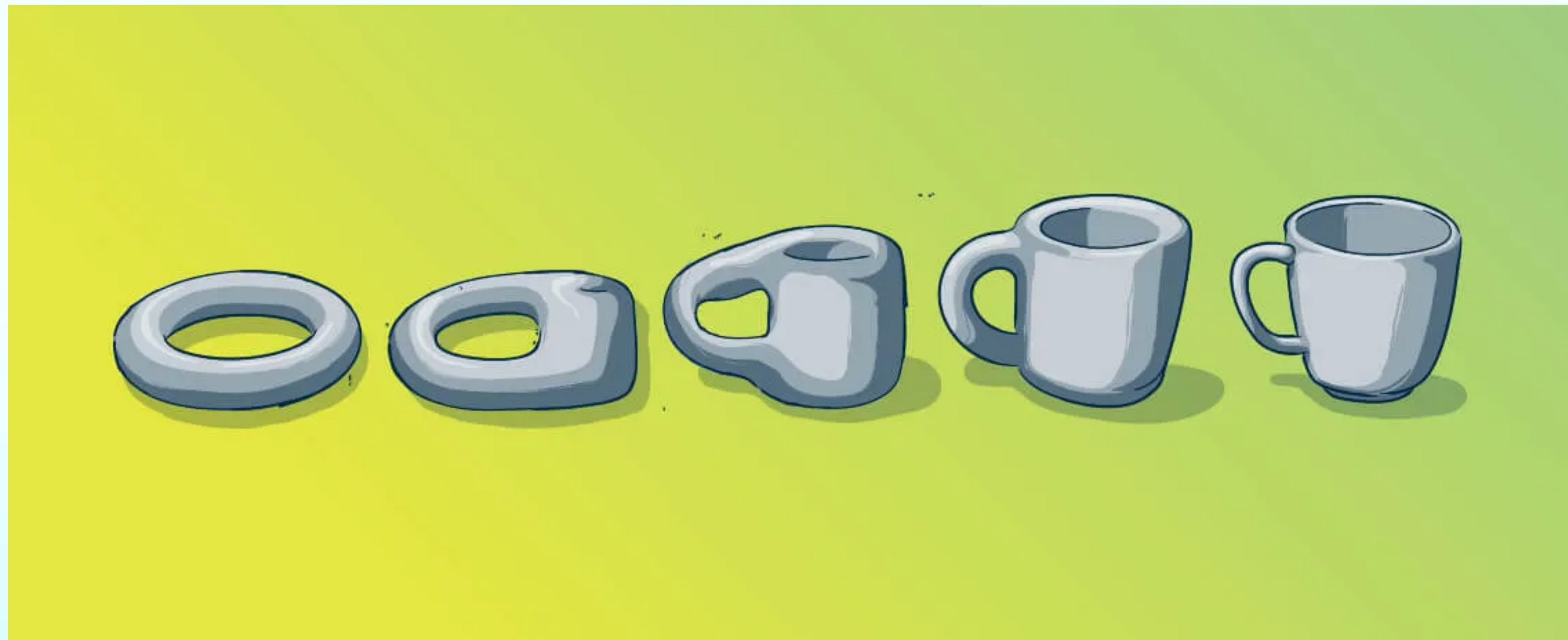
Simmetrie continue

Simmetrie discrete

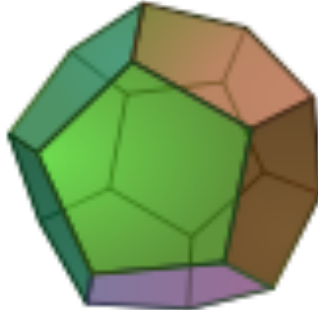
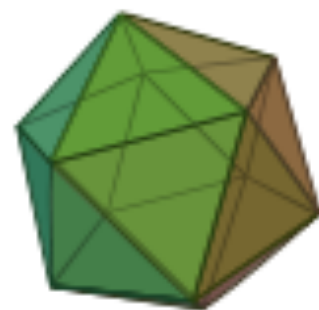
Dalla teoria dei set alla geometria differenziale



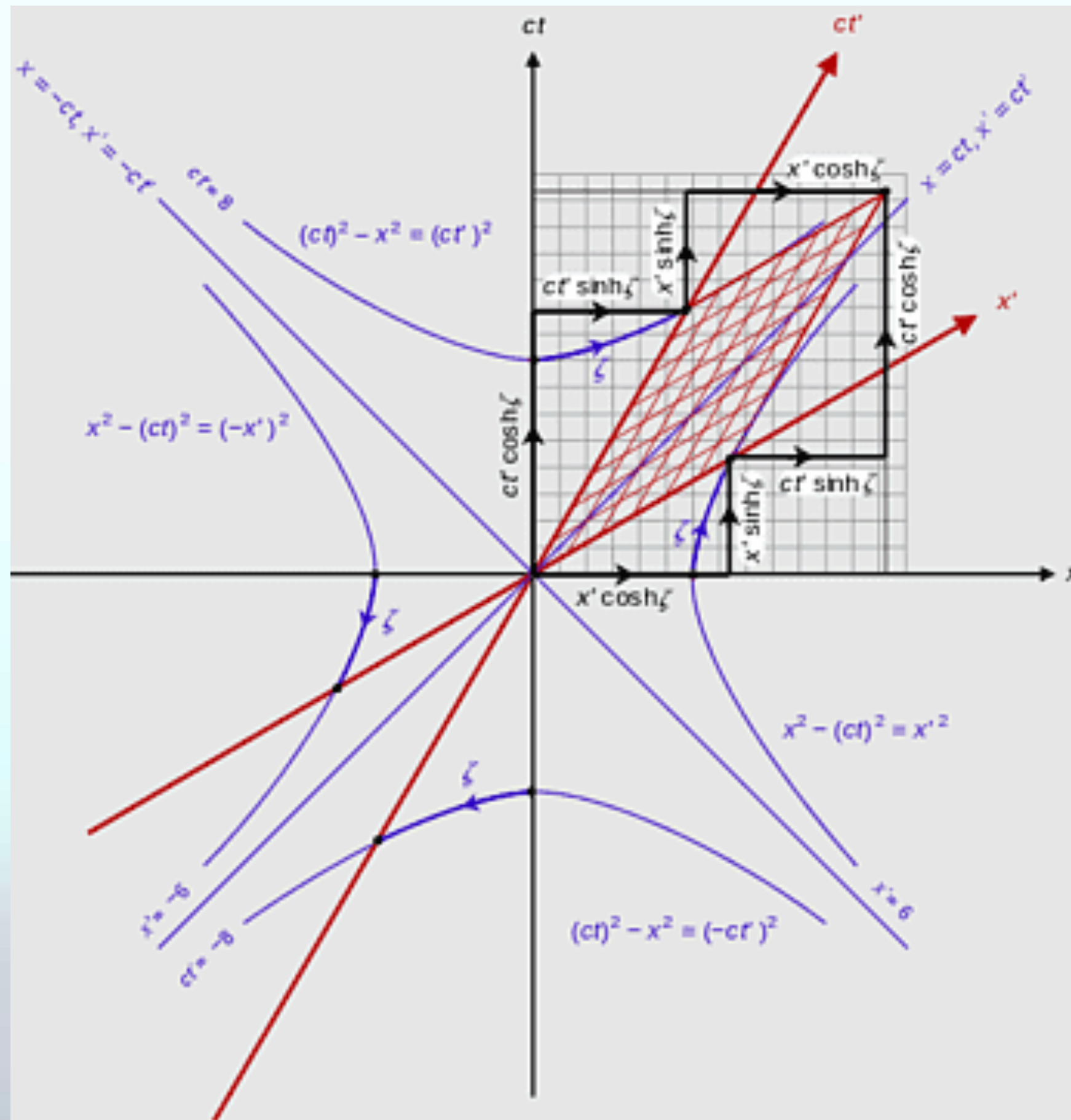
Topologia: Buchi e caratteristica di Eulero



$$V-E+F=2$$

Tetrahedron $V=4, E=6, F=4$	Cube or hexahedron $V=8, E=12, F=6$	Octahedron $V=6, E=12, F=8$	Dodecahedron $V=12, E=30, F=20$	Icosahedron $V=20, E=30, F=12$
				

Trasformazioni di Lorentz: Rotazioni iperboliche



$$x = (x^0, x^1, x^2, x^3) \quad x' = (x'^0, x'^1, x'^2, x'^3)$$

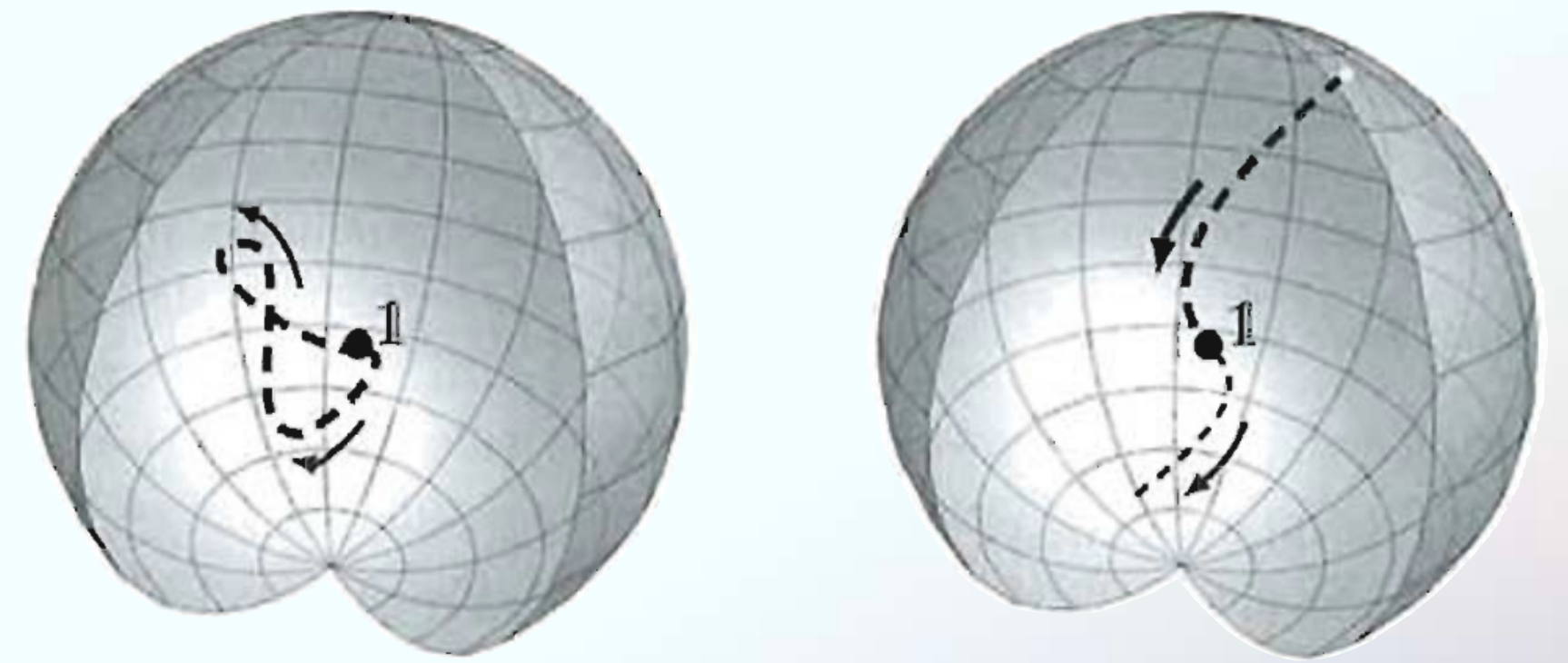
$$x'^{\mu} = \Lambda^{\mu}_{\rho} x^{\rho}$$

$$x^2 = x'^2$$

$$g_{\rho\gamma} x^{\rho} x^{\gamma} = g_{\mu\nu} x'^{\mu} x'^{\nu}$$

$$= g_{\mu\nu} (\Lambda^{\mu}_{\rho} x^{\rho}) (\Lambda^{\nu}_{\gamma} x^{\gamma})$$

Lo split delle particelle: Bosoni e Fermioni

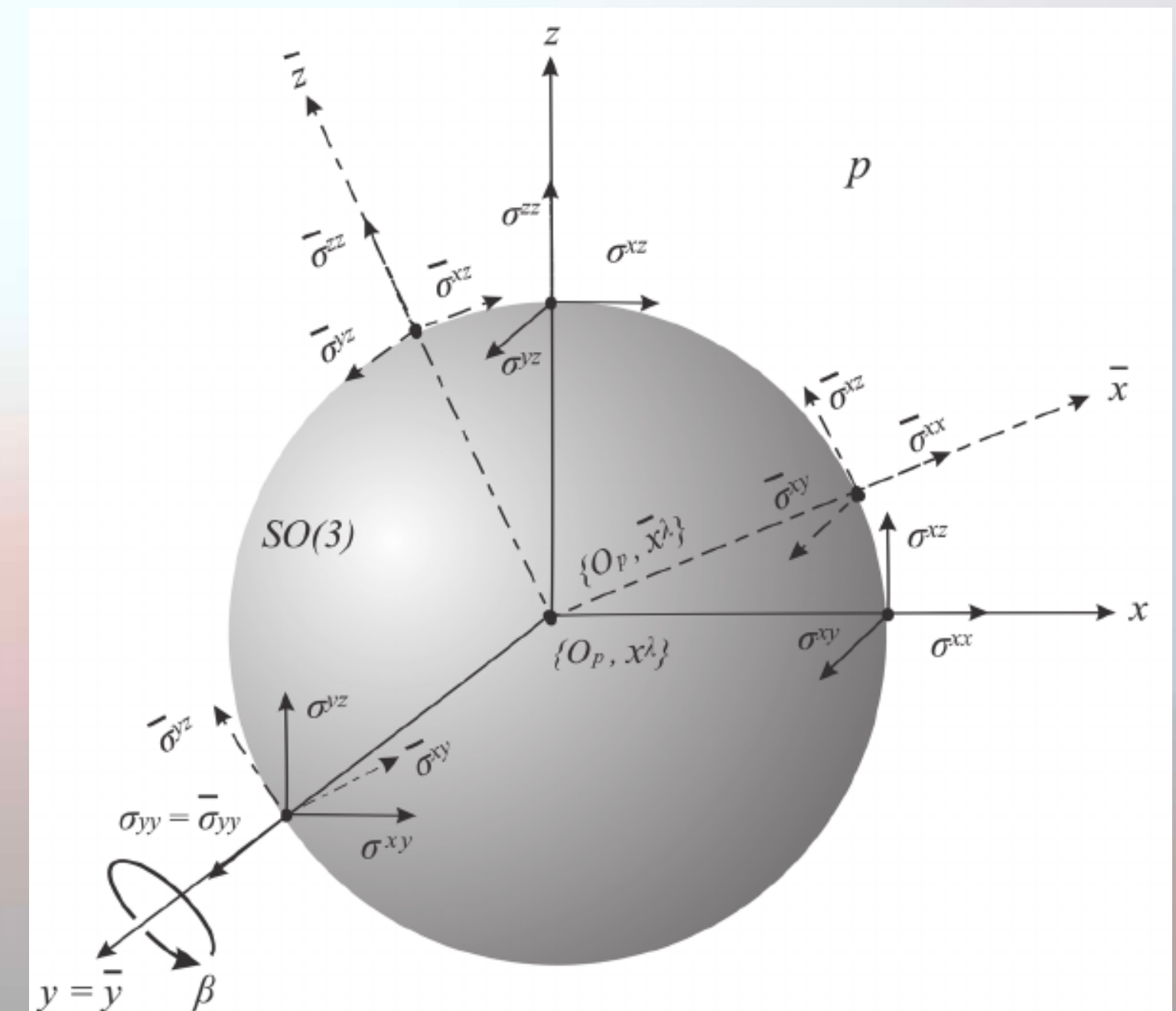
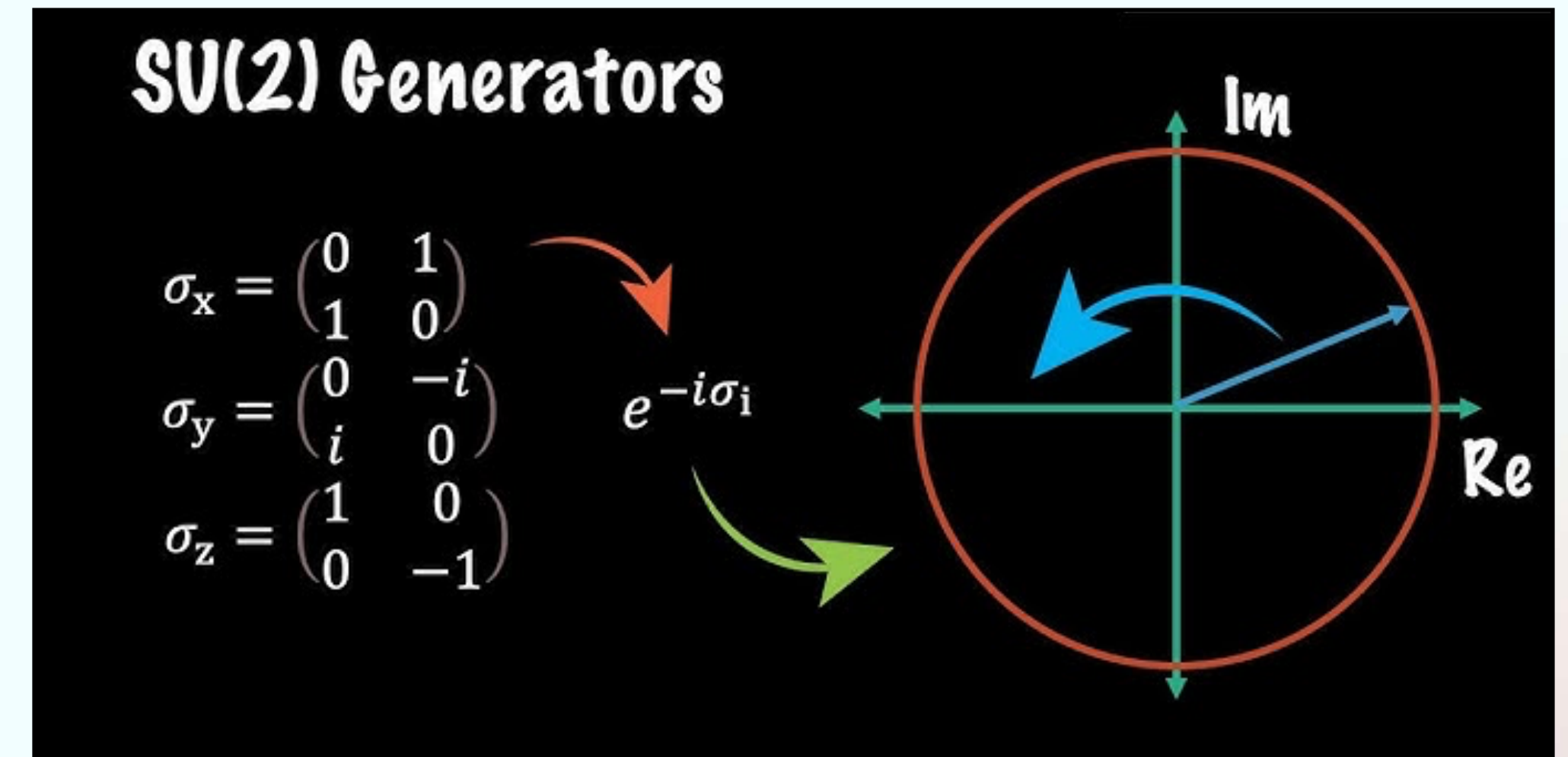


$$n = 0, \frac{1}{2}, 1, \frac{3}{2}, 2, \frac{5}{2} \dots$$

La connessione con lo Spin

$$[F_a, F_b] = i f^{abc} F_c$$

Localmente isomorfi (come topologie)



La discretizzazione

$$\mathbb{Z}_2$$
$$\varphi' = -\varphi$$

$$V = \frac{1}{2} \mu^2 \varphi^2 + \frac{1}{4} \lambda \varphi^4$$

Klein Four Group:- V_4 OR K_4 .

$V_4 = \{e, a, b, c\}$

$V_4 = \{a, b \mid a^2 = b^2 = (ab)^2 = e\}$

x \ y	e	a	b	c
e	e	a	b	c
a	a	e	c	b
b	b	c	e	a
c	c	b	a	e

Symmetric Dif

$A \oplus B = (A \cup B) -$

$A \oplus A = A^2 = A -$

$A \oplus B = \{0, 1\} -$

$AC = \{0, 1\} - \{0$

$U(8) = \{1, 3, 5, 7\} \bmod 8.$

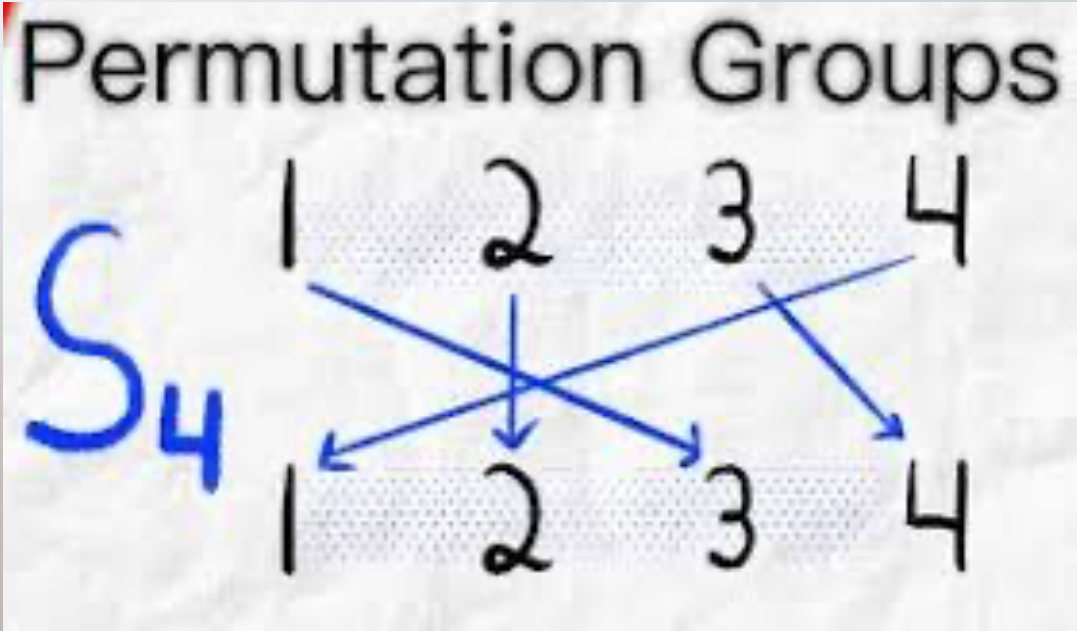
$a^2 = 3 \times 3 = 9 \equiv 1 = e$

$ab = 3 \times 5 = 15 \equiv 7 = c$

$bc = 5 \times 3 = 15 \equiv 7 = c$



$$\mathbb{Z}_2 \times \mathbb{Z}_2 \subset$$

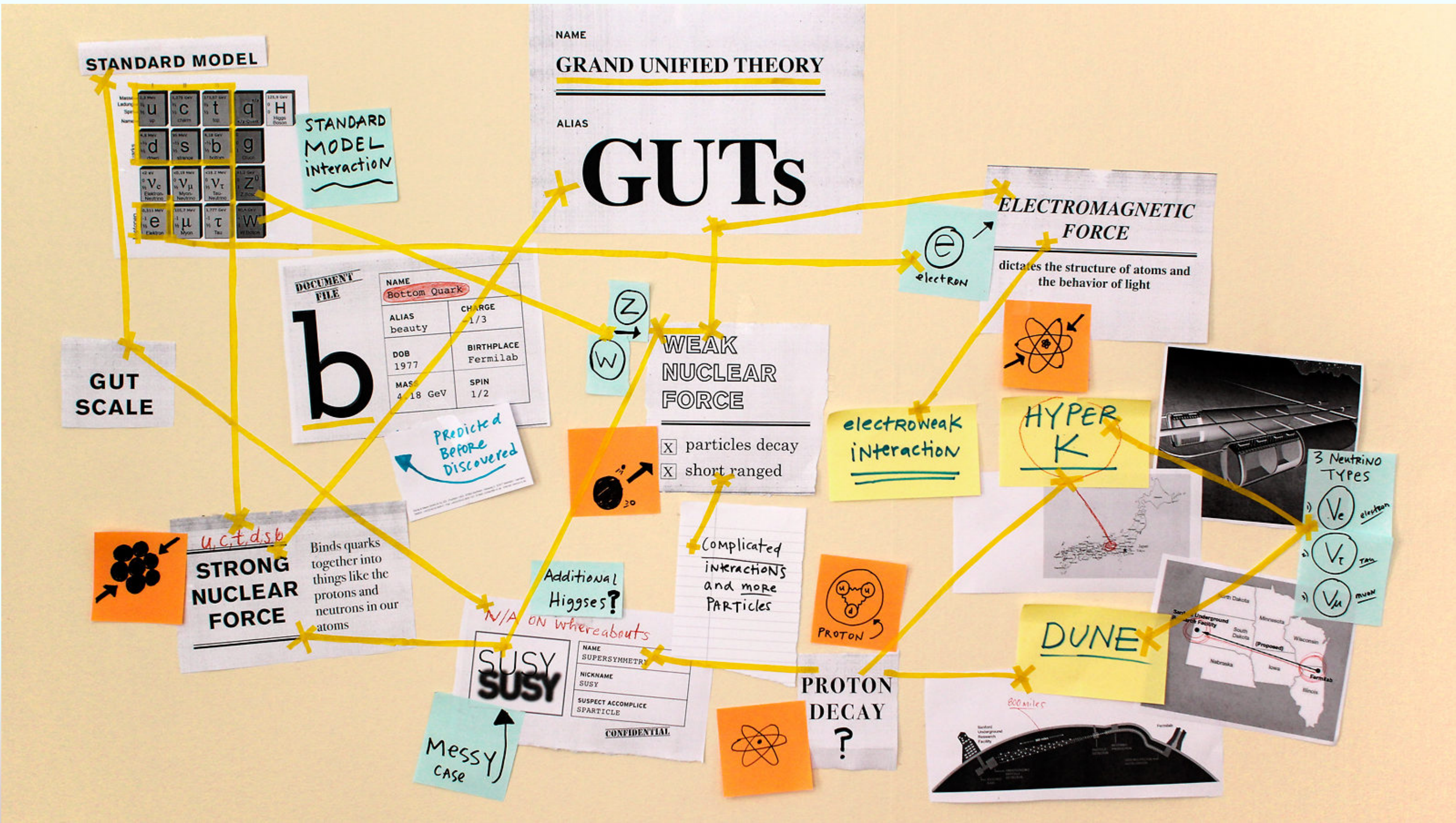
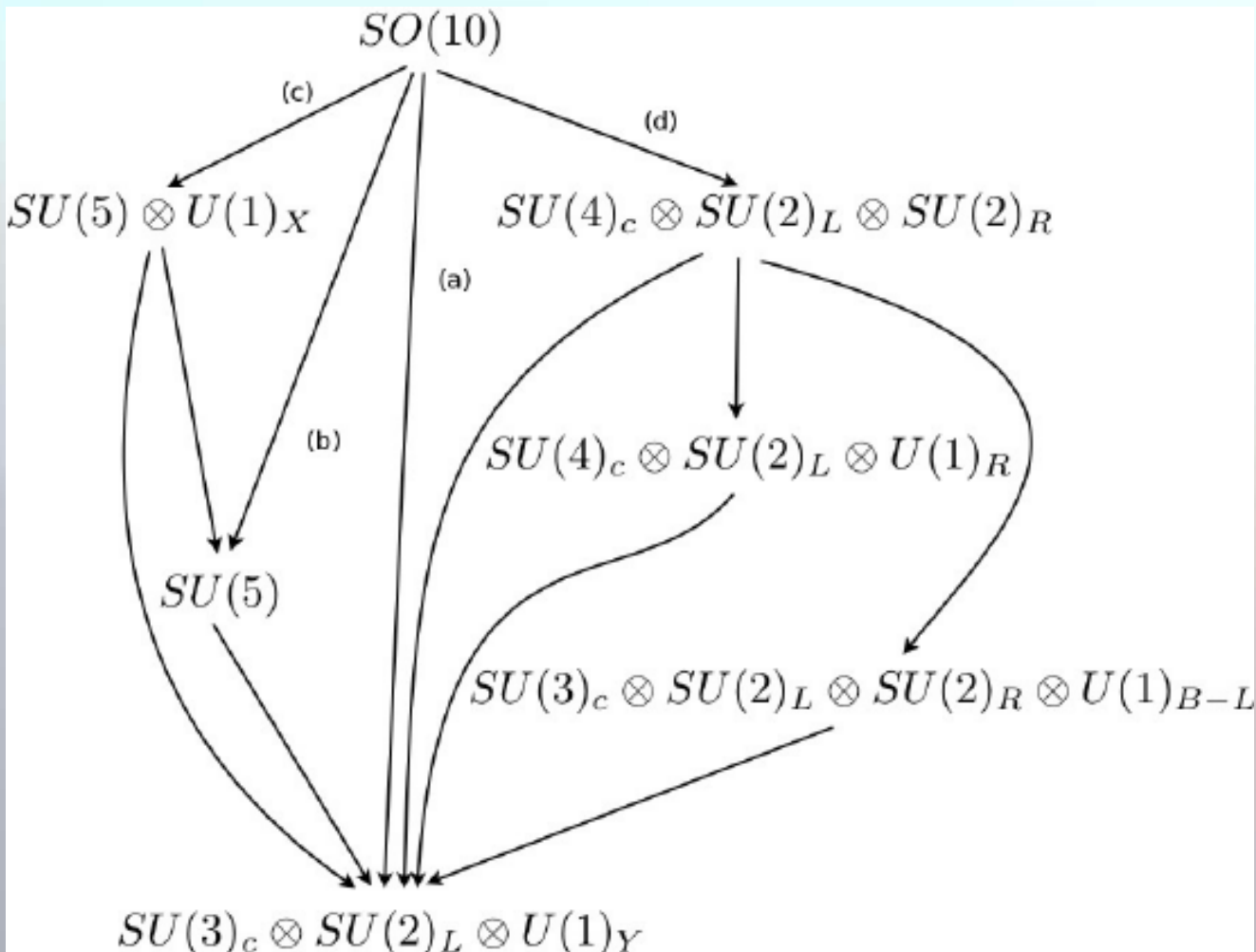
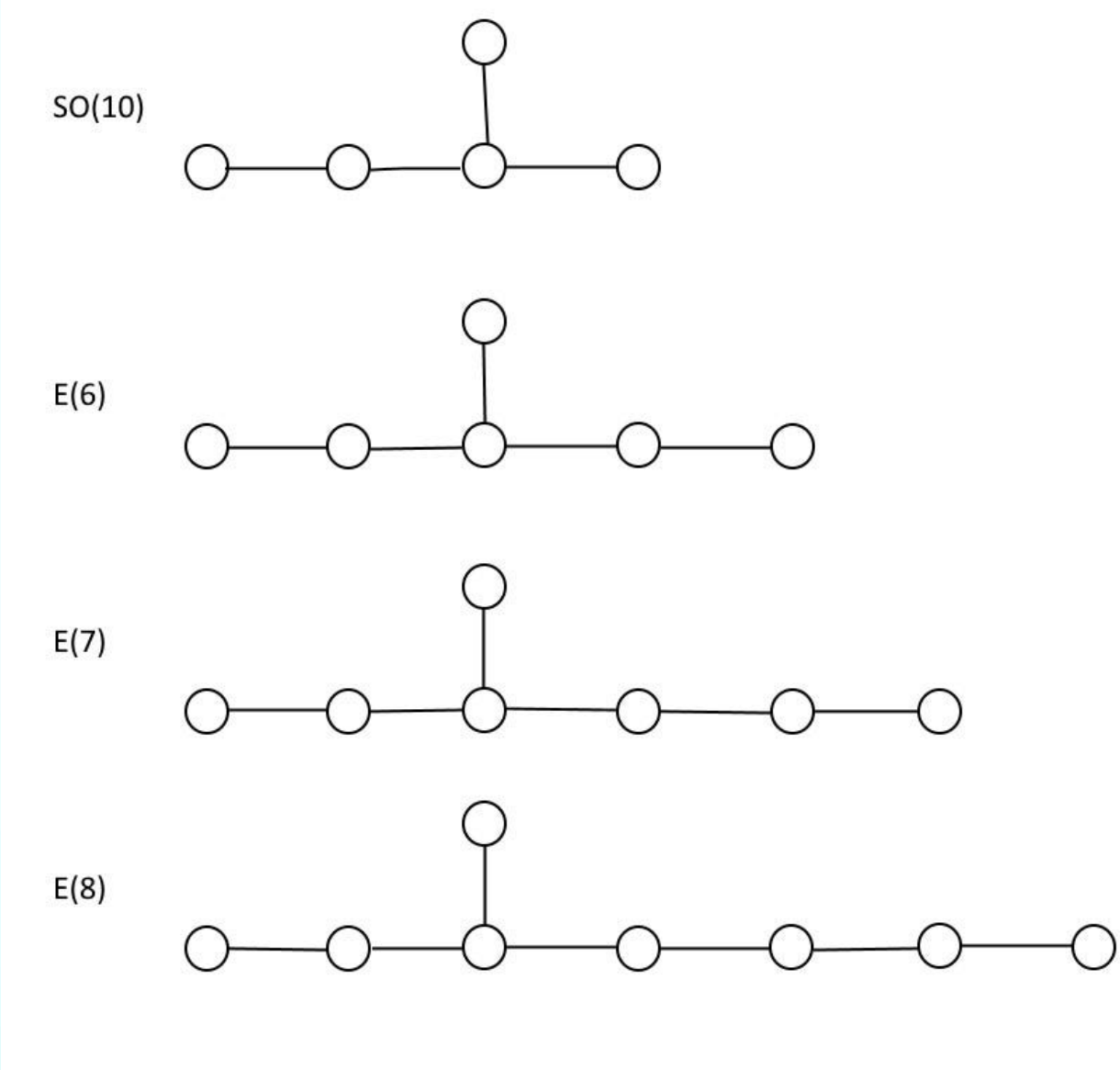


Un primo sguardo all'avanguardia

Di cosa mi occupo?



Teorie di Grande Unificazione...



... Simmetria Modulare

$$SL_2(\mathbb{Z})$$

