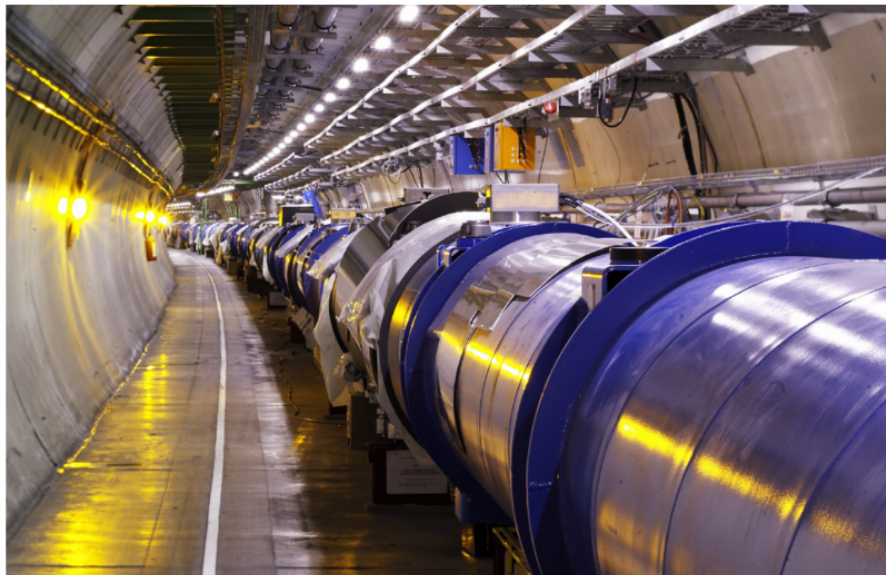


Fundamental Science as Bridges between Nations

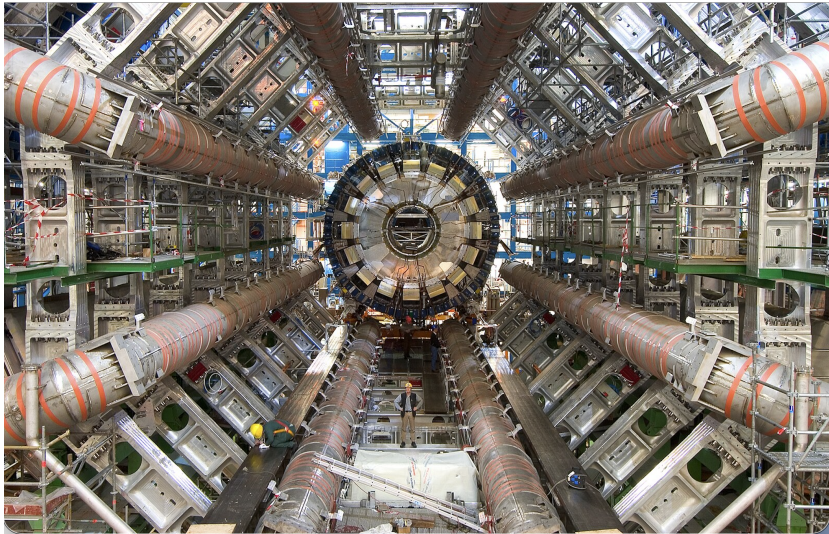
Gerard 't Hooft

Institute for Theoretical Physics

November 14
2025

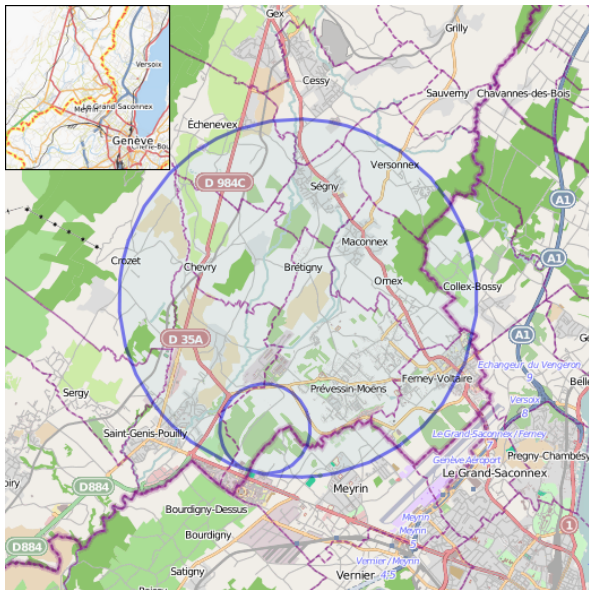


Large Hadron Collider (LHC, CERN)



3

The Atlas detector



4

LHC and future accelerator around Geneva

With the help of (45) one establishes

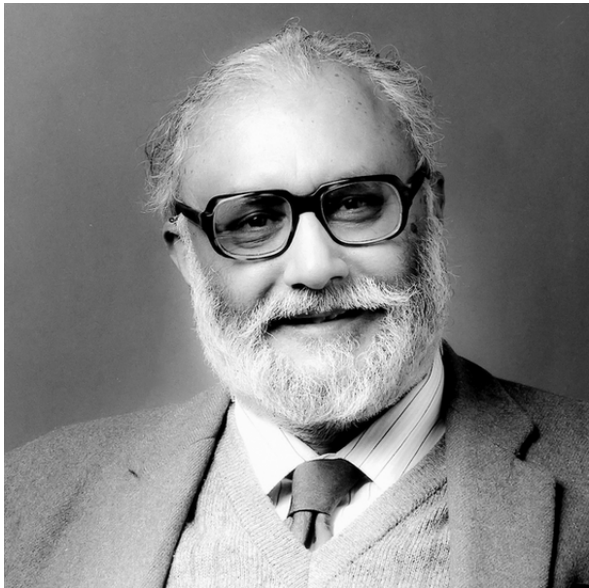
$$\begin{aligned}
 \Pi(W) = \Pi(\Omega) &- \text{diagram 1} - \text{diagram 2} - \frac{1}{2} \text{diagram 3} - \frac{1}{2} \text{diagram 4} \\
 &- \text{diagram 5} - \frac{1}{2} \text{diagram 6} - \frac{1}{4} \text{diagram 7} + \text{diagram 8}.
 \end{aligned}
 \tag{48}$$

All together one finds

$$\begin{aligned}
 (39) = (39 \text{ } W \rightarrow \Omega) &- \frac{1}{2} \text{diagram 1} - \frac{1}{2} \text{diagram 2} - \frac{1}{2} \text{diagram 3} \\
 &- \frac{1}{2} \text{diagram 4} - \text{diagram 5} - \frac{1}{6} \text{diagram 6} \\
 &- \frac{1}{4} \text{diagram 7} - \frac{1}{2} \text{diagram 8} - \frac{1}{4} \text{diagram 9} \\
 &- \frac{1}{4} \text{diagram 10} - \frac{1}{4} \text{diagram 11} - \frac{1}{4} \text{diagram 12} \\
 &- \frac{1}{4} \text{diagram 13} + \frac{1}{4} \text{diagram 14} - \frac{1}{4} \text{diagram 15} \\
 &- \frac{1}{4} \text{diagram 16} + \text{diagram 17} + \text{diagram 18} \\
 &+ \frac{1}{2} \text{diagram 19} + \frac{1}{2} \text{diagram 20} + \text{diagram 21} \\
 &- \frac{1}{4} \text{diagram 22}.
 \end{aligned}
 \tag{49}$$

Summarizing for two closed loops: the W -propagator may be replaced by an

6



Abdus Salam



7

International Institute of Physics, Natal, Brazil



8

J.R. Thorbecke (1798-1872)



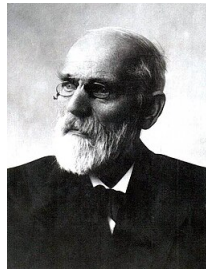
J. v.'t Hoff 1901



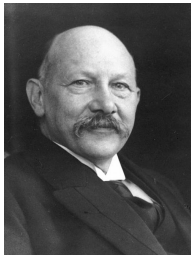
H.A. Lorentz 1902



P. Zeeman 1902



J.D. v.d. Waals 1910



H.Kam. Onnes 1913



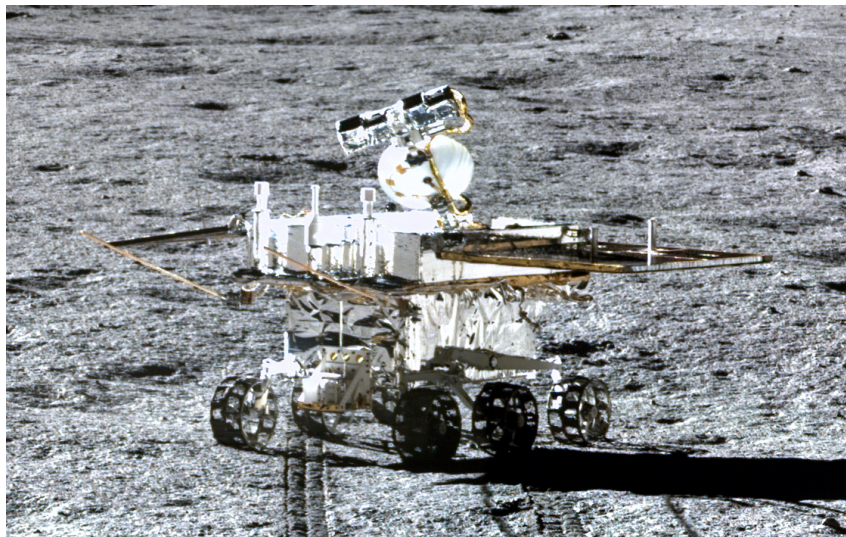
W. Einthoven 1924



C. Eijkman 1929



P. Debije 1936



10 ChangE-4, Yutu-2

11

SHAI = Super Human Artificial Intelligence

Thank You

