



EPAC

2000

WIEN

History



1960's

a team of 4 authors
made a fantastic

COSMOLOGICAL PROPOSITION

$4 > 3$

Nobel Prize

$n \leq 3$

great impact
"everyone" influenced



Their Cosmological Proposal

"

We all live
in a

yellow

submarine"

However ...

they didn't know the
literature

fairy tales



Once upon a time

- ∃ a little boy
- born in a castle in



- a prince ? NO!
- his father was a forester in Prince's service
- loved to play with gadgets , balloons



grew up

put gadgets inside balloons

Fantastic discovery

We all live in an
ACCELERATOR

bombarded by "COSMIC RAYS"

little boy ?

Became a *Nobelman*
after all (1936)

Happy ? No!

Victor Franz Hess

(1883-1964)

Nobelpris 1936

professor i Innsbruck

1938 fick fly , frun av judisk börd

Tråkigt!



Without accelerators

↳ no physics

Know accelerator designers +
builders

MAGICIANS

MIRACLES

TRUE MIRACLES

What kind of **MIRACLE**
do we wish to see ?

What is the Biggest
MYSTERY in particle phys.?

Mass

for a long time

Great Expectations
from future accelerators

- **LHC**
- **Linear Colliders** ee
- **Neutrino Factories**
- **Muon Colliders**

"... the origin of **mass** is a very interesting question, where does the mass of the electron come from? I must still keep on my blackboard a little sign which I have had for the last three or four years, and which says: "Why does the μ meson weigh?"

Feynman, 1958
Rochester Conf.

$$E^2 = m^2 c^4 + \vec{p}^2 c^2$$

$$F = m a$$



$$\frac{G m_1 m_2}{r^2}$$




most trivial looking
yet

Biggest

WHY

mass

 kind of energy
extremely fundamental
because it is

born out of the most
fundamental

 **Symmetry** 
principle we have

mass, spin born together

stretch our beloved Symmetry
Supersymmetry

A lot of new "stuff"

thought's free

let's dream 1 accelerator wish

WW Collider

live only about 10^{-25} s

Why WW? or ZZ

"Good old days"

↪ + nucleon reactions

calculated cross section

sick expressions as $E \uparrow$

Prob.



Knew must be
something
there

The closest we can get
to our

Beloved Gedanken

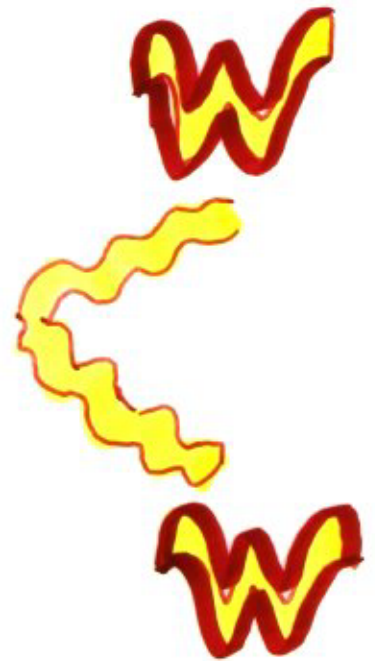
WW machine

is

LHC

SLHC

Super



Something must be

there - WHAT

What's



Standard Higgs
talked about **30** years

LEP mass < 250 GeV

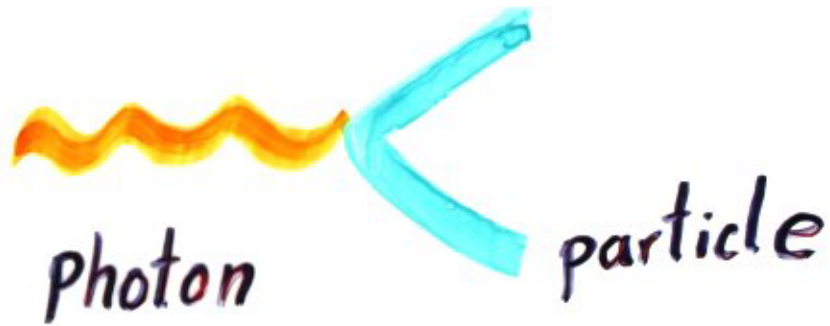


Muon collider
Higgs factory

Big emotional
problems

Not the end of the
story

Electric Charge



Mass



2

lots of Higgs-looking particles

seen
hidden in LHC

Higgs hunters give us

"No-lose theorem"

Even in the "worst scenario"
you will see a signal in

e^+e^- colliders

$e^+e^- \rightarrow Z + \text{anything}$

High luminosity



Standard Model



None of the above!



Wonders

will

Never Cease

but

it's

you

who have to make them

Happen



*Not to put all our eggs
in the same basket !!*

egg you to diversification