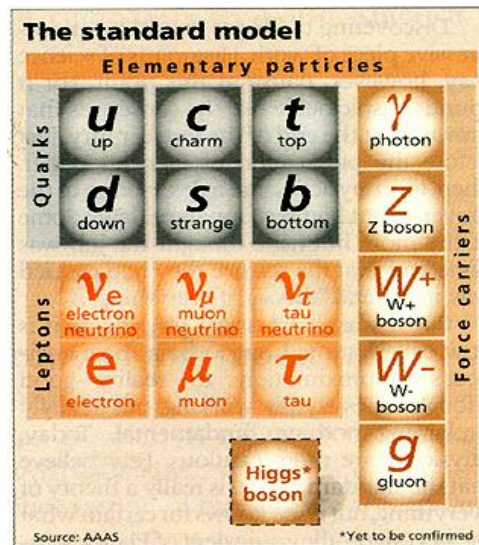


Theoretical Perspectives

S. Y. Choi (Chonbuk)

Questions & Comments

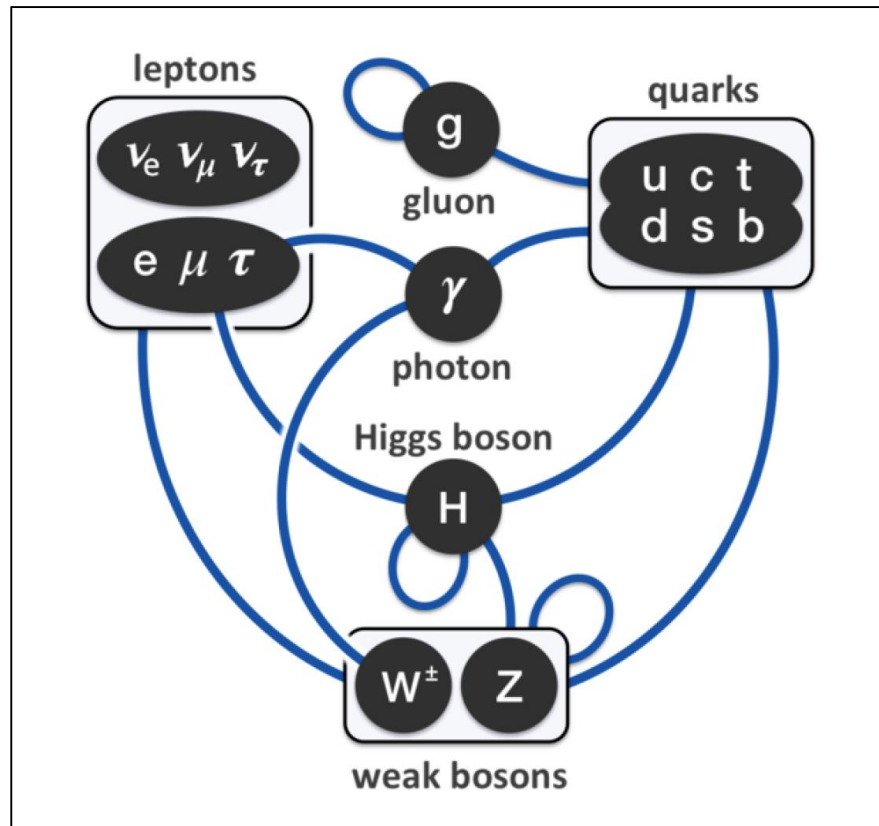


???

The 20th LHC monthly meeting, December 16, 2016

Our Core Theory : Standard Model

A consistent relativistic & quantum field theory
with the 126 GeV Higgs discovery in 2012!



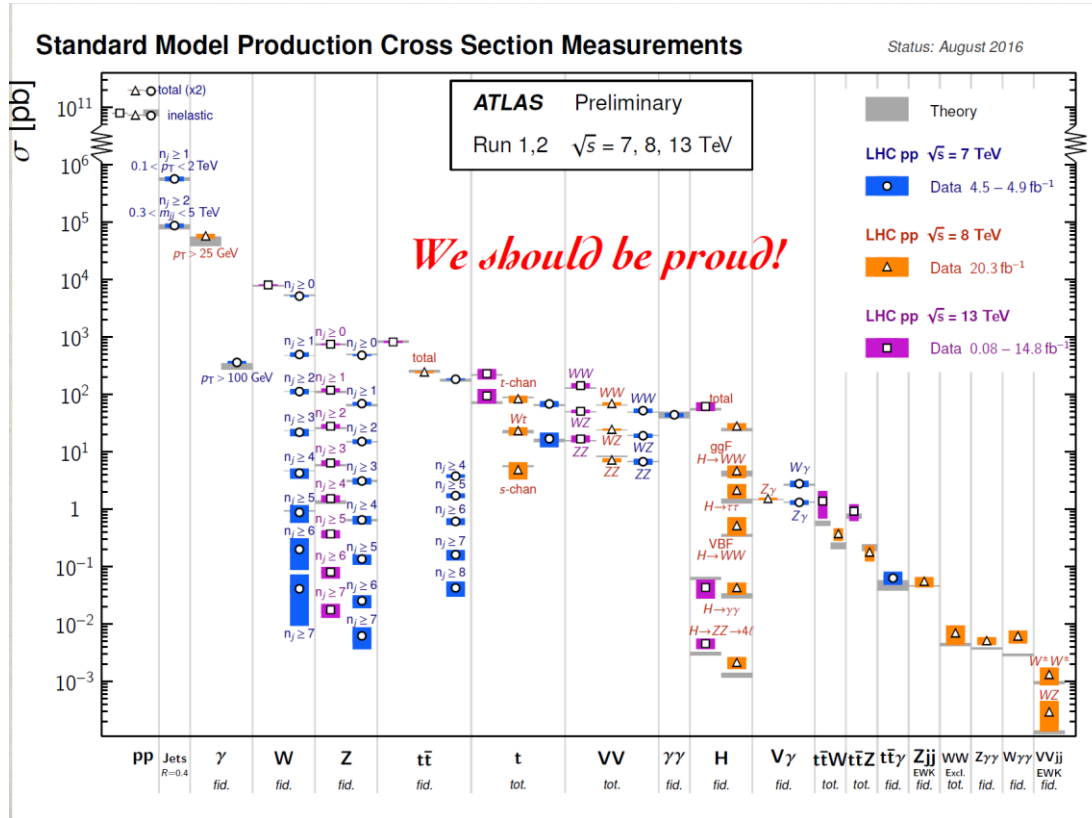
[Wikipedia]

Electromagnetic
[+] Weak
+ Strong

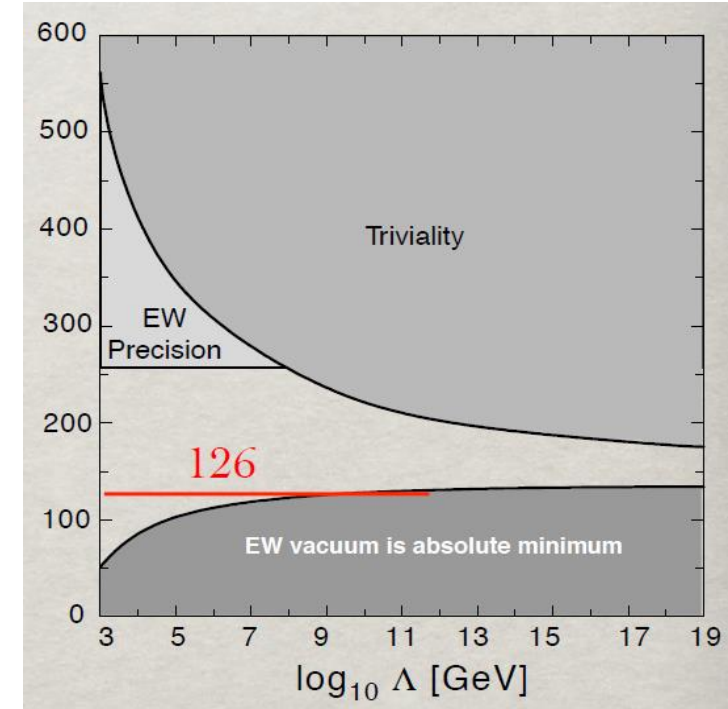
Local Gauge Symmetries
Spontaneous EWSB
Weakly-coupled
Unitary
Renormalizable

Glory ⇔ Disaster ?

[T. Han, 2016]

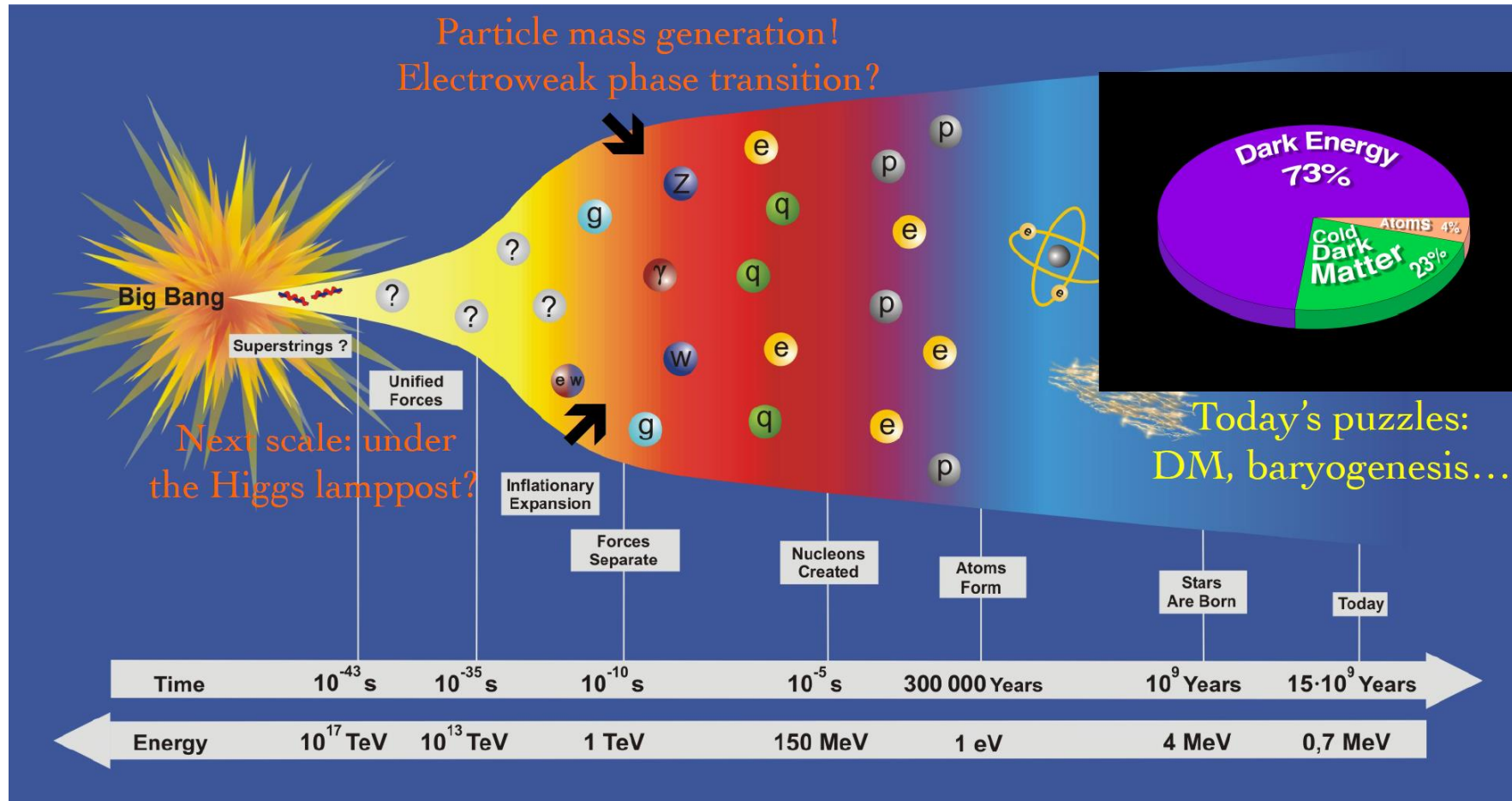


“Perfectly” works up to Terascale



Valid, perhaps, up to the Planck scale

Grand Evolution of Universe

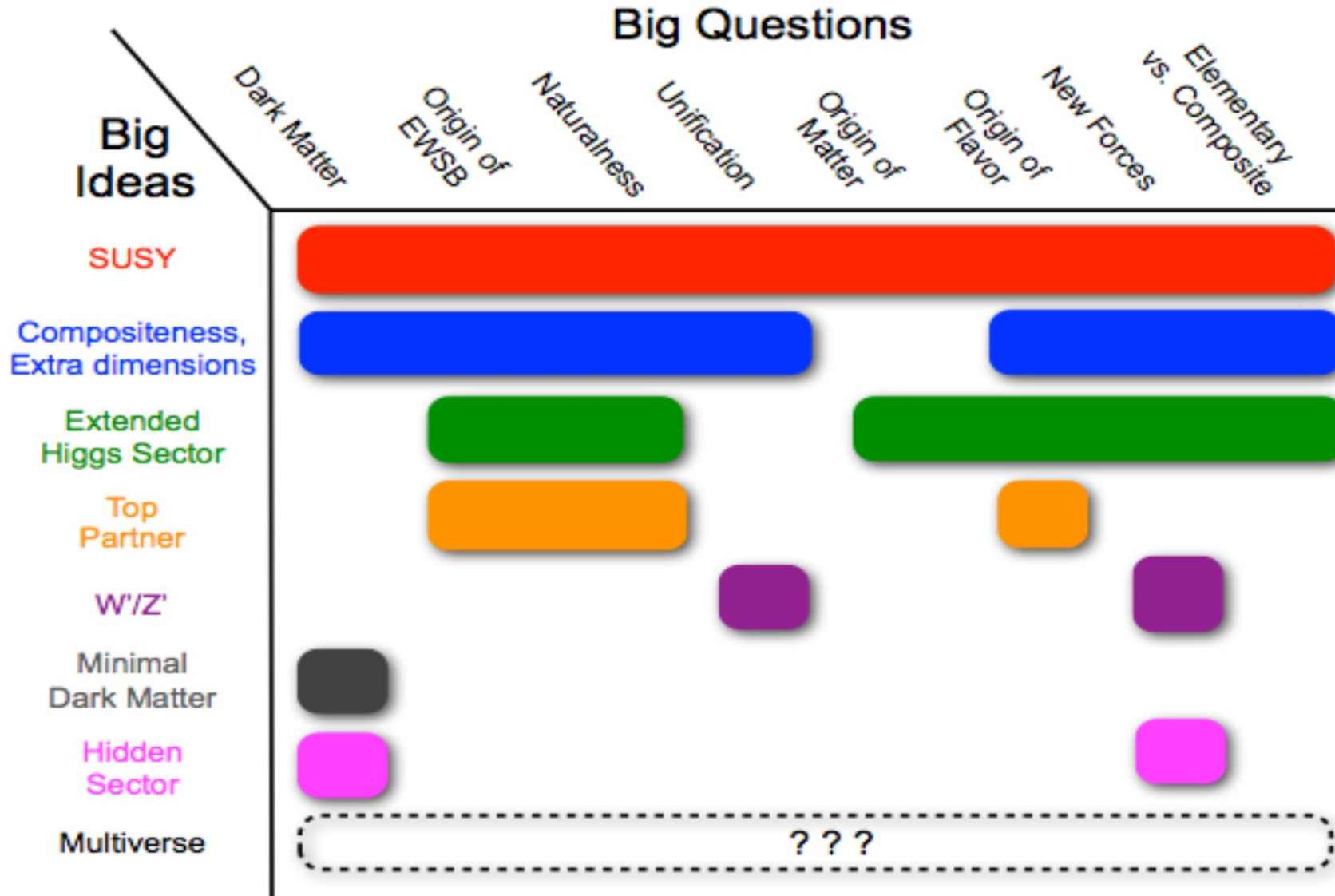


[T. Han, 2016]

Quantum Gravity, Unification, Inflation, DM, DE, Matter Asymmetry, ...

Questions

[Snowmass NP report, 2013]

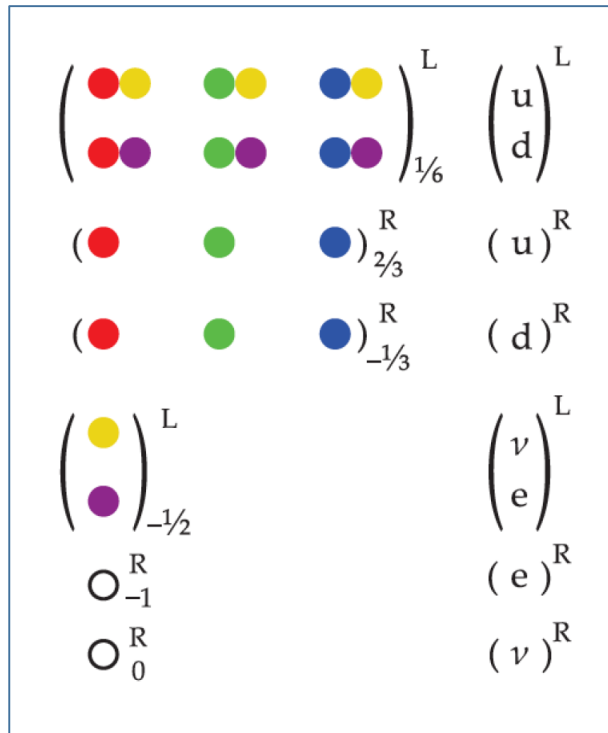


???

Korean

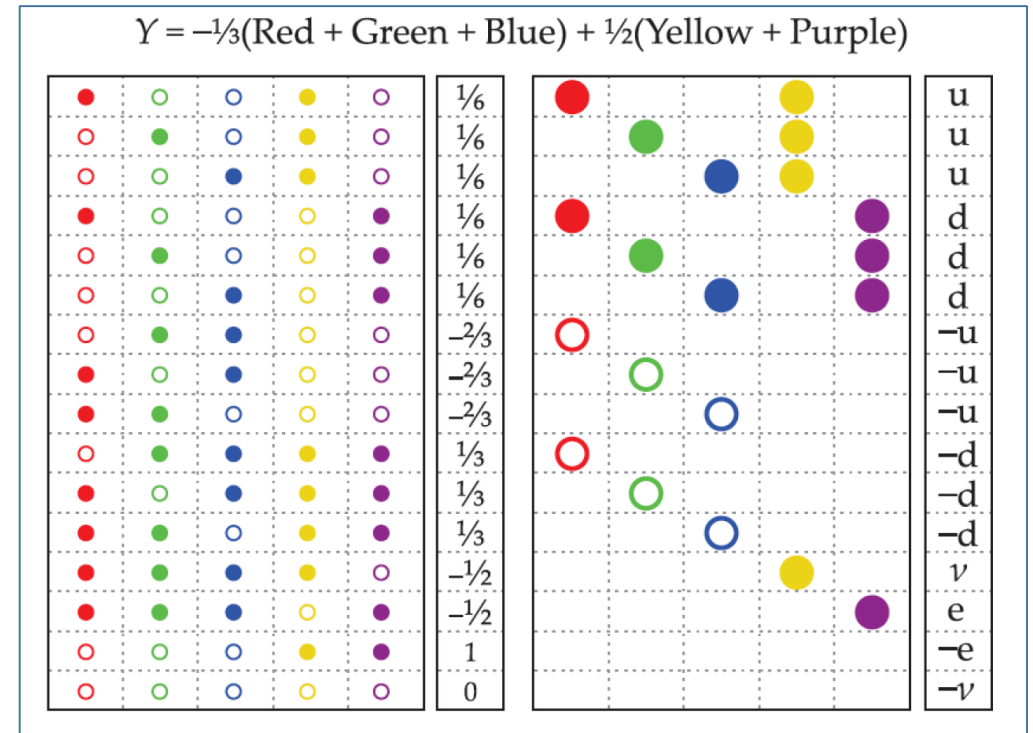
Unification : Quantum Numbers

Untidy



Tidy

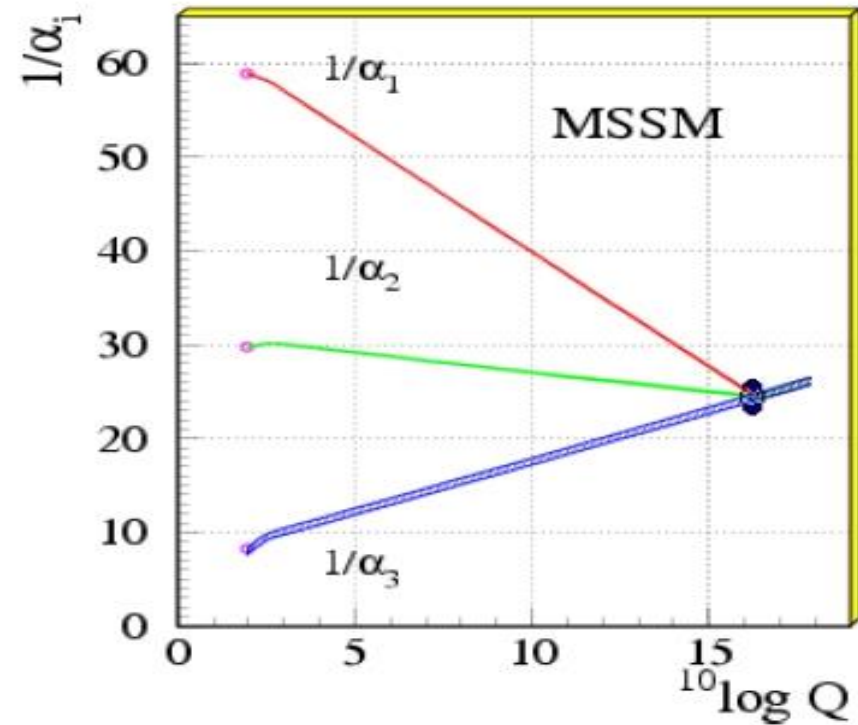
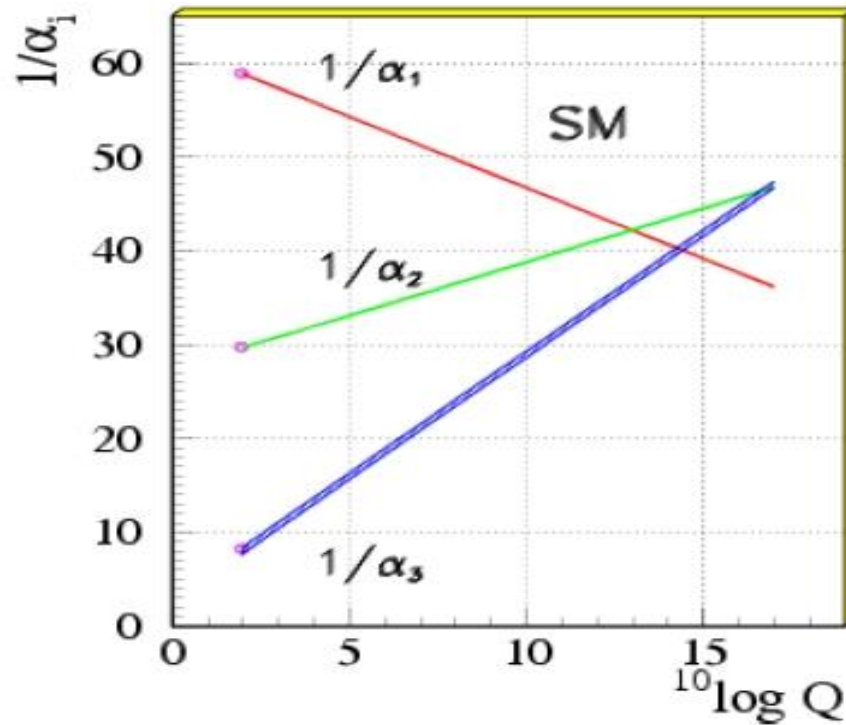
[F. Wilczek]



Proton Decay + Majorana Neutrinos + ???

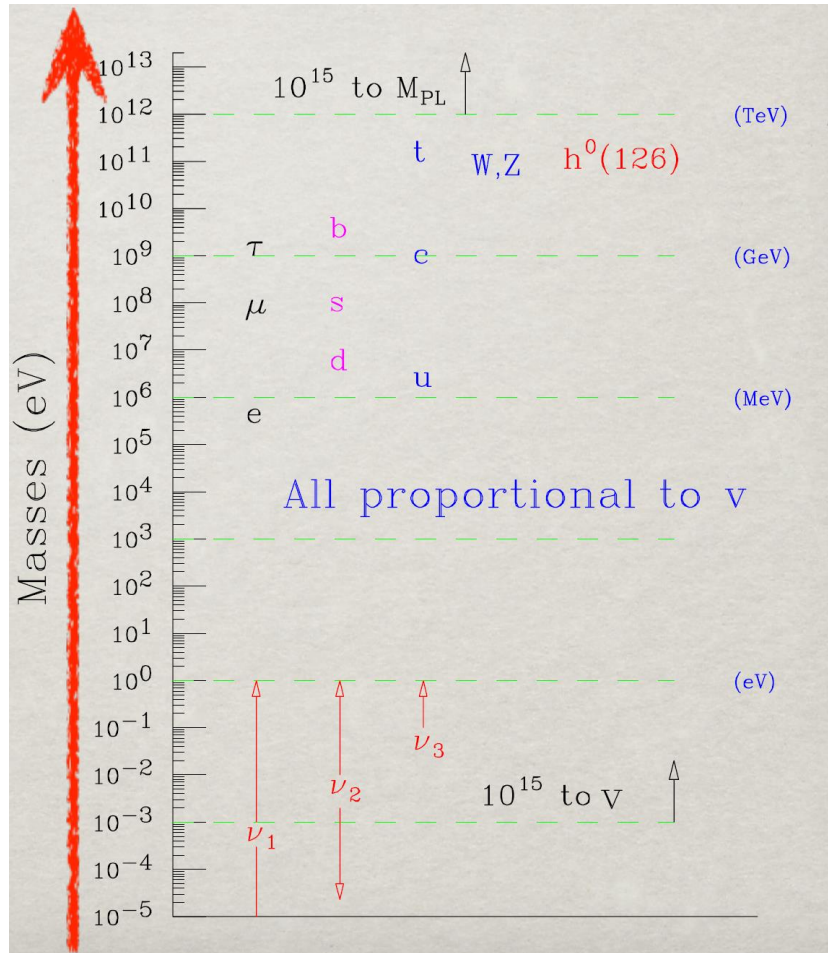
Unification : Force and Substance

[D.I. Kazakov]



??? \Leftrightarrow SUSY

Flavor Puzzle : Mass and Mixing



[T. Han, 2016]

Extremely large hierarchy

No concrete hints for flavor mixing patterns

New CP-violation sources?

...



What symmetries and which scale?

Comments

No guaranteed NP scales
unlike the EW scale



...

Many scenarios for DM

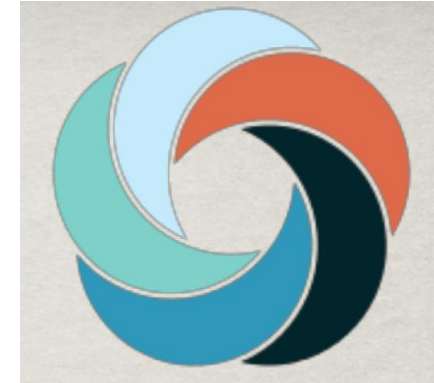
Various types of portals
to hidden sectors

...

Quantum gravity
(superstring \leftrightarrow supergravity)

P5 Five Science Drivers

Report of the Particle Physics Project
Prioritization Panel, 2014



Use the Higgs boson as a new tool for discovery

Pursue the physics associated with neutrino mass

Identify the new physics of dark matter

Understand cosmic acceleration: dark energy and inflation

**Explore the unknown :
new particles, interactions and physical principles**

COLLISION COURSE

Particle physicists around the world are designing colliders that are much larger in size than the Large Hadron Collider at CERN, Europe's particle-physics laboratory.



LHC Leads the Way (2015-2030)

CEPC/SppC?

FCC?

ILC as Higgs Factory & beyond

Table 1-1. Proposed running periods and integrated luminosities at each of the center-of-mass energies for each facility.

Facility	HL-LHC	ILC	ILC(LumiUp)	CLIC	TLEP (4 IPs)	HE-LHC	VLHC
\bar{s} (GeV)	14,000	250/500/1000	250/500/1000	350/1400/3000	240/350	33,000	100,000
$\mathcal{L}dt$ (fb ⁻¹)	3000/expt	250+500+1000	1150+1600+2500	500+1500+2000	10,000+2600	3000	3000
dt (10 ⁷ s)	6	3+3+3	(ILC 3+3+3) + 3+3+3	3.1+4+3.3	5+5	6	6

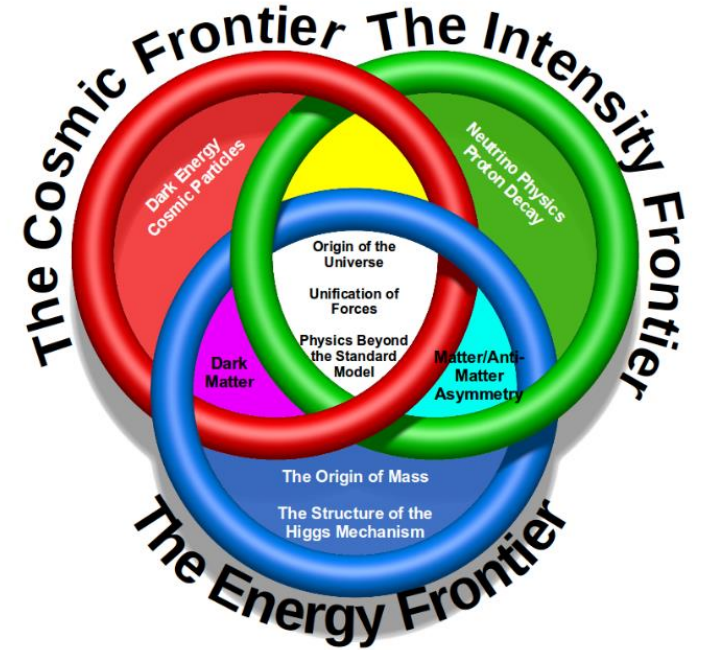
Snowmass 1310.8361

Strategies for Future Korean Particle Physics Community

**Theories?
Experiments?**



자유토론 !!



전 방위적
전 스케일
탐구 탐험