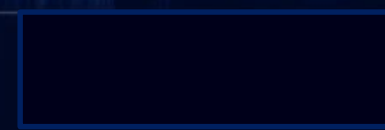


# Parallel Worlds: Connecting the Micro and Macro

**About CERN, Physics, and Innovation**

Innovation for Change, March 11, 2019

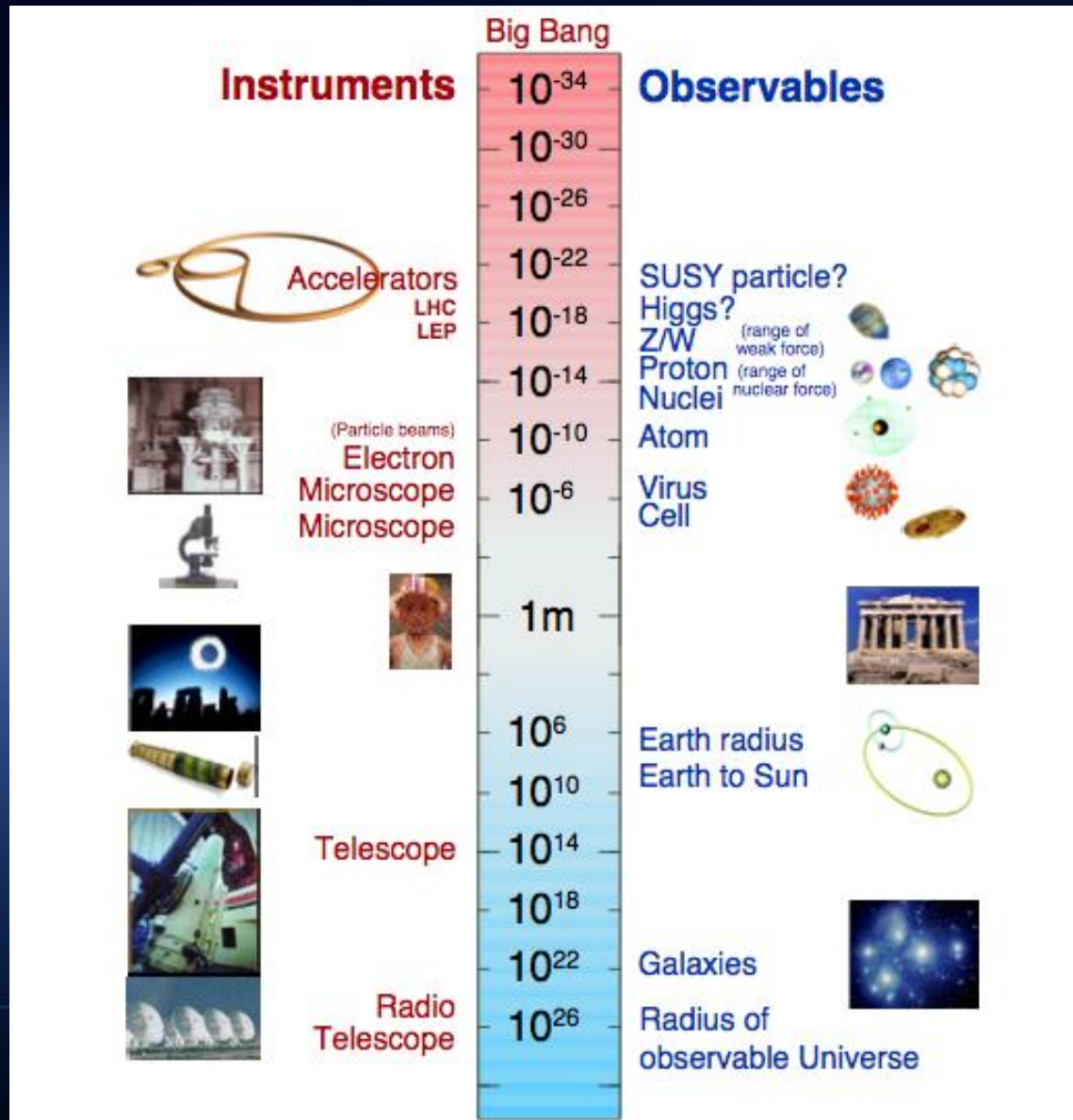
Markus Nordberg (CERN)



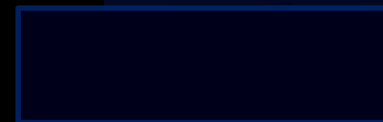
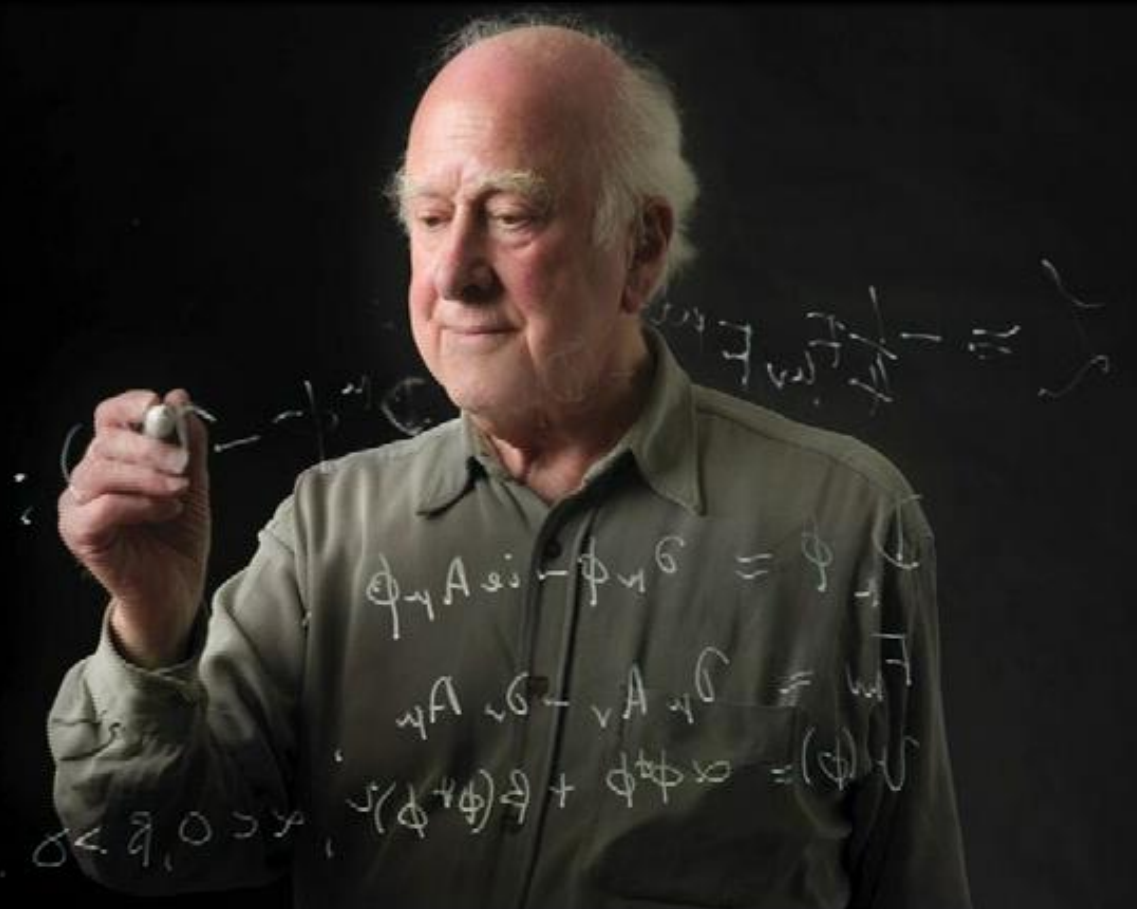


# Size of things

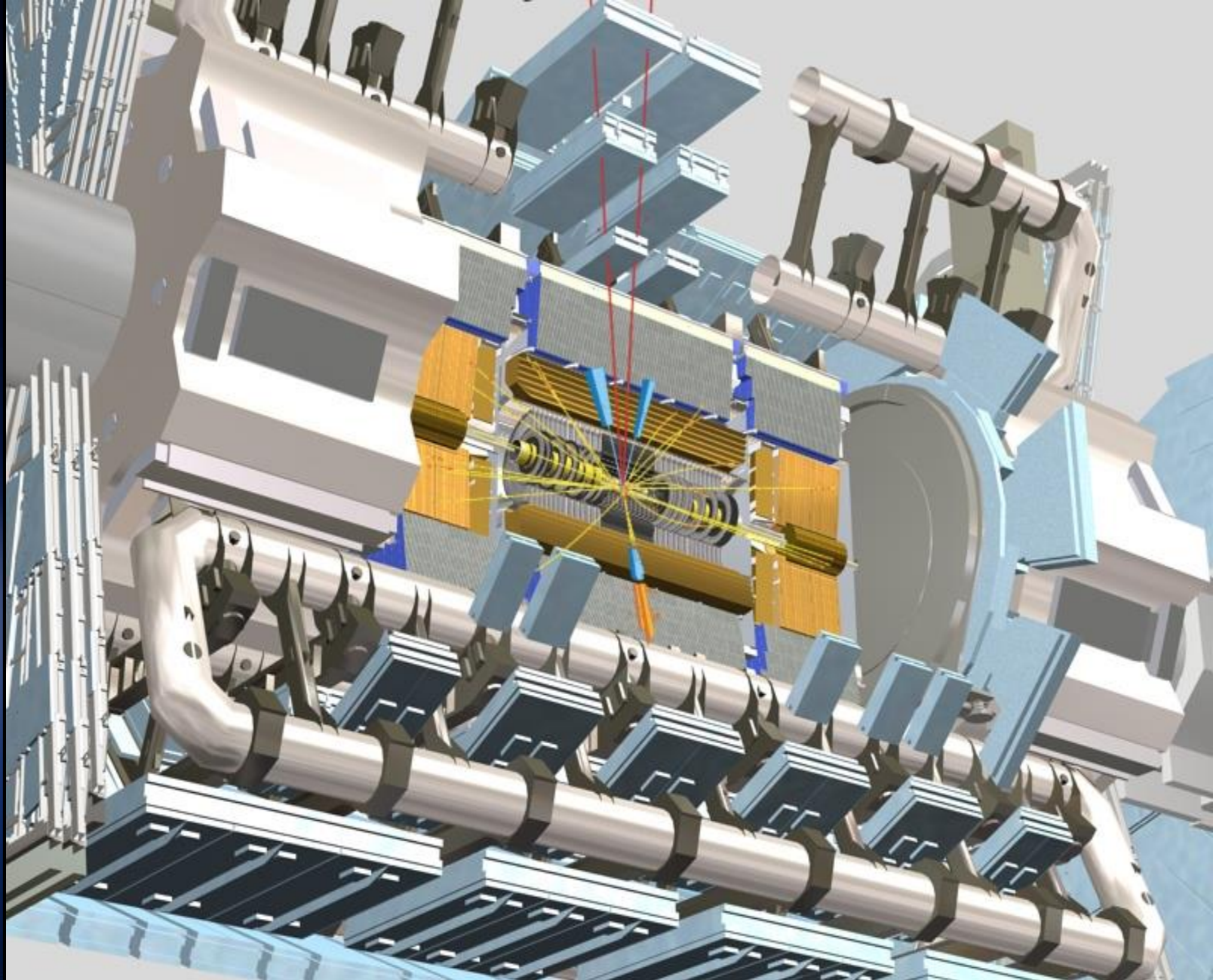
## How does CERN Measure?

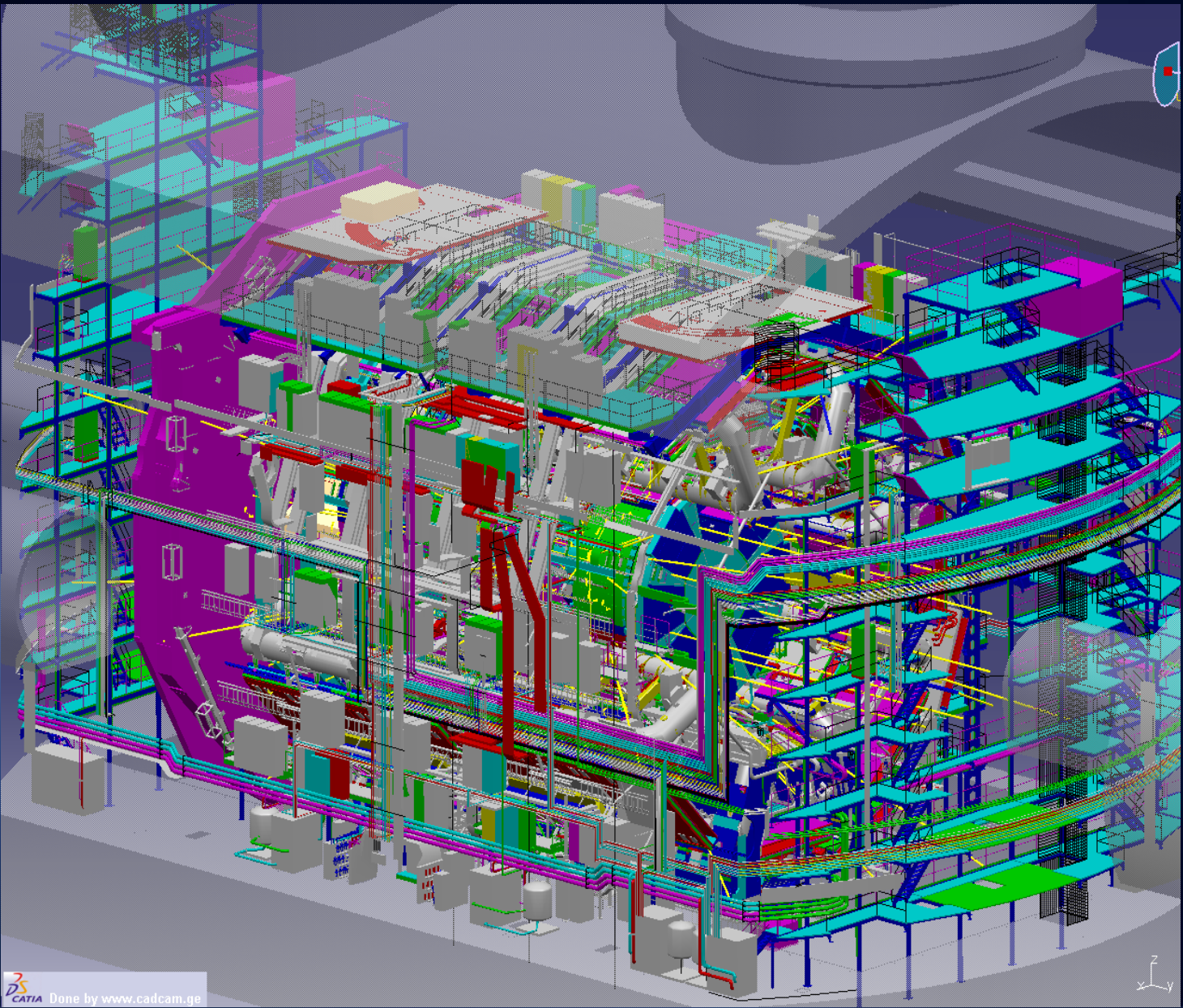


# Where do we start?

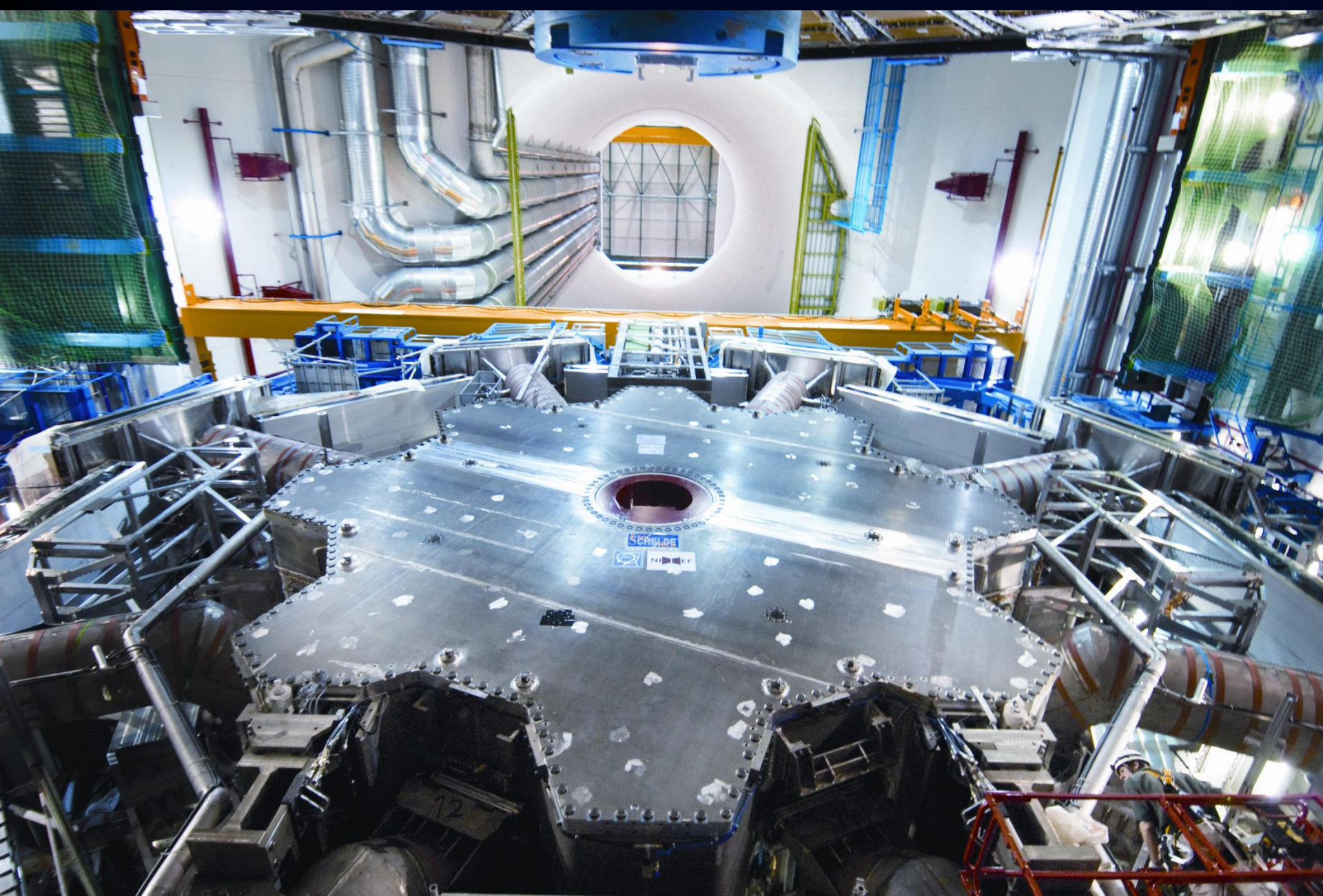








 Done by [www.cadcam.ge](http://www.cadcam.ge)

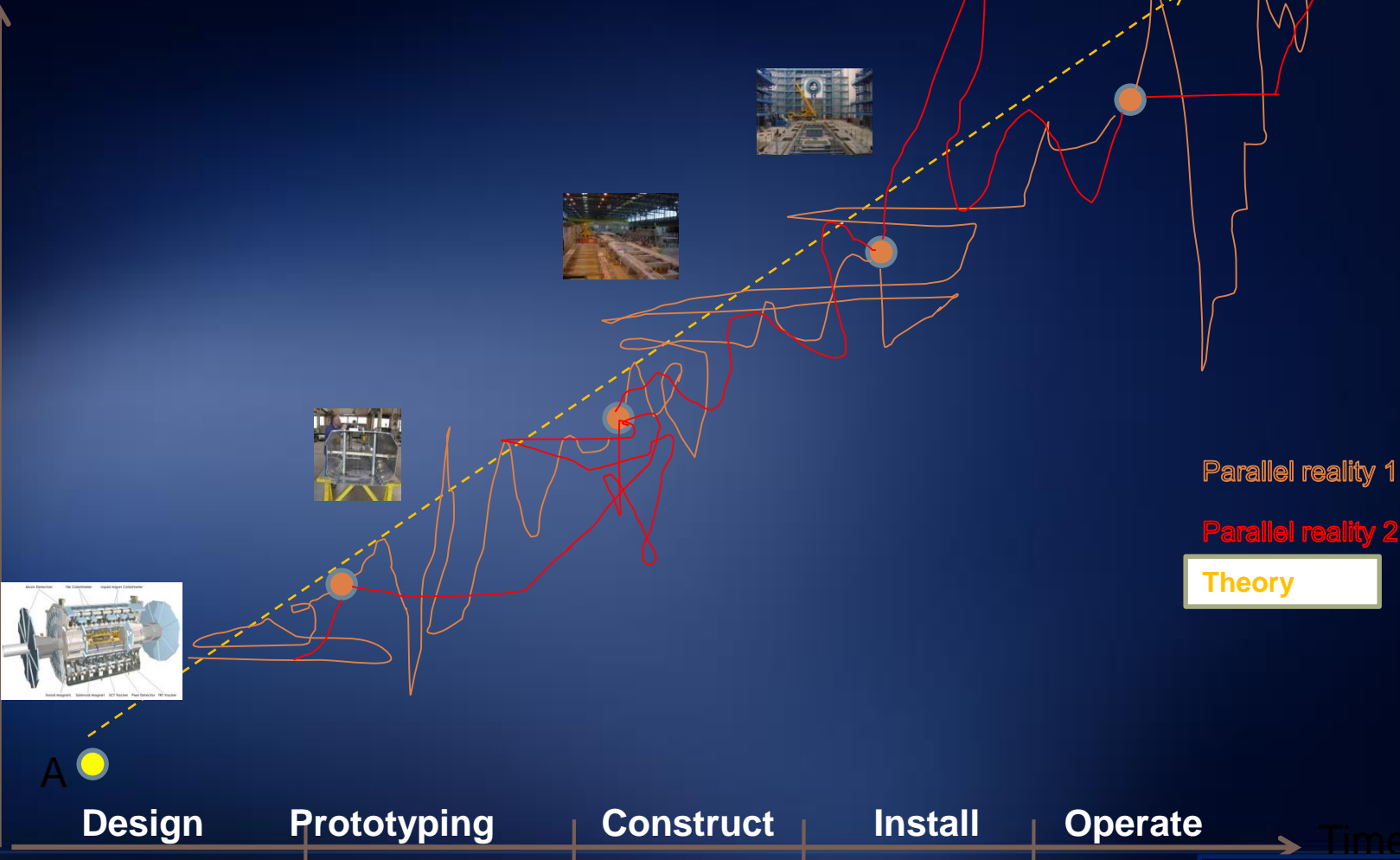




# Implementing Strategy is Not Linear



Progress



Parallel reality 1

Parallel reality 2

Theory

Design

Prototyping

Construct

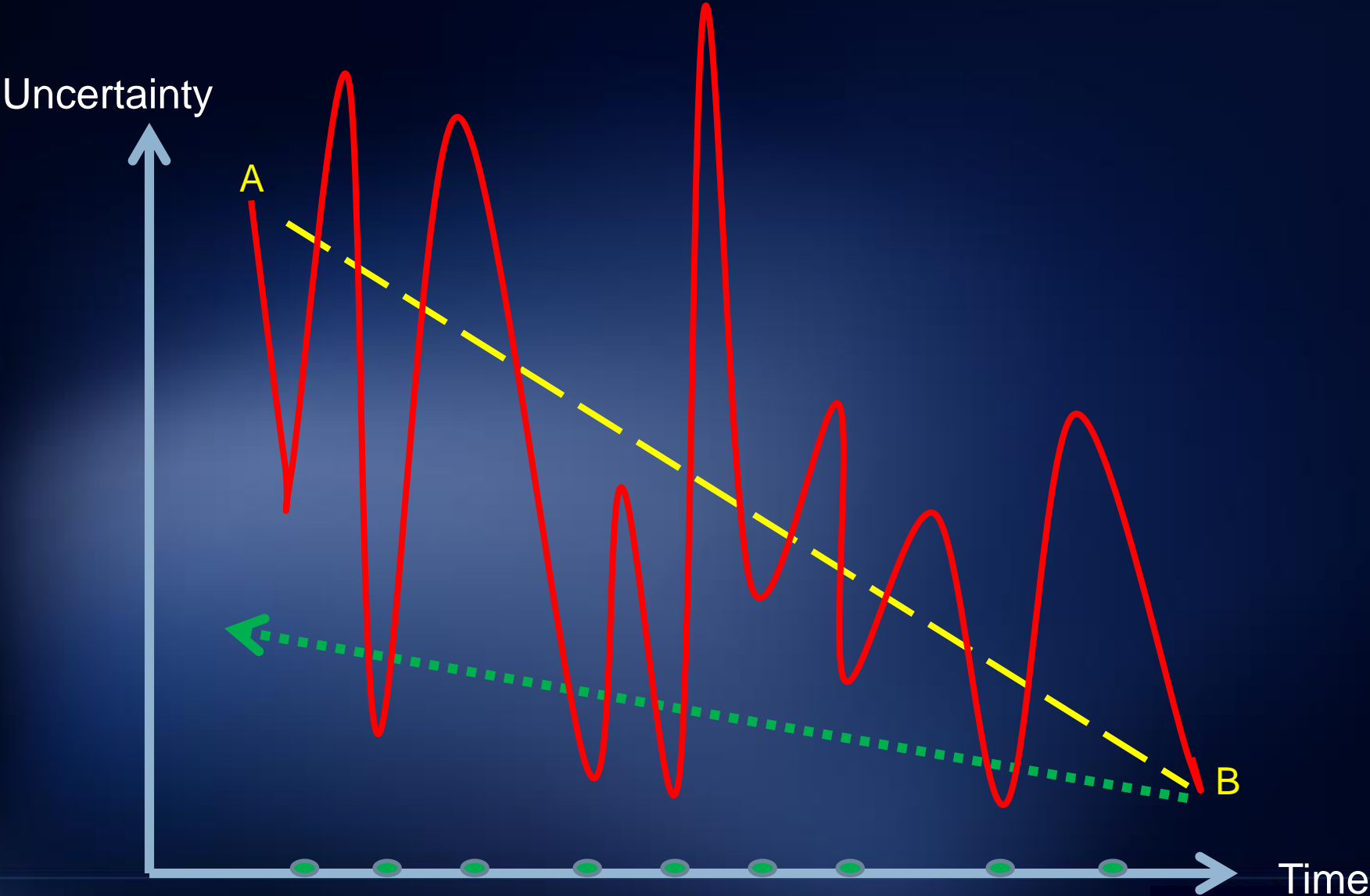
Install

Operate

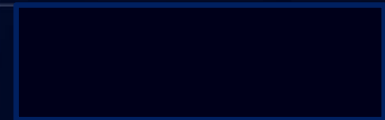
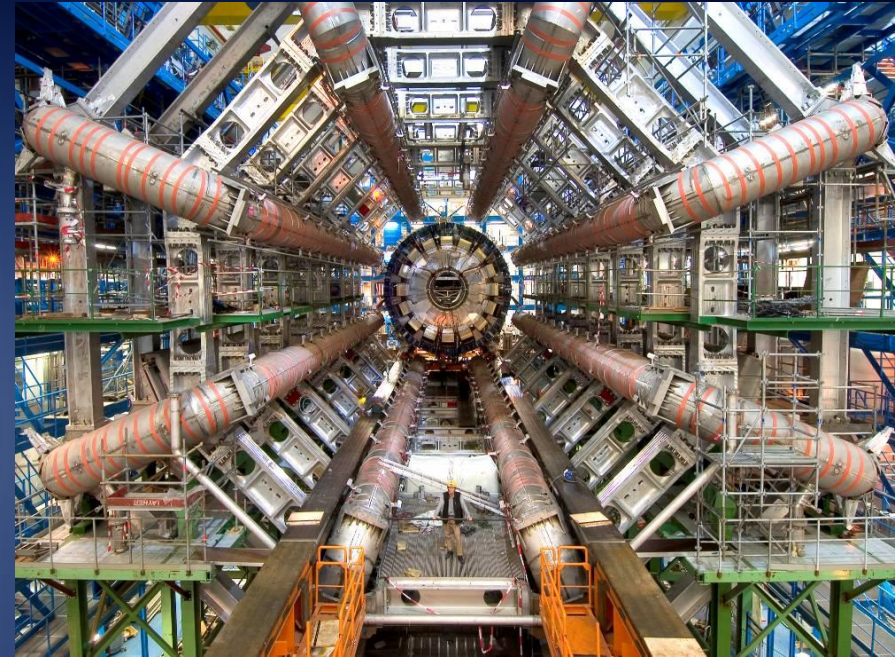
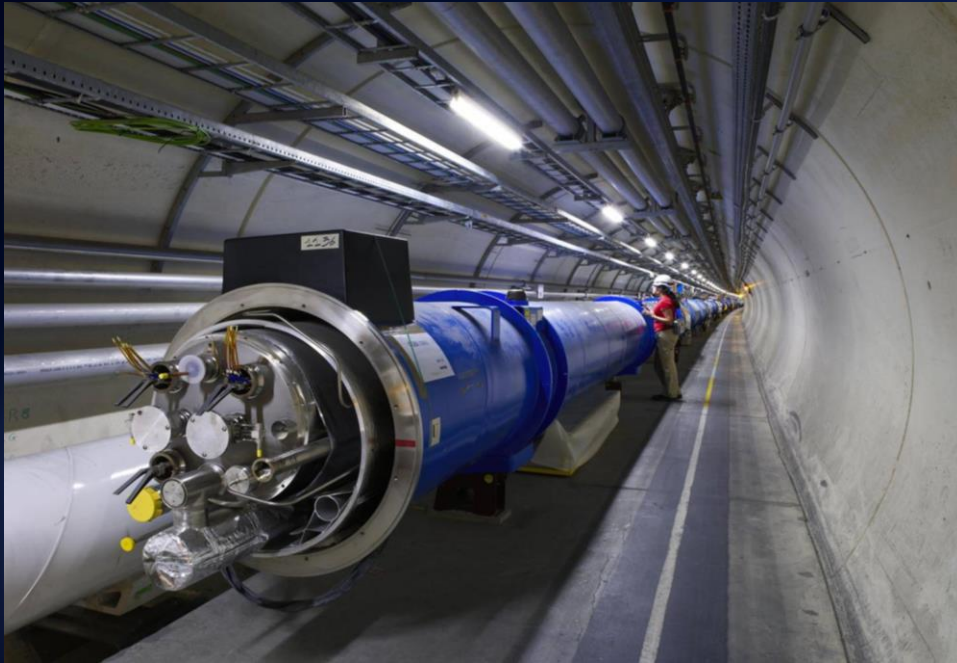
Time

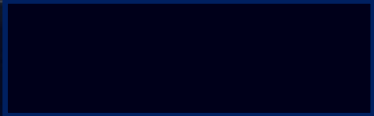


# Absorbing vs. Reducing Uncertainty



# Seeing the Micro needs the Macro (scopes)







# CERN was founded 1954: 12 European States Today: 22 Member States

- ~ 2300 staff
- ~ 730 other paid personnel
- ~ 13 000 users
- Budget (2018) ~1000 MCHF

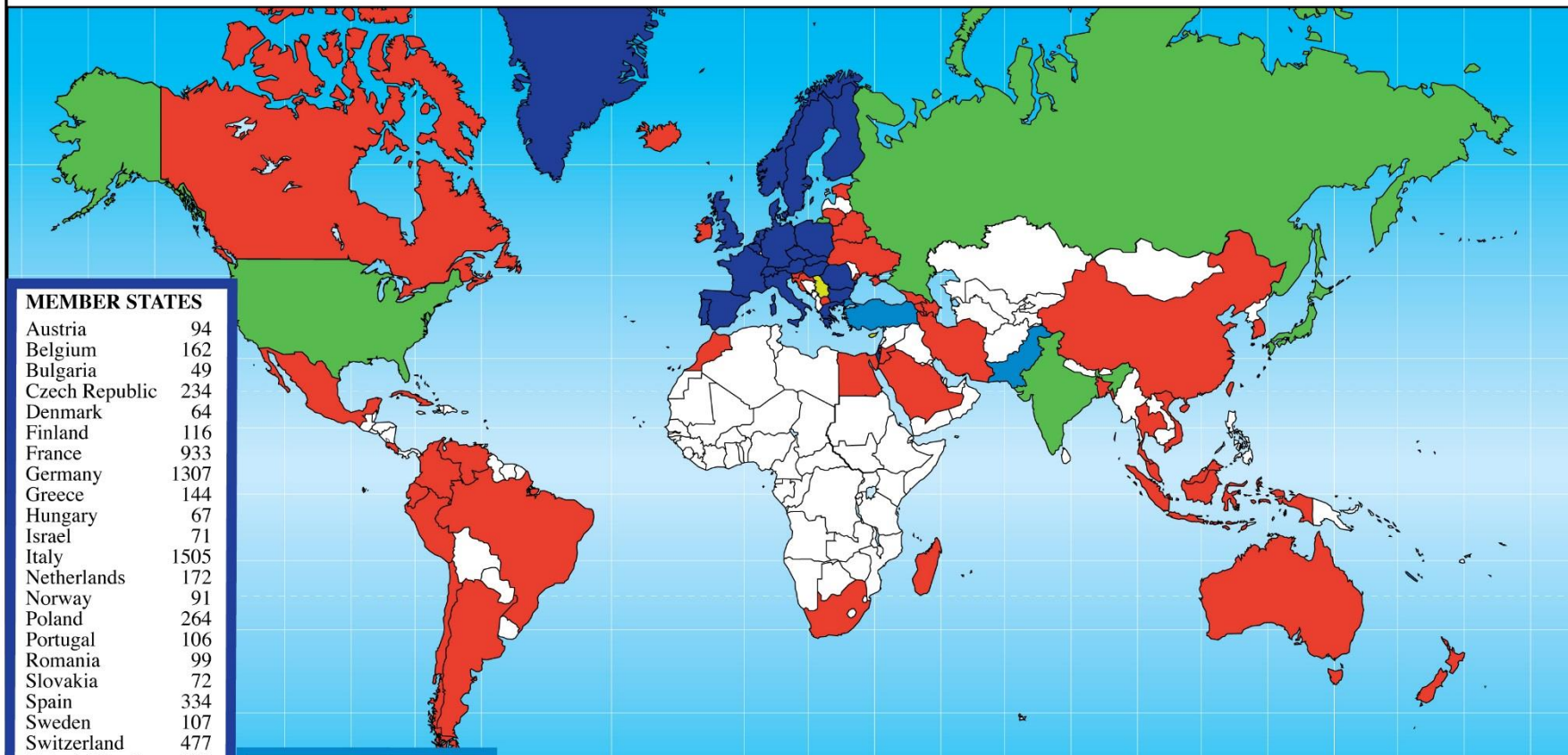
- **22 Member States:** Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.
- **2 Candidate for Accession to Membership of CERN:** Cyprus, Serbia
- **8 Observers to Council:** India, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and Unesco





# A Global Reach

## Distribution of All CERN Users by Location of Institute on 12 January 2016



### MEMBER STATES

Austria	94
Belgium	162
Bulgaria	49
Czech Republic	234
Denmark	64
Finland	116
France	933
Germany	1307
Greece	144
Hungary	67
Israel	71
Italy	1505
Netherlands	172
Norway	91
Poland	264
Portugal	106
Romania	99
Slovakia	72
Spain	334
Sweden	107
Switzerland	477
United Kingdom	910

**7378**

### ASSOCIATE MEMBERS

Pakistan	36
Turkey	126

**162**

### OBSERVERS

India	187
Japan	279
Russia	980
USA	1915

**3361**

### STATES IN ACCESSION TO MEMBERSHIP

Cyprus	11
Serbia	37

**48**

### OTHERS

Argentina	29	China	208	Iceland	2	Mexico	64	TFYROM	2
Armenia	18	Colombia	12	Indonesia	9	Morocco	7	Ukraine	30
Australia	40	Costa Rica	1	Iran	25	New Zealand	6	Venezuela	1
Azerbaijan	4	Croatia	25	Ireland	9	Peru	3	Viet Nam	1
Bangladesh	2	Cuba	3	Jordan	2	Saudi Arabia	1		
Belarus	26	Ecuador	2	Korea	145	Singapore	1		
Brazil	151	Egypt	26	Lithuania	15	Slovenia	20		
Canada	174	Estonia	17	Madagascar	3	South Africa	47		
Chile	15	Georgia	23	Malaysia	12	Taiwan	78		
		Hong Kong	22	Malta	5	Thailand	13		

**1299**

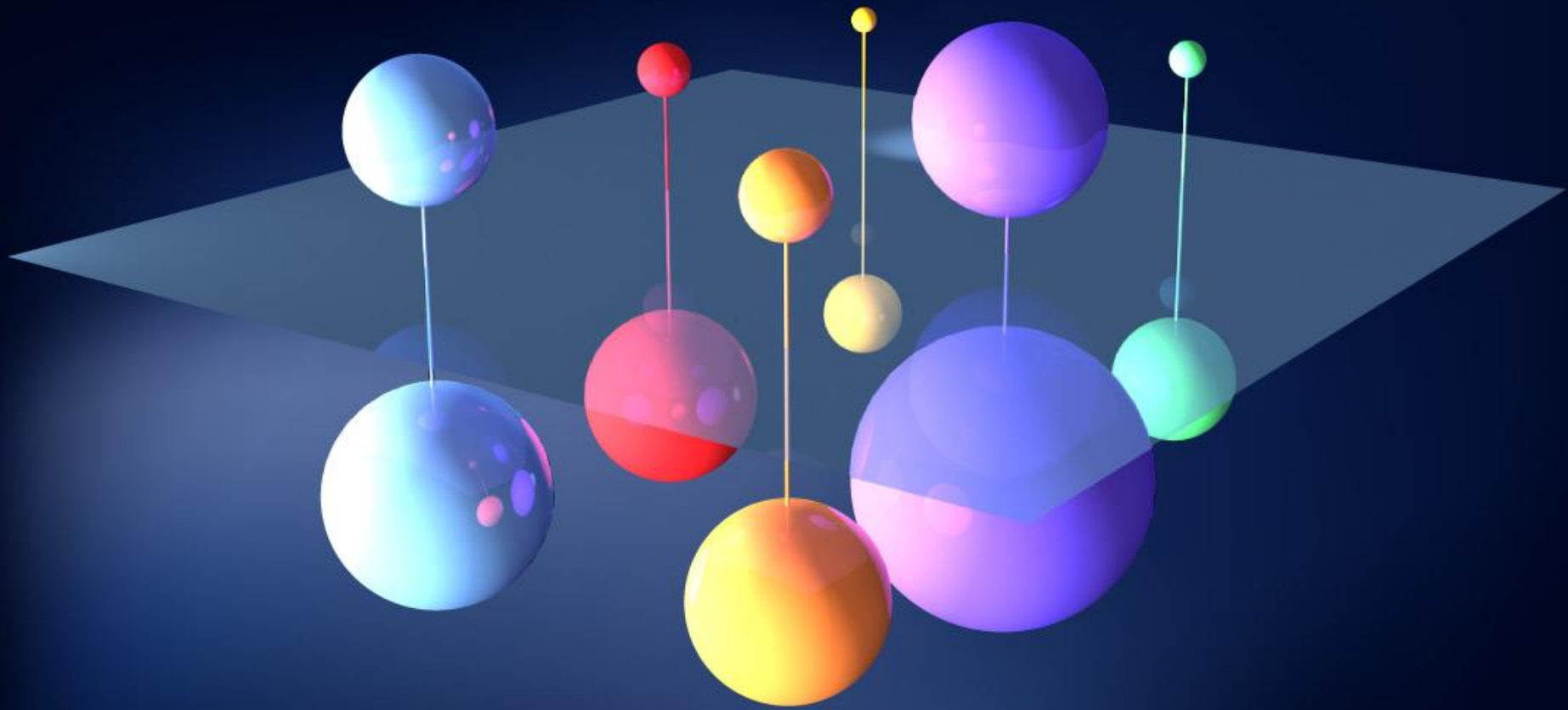


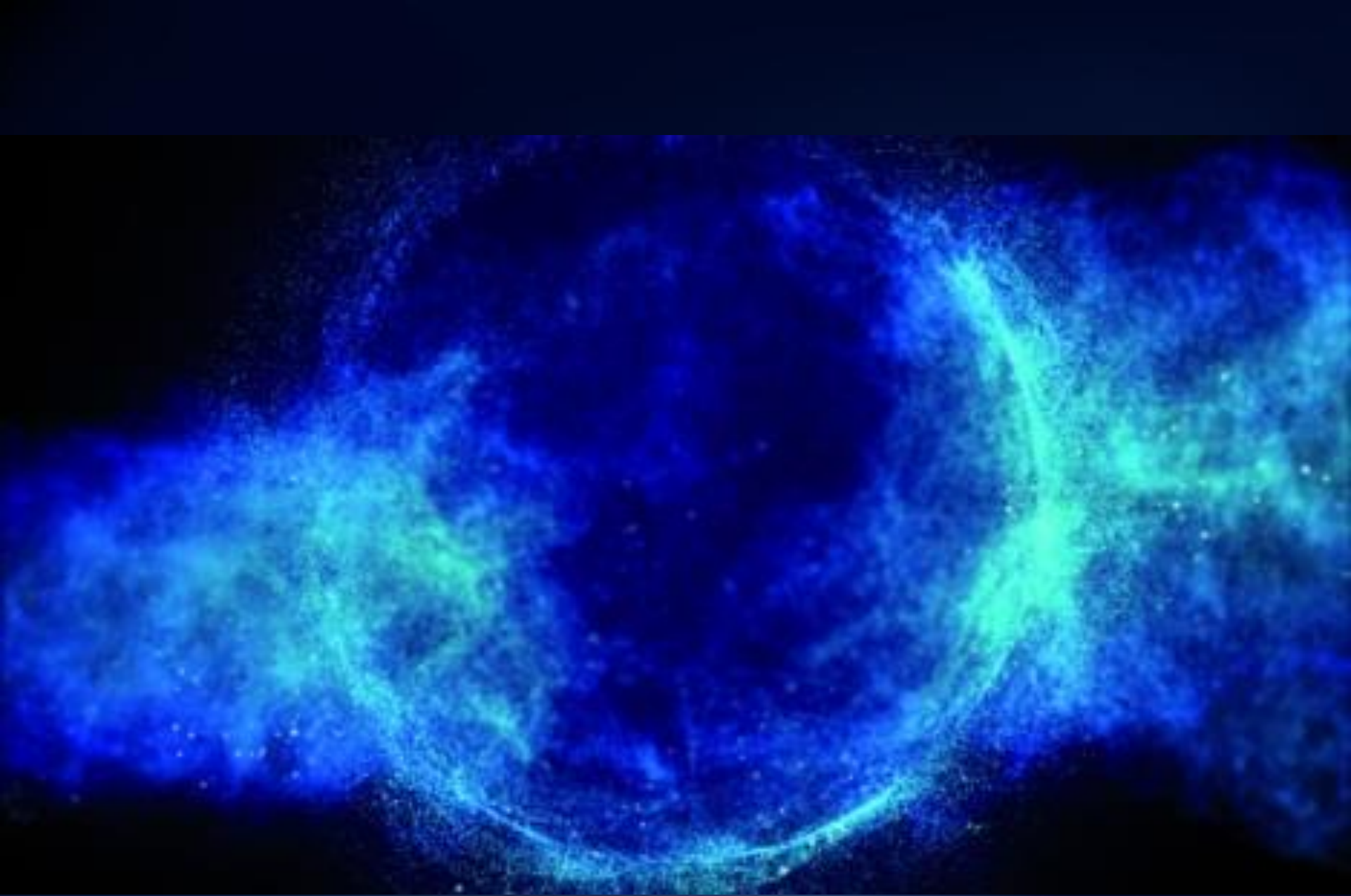
# (How) Do We Manage This?

1. Vision
2. Commitment
3. Tolerance

**What is Wrong with this Picture?**

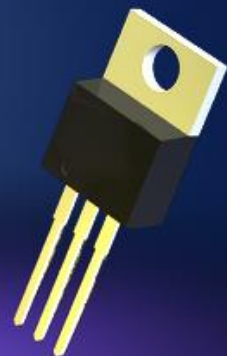
















What do you see differently?