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# Review of Beam Instrumentation in Linac4

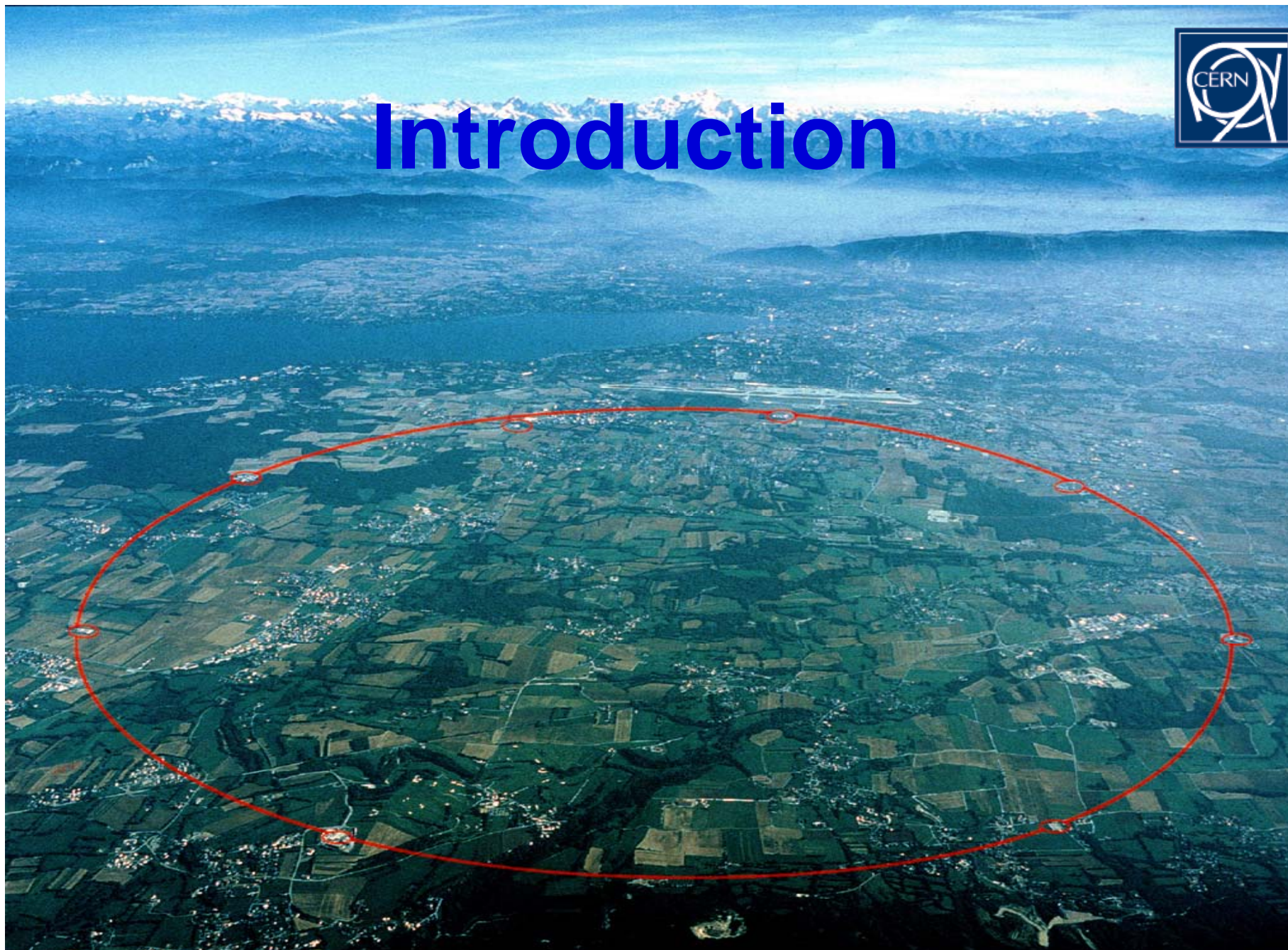
9 May, 2007 - CERN

## Content

- ◆ **Introduction:**  
context / proposal / planning
- ◆ **Goal of the review**



# Introduction





## *The European strategy for particle physics*

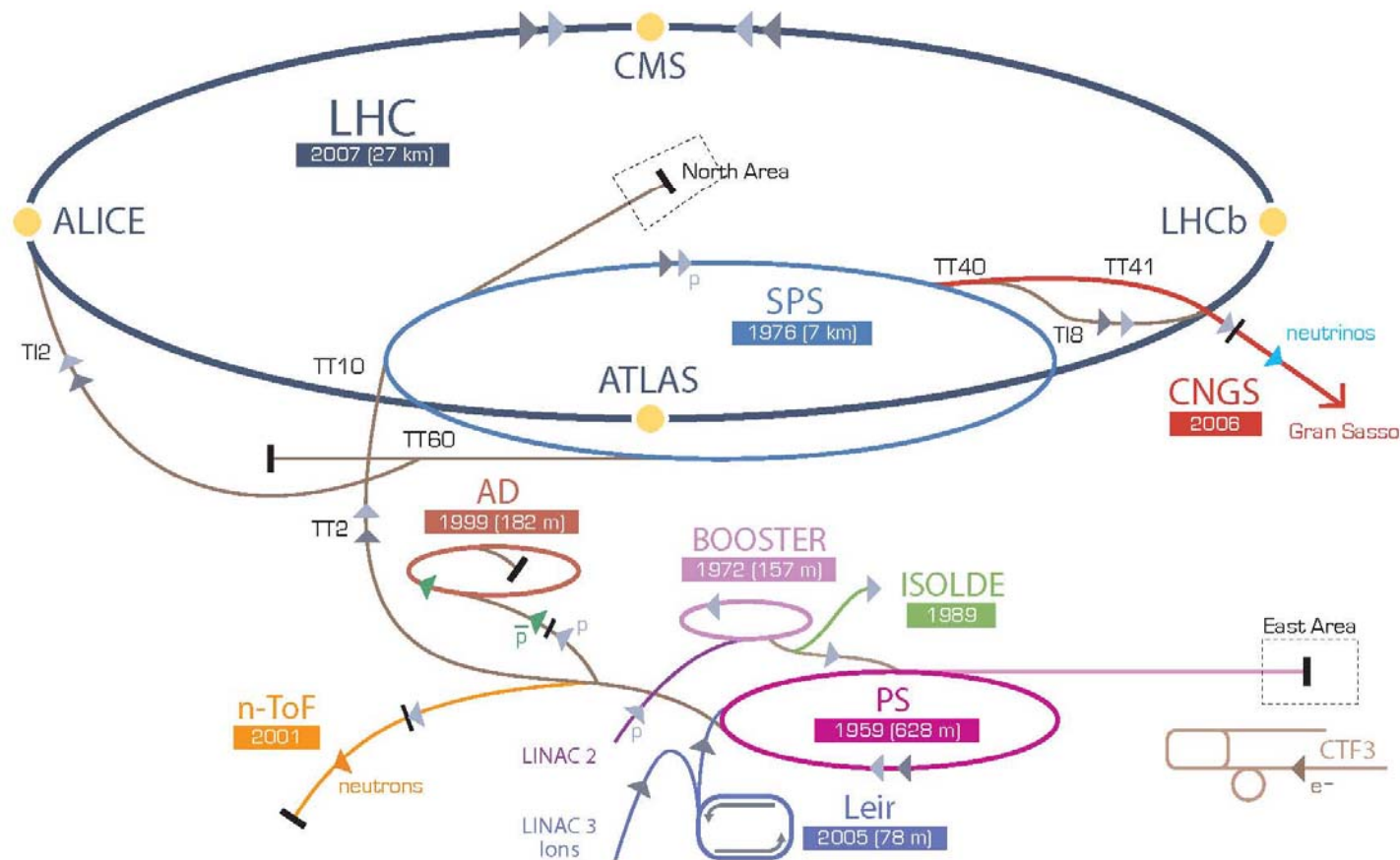
### *Scientific activities*

3. The LHC will be the energy frontier machine for the foreseeable future, maintaining European leadership in the field; *the highest priority is to fully exploit the physics potential of the LHC, resources for completion of the initial programme have to be secured such that machine and experiments can operate optimally at their design performance.* A subsequent major luminosity upgrade (SLHC), motivated by physics results and operation experience, will be enabled by focussed R&D; *to this end, R&D for machine and detectors has to be vigorously pursued now and centrally organized towards a luminosity upgrade by around 2015.*

⇒ **Consolidation and upgrade of injectors**

⇒ **LHC upgrade and maximum performance injectors**

# CERN accelerator complex



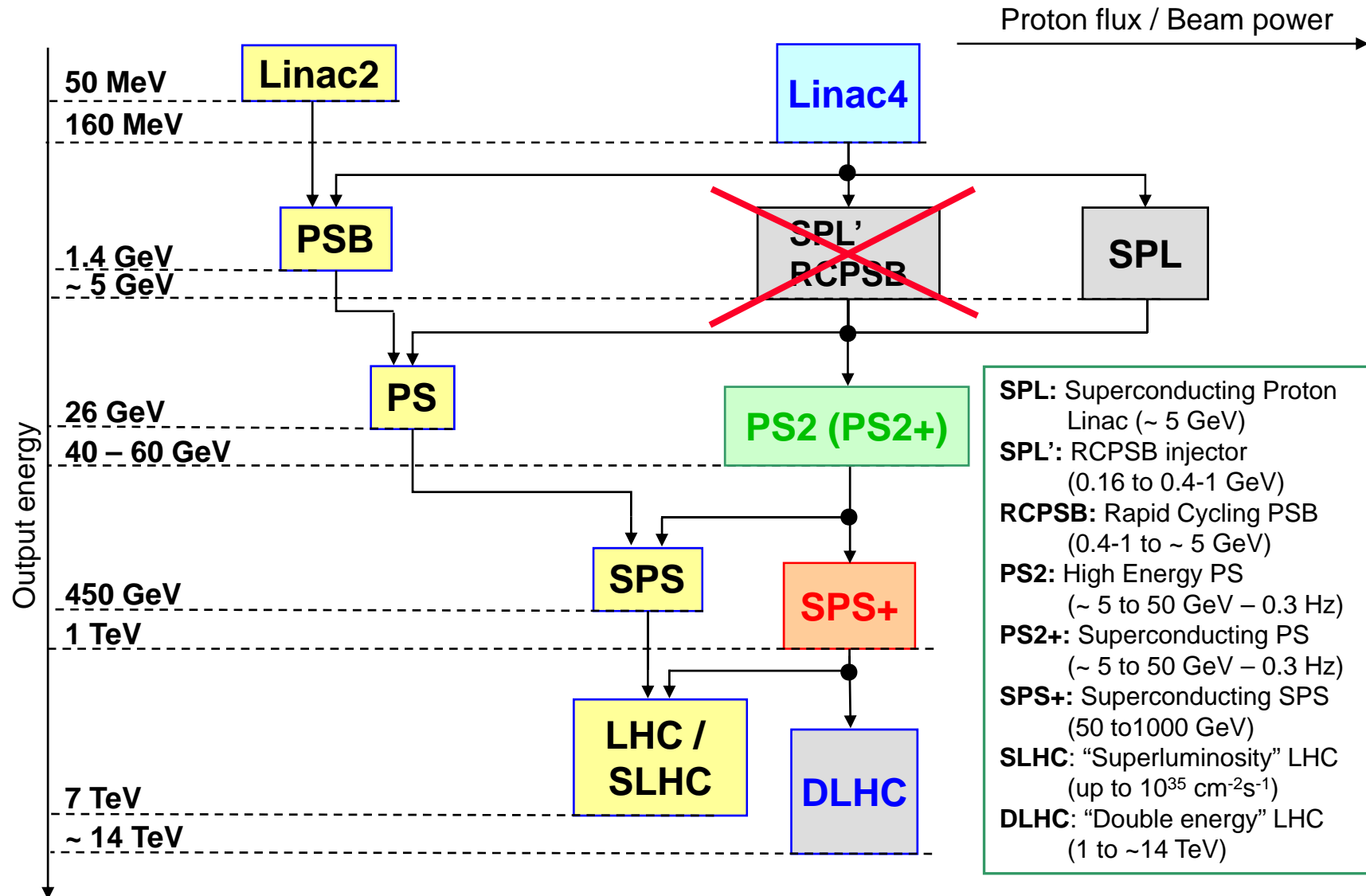
▶ p (proton) ▶ ion ▶ neutrons ▶  $\bar{p}$  (antiproton)  $\leftrightarrow$  proton/antiproton conversion ▶ neutrinos ▶ electron

LHC Large Hadron Collider SPS Super Proton Synchrotron PS Proton Synchrotron

AD Antiproton Decelerator CTF3 Clic Test Facility CNGS Cern Neutrinos to Gran Sasso ISOLDE Isotope Separator OnLine DEvice

LEIR Low Energy Ion Ring LINAC LINear ACcelerator n-ToF Neutrons Time Of Flight

# Planned upgrades of the accelerator complex



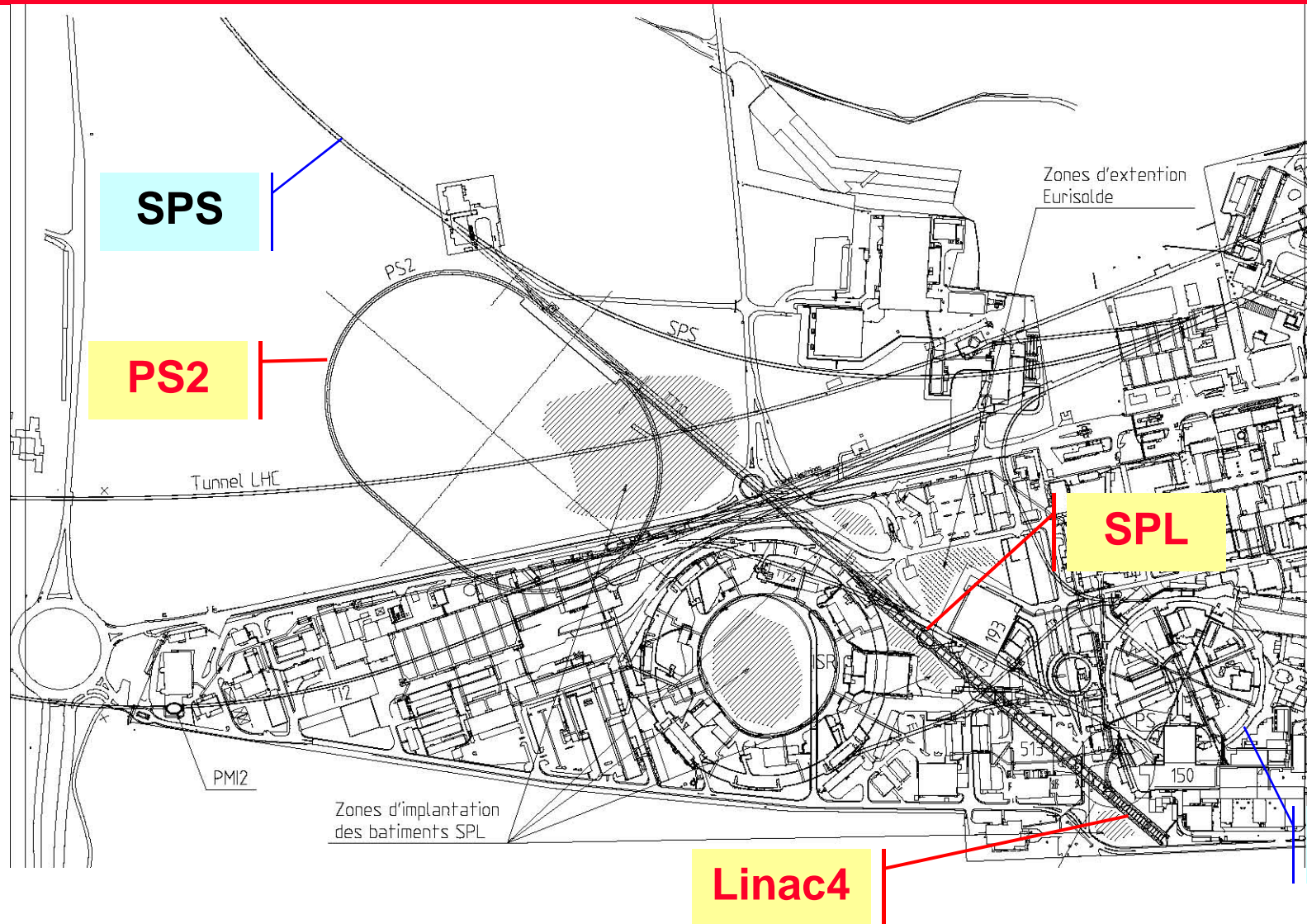


# Benefits for physics

STAGE	1	2	3	4
<b>DESCRIPTION</b> <i>(new accelerator)</i>	<i>Linac4</i> <b>PSB</b> <b>PS</b> <b>SPS</b>	<i>Linac4</i> <b>PSB</b> <i>PS2 or PS2+</i> <b>(&amp; PS)</b> <b>SPS</b>	<i>Linac4</i> <b>SPL</b> <i>PS2 or PS2+</i> <b>SPS</b>	<i>Linac4</i> <b>SPL</b> <i>PS2 or PS2+</i> <b>SPS+</b>
Performance of LHC injectors (SLHC)	+	++	++	+++
	Ultimate beam from PS	Ultimate beam from SPS	Maximum SPS performance	Highest performance LHC injector
Higher energy LHC	-	-	-	+++
$\beta$ beam	-	-	++ ( $\gamma \sim 100$ )	++ ( $\gamma \sim 200$ )
$\nu$ Factory	-	-	+++ (~5 GeV prod. beam)	+++ (~5 GeV prod. beam)
k, $\mu$	-	~150 kW beam at 50 GeV	~200 kW beam at 50 GeV	~200 kW beam at 50 GeV
EURISOL	-	-	+++	+++

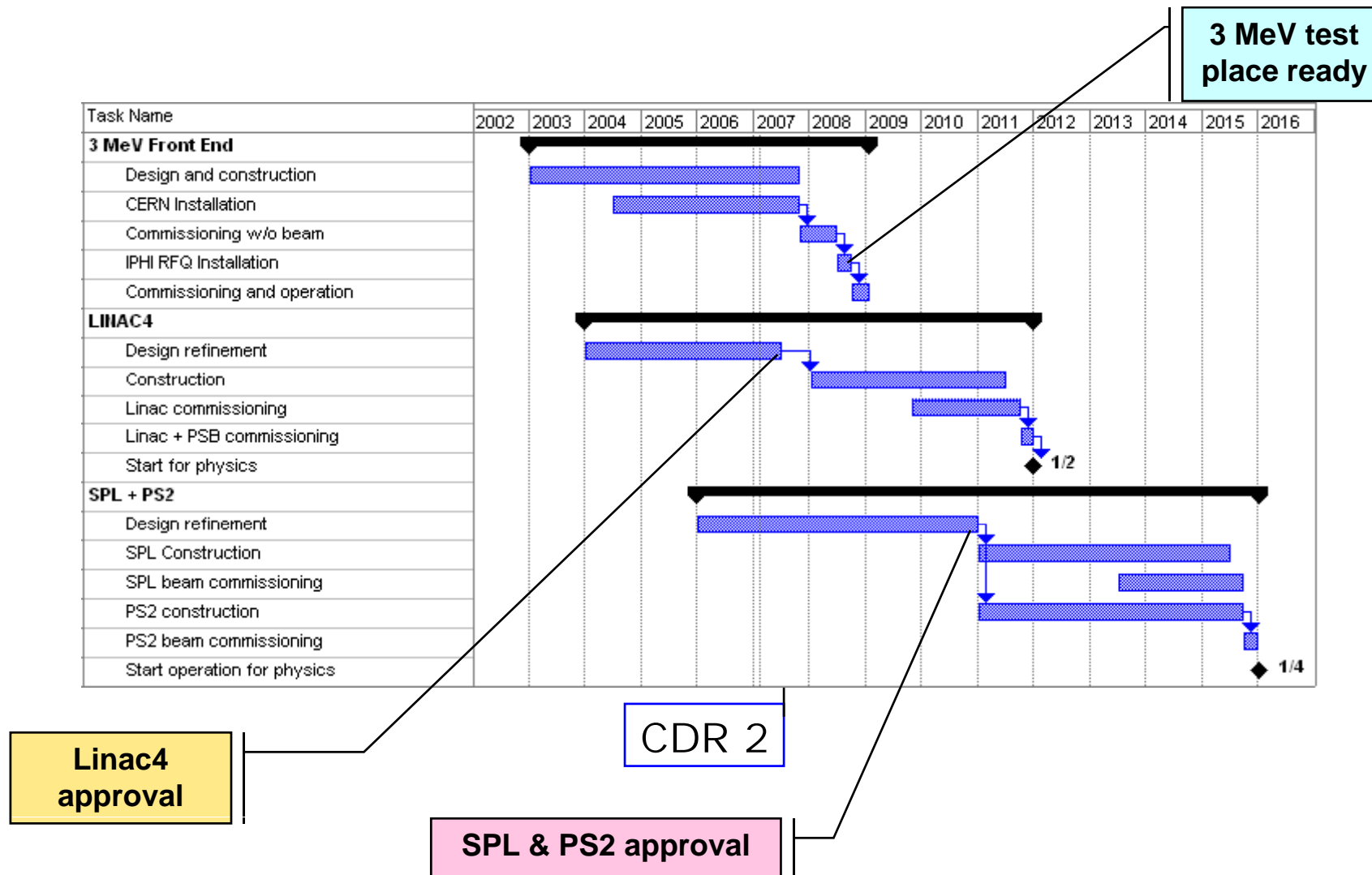


# Layout of the new injectors





# Planning of the new injectors







# Goals of the review



# Taking into account the short and long term CERN context:

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- ◆ To record the needs and planning of the accelerator design team,
- ◆ To collect the experience of recently built linac(s) in terms of problems and related needs in instrumentation,
- ◆ To determine/confirm the nature/specifications/location/quantity of the instruments to be installed,
- ◆ To list the possible options wrt the types of instruments:
  - ranking them in order of preference (priority of development),
  - indicating the possibility to duplicate existing devices,
  - recommending possible collaborations with other laboratories with similar needs.