



Review on PS Booster with Linac4

CERN, BE Auditorium Meyrin, 15 -16.1.2009

1. Goals
2. Committee
3. Mandate
4. Schedule



Goals



The CERN PS Booster is in many respects a non-conventional machine and is a critical component of the LHC Injection chain. Achieving the present performance has required many years of work and of constant improvement.

The construction of Linac4 will entail a deep modification of the PSB injection region (higher energy, H^-) and a redefinition of the PSB operating modes.

Now that we are in the final design phase we need to balance our design with the experience of the laboratories already active with H^- and collect experience and information from the other laboratories but also from a wider range of CERN experts.

Format:

a Review with 4 external and 1 internal reviewers, plus the presence of internal (CERN) experts who can participate to the debate.

Conclusions and recommendations from the Reviewers on the last day.



Review Committee



Review Committee:

Eric Prebys (FNAL), chair
Michael Plum (ORNL),
Izumi Sakai (Fukui University, JPARC),
John Thomason (RAL),
Gianluigi Arduini (CERN).

Internal Experts (will not participate to the closed sessions):

Karlheinz Schindl; (Michel Chanel); (Paul Collier); Flemming Pedersen; Roland Garoby; Steven Hancock; Jean-Pierre Delahaye; Michael Benedikt

The "extended committee" of CERN experts should participate in the debate and feel free to give indications-suggestions, even if not in a formal way as the ones coming from the official Review Committee.



Mandate



The mandate of the “Review of PS Booster with Linac4” review committee is to give advice and guidance to the project management by making assessments and by providing recommendations on the modifications and operating modes foreseen for the PS Booster with Linac4.

In particular the committee should provide feedback on the following issues:

- Assess the technical approach and identify possible hidden showstoppers and problems.
- Provide feedback on whether operational aspects are sufficiently covered, based on practical experience at other facilities
- Provide advice on further simulation and design studies that may be required.
- Review concepts on the operation of the PSB with Linac4 within the CERN accelerator complex.
- Provide advice on the finalization of the injection region layout including the proposed reduction of the machine acceptance.
- Estimate whether the proposed schedule and resources are realistic.



Schedule



Thursday 15.1: Open session, 8 presentations from 09:00 to 16:00

1st Meeting of the Review Committee (closed session) 16:15 – 18:00

2nd Meeting of the Review Committee (closed) Friday 16.1 08:00 – 11:00

Conclusion session (open) in the BE **Auditorium at 11:00, Friday 16.1** :

Presentation of preliminary conclusions by the Committee Chair



Thanks to...



The Review Committee members who have accepted this important task.

The “internal” members who have arranged their busy agendas to be here today.

Christian Carli and Klaus Hanke who, with the support of Roland Garoby, have prepared the programme, the mandate and have contacted the committee.

Cecile Noels for all the practical aspects.



Linac4 Overview

M. Vretenar, PSB review with Linac4, 15.1.2009

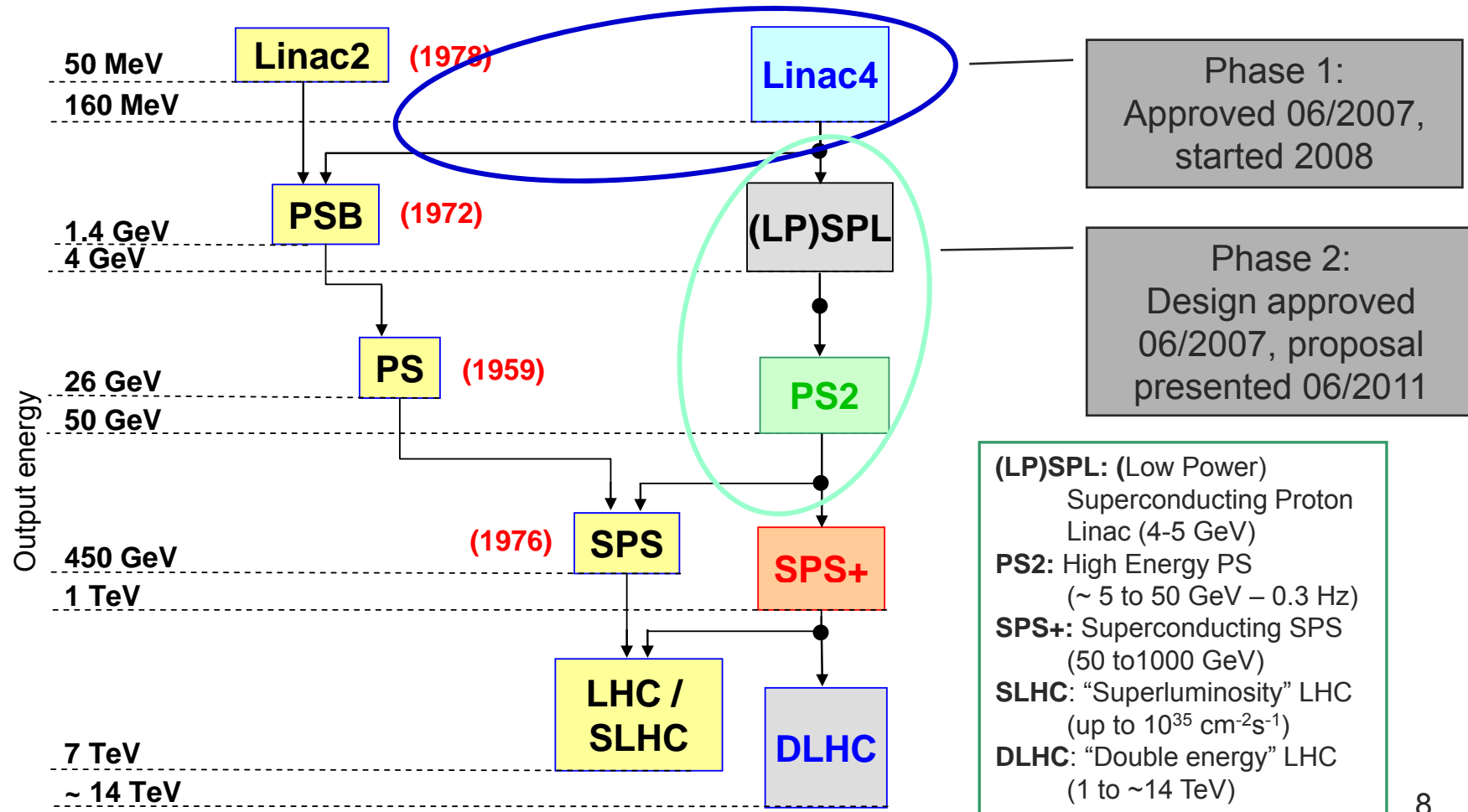
1. Motivations
2. Layout
3. Project structure
4. Schedule
5. Status



The upgrade of the LHC Injectors



Motivations: progressively increase the LHC luminosity, increase reliability, simplify operation, reduce radiation, open to new physics applications.

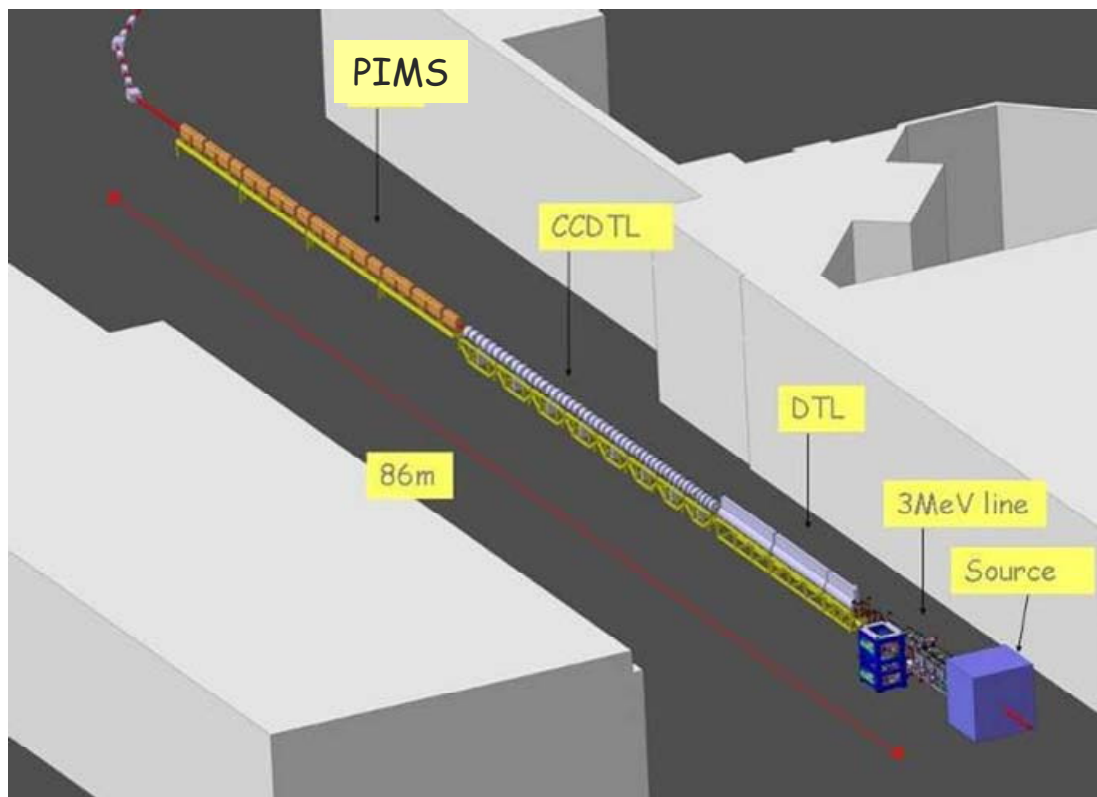




Linac4



- Linac4 is a normal-conducting H⁻ linac at 160 MeV energy that will replace Linac2 as injector to the PSB and can be lately extended to the SPL.
- Linac4 because the 4th linac to be built at CERN (Linac3 is the heavy-ion linac).
- 160 MeV energy will give a factor 2 in $\beta\gamma^2$ with respect to the present 50 MeV Linac2.



Output Energy	160 MeV
Bunch Frequency	352.2 MHz
Max. Rep. Rate	2 Hz
Max. Beam Pulse Length	1.2 ms
Max. Beam Duty Cycle	0.24 %
Source current	80 mA
RFQ output current	70 mA
Linac pulse current	40 mA
	(after chopping)
N. particles per pulse	1.0×10^{14}
Transverse emittance	0.4π mm mrad
Max. rep. rate for accelerating structures	50 Hz

Equipped with a fast beam chopper at 3 MeV



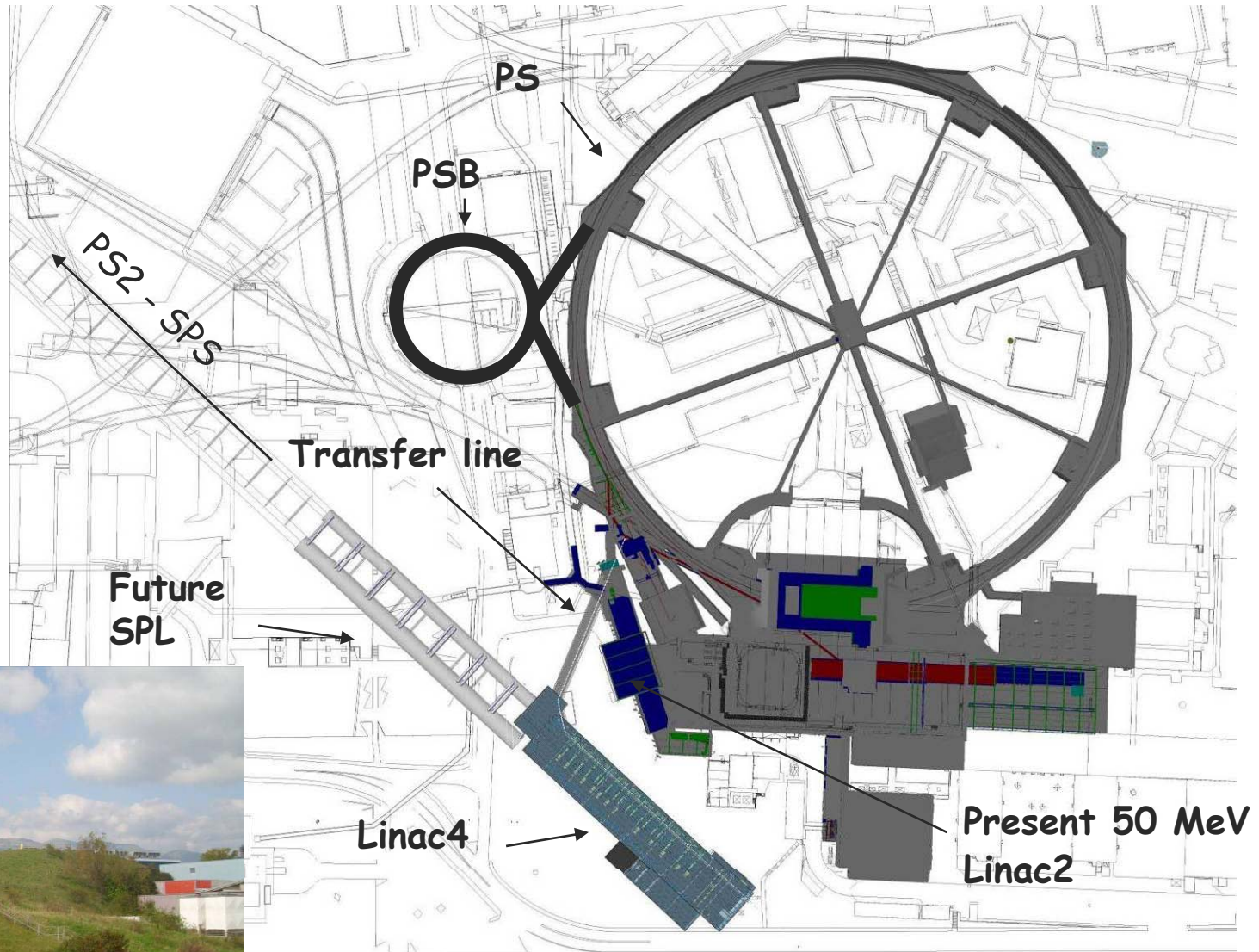
Linac4 on the CERN site



Linac4 will be built in an area between the PS complex and the IT building usually called “Mount Citron”.

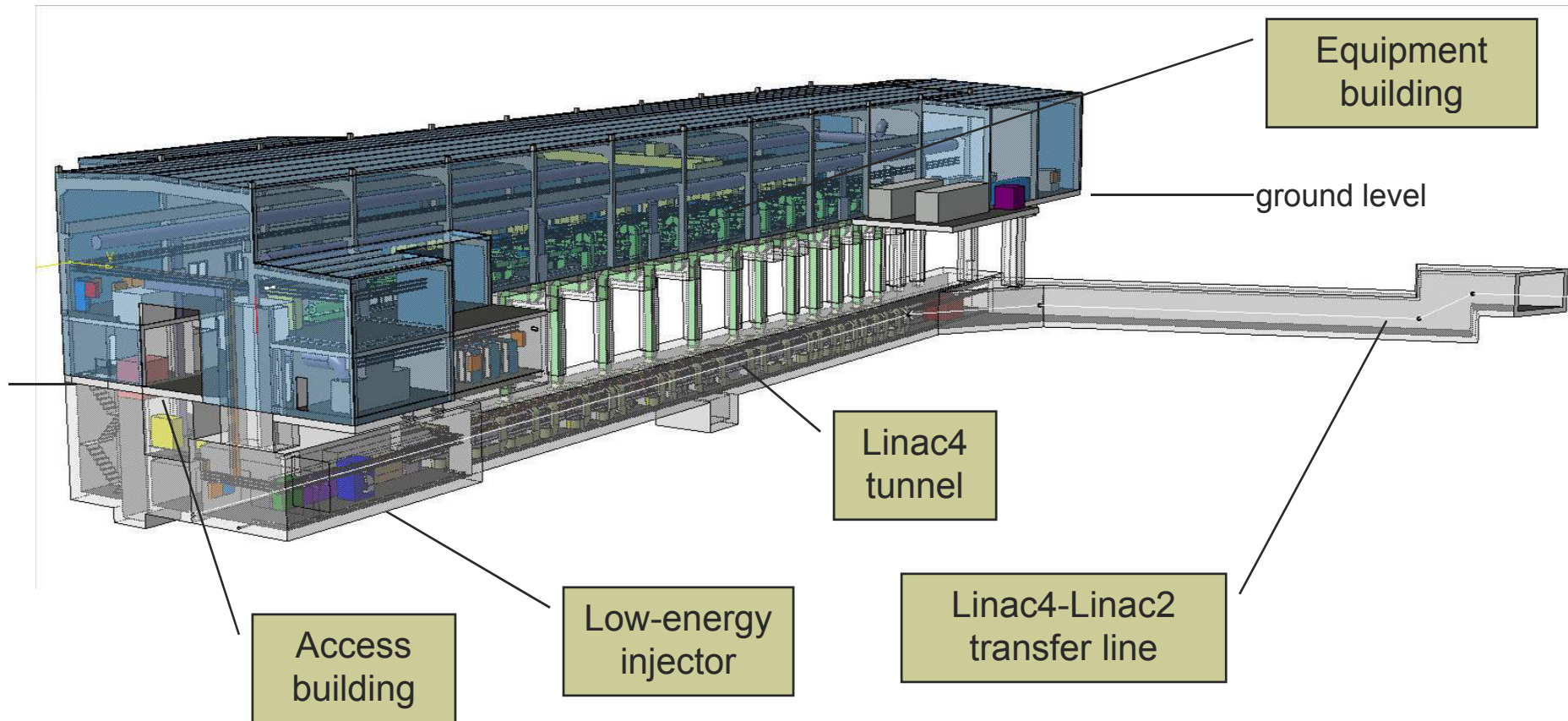
Position and orientation allow future extension to the SPL.

A transfer line from the Linac4 tunnel connects to the present Linac2-PSB line.





Linac4 civil engineering



Pre-integration May – October 2007
Tendering drawings November 2007 – April 2008
Tendering May 2008, Contract to FC September 2008.
Civil Engineering Works started in October 2008.



Civil engineering is progressing



Mount-Citron, 14.10.2008...



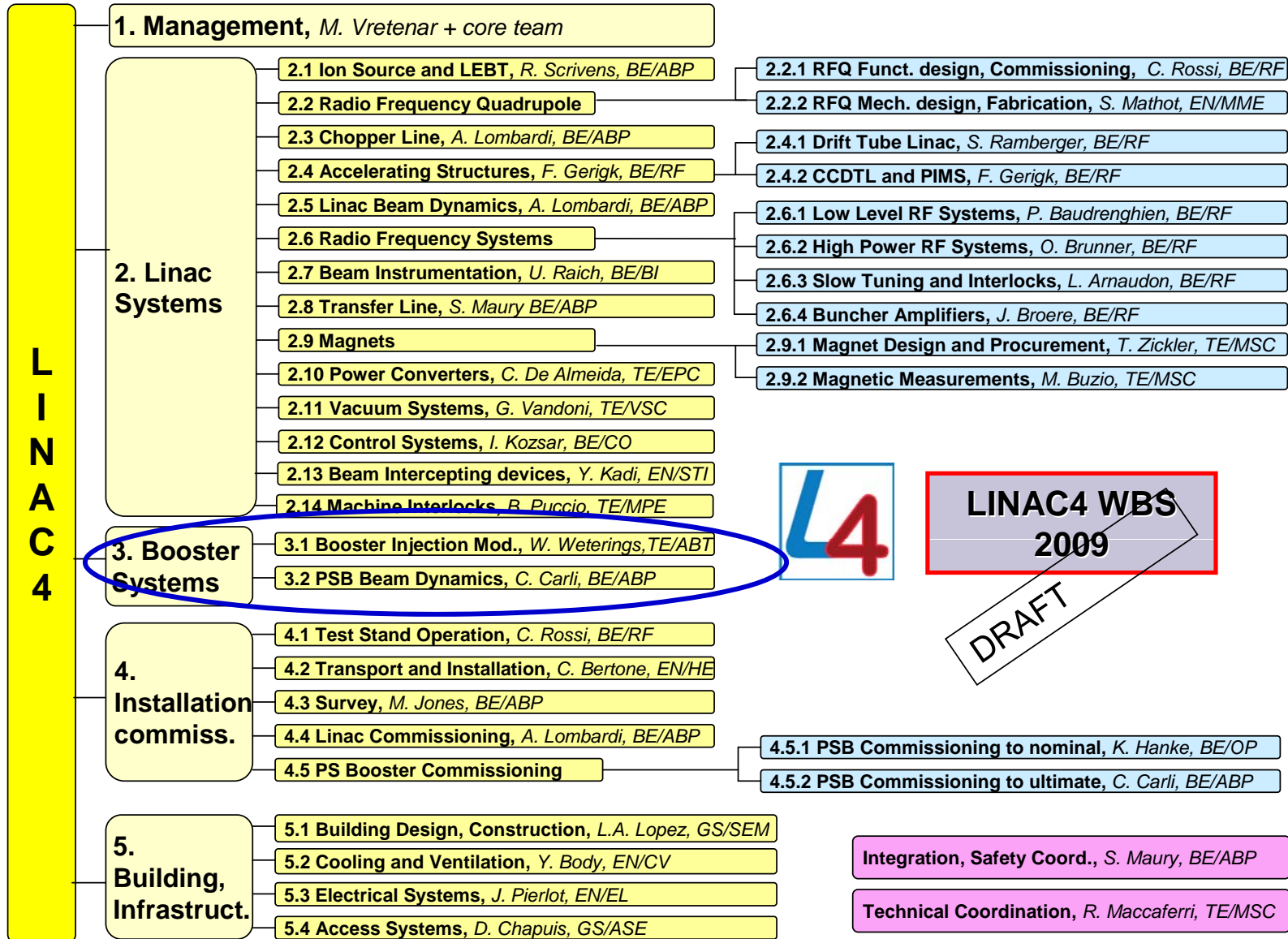
**Groundbreaking
16.10.2008**

Mount Citron, 27.11.2008





Project WBS



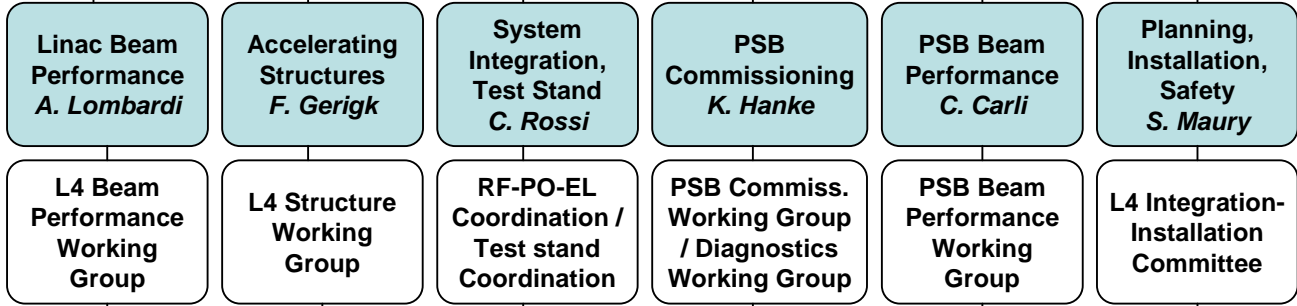


LINAC4 MANAGEMENT AND COMMUNICATION STRUCTURE



SLHC Projects – L. Evans

Linac4 Project Management – M. Vretenar

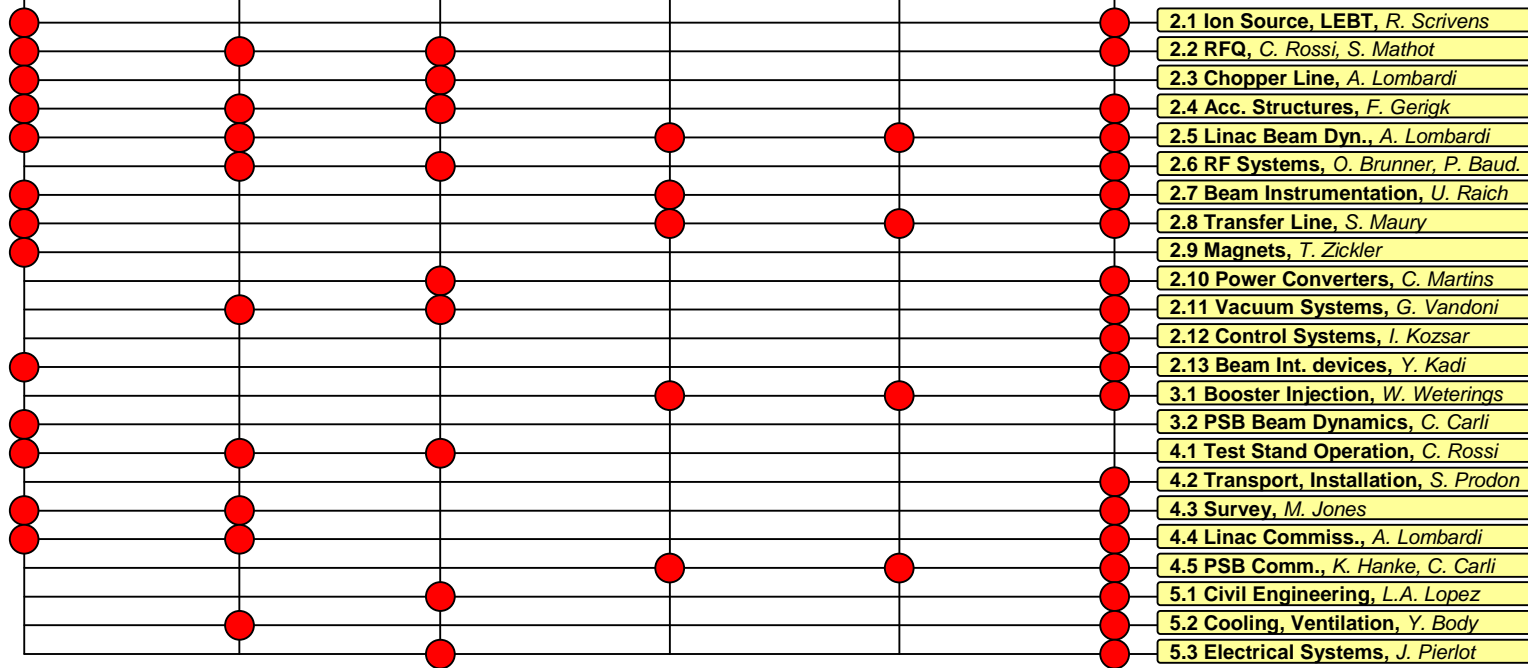


PAF, SPL, International Collaborations R. Garoby

Technical Coordination R. Maccaferri

core team

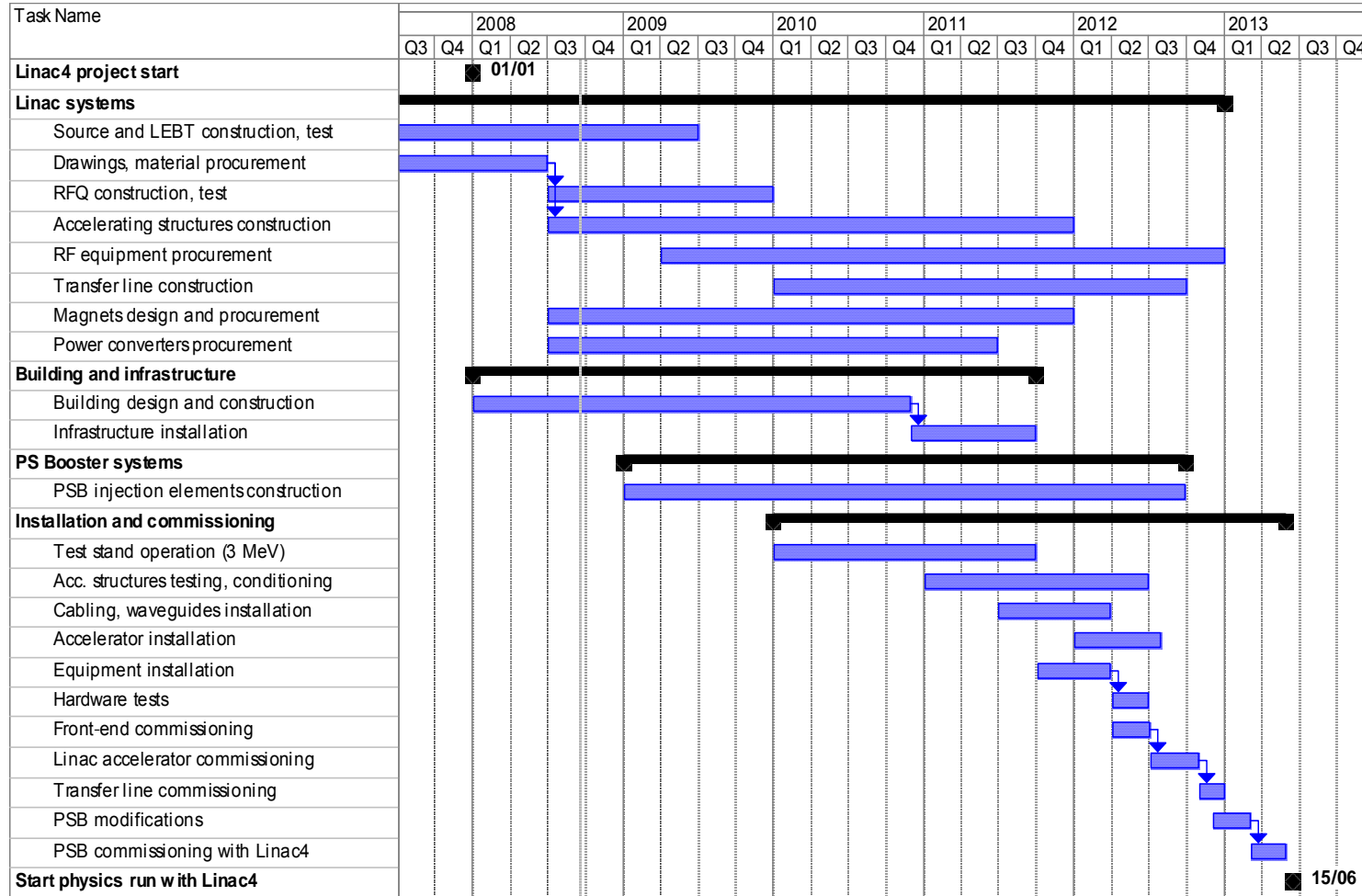
committees and working groups



Linac4 Workpackages



Linac4 Master Plan



✓ End CE works:
December 2010

✓ Installation:
2011

✓ Linac
commissioning:
2012

✓ Modifications
PSB: shut-down
2012/13 (7.5
months)

✓ Beam from
PSB:
15.6.2013



Linac4 Status (01/2009)



- Civil Engineering works started 22.10.2008, delivery of building end 2010.
- Safety File submitted to CERN Safety Commission in June 2008. Building approved.

- Ion source almost completed, first beam tests beginning 2009.
- 3 MeV Test Stand infrastructure completed.
- Prototype modulator tested with LEP klystron in pulsed mode.
- Chopper line built and assembled.
- Prototypes of accelerating structures tested (CCDTL), being tested (DTL), starting construction (PIMS). Material being ordered, construction of DTL and CCDTL will start in 2009.
- Started preparation for large contracts (klystrons, modulators, magnets,...).

- Detailed descriptions of Workpackages ready, project baseline being frozen.