

# CANDIDATE LOCATIONS FOR PLASMA WAKE-FILED EXPERIMENT AT CERN

## Outline

- ❑ Possible installation in the PS East Area
- ❑ Possible installation in the SPS – TT61/TCC4/TT5 area

Just first ideas, further studies and understanding of pros/cons of each solution need to be evaluated wrt the specifications from the experiment

.....and SAFETY !!

EFTHYMIOPOULOS, I (EN/MEF)

WITH INPUT & SLIDES FROM : R. STEERENBERG, HEL. VINCKE, C. HESSLER,  
M.MEDDAHI, L. GATIGNON

# USING A PS BEAM

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## Beam line in the PS East Area

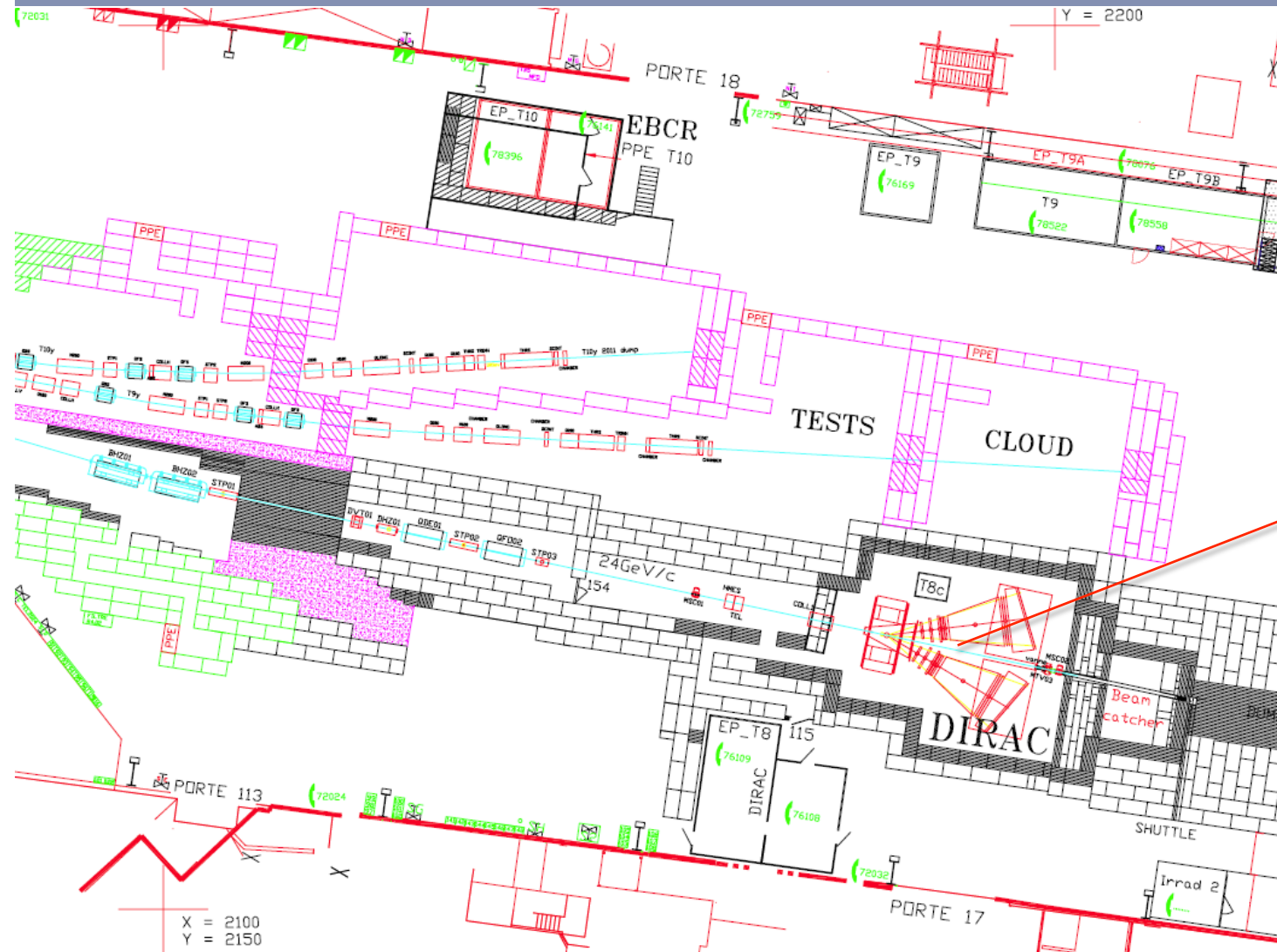
- Possibility to use a semi-fast extraction from PS machine
- Achievable beam parameters (to clarify with experts):
  - 50ns pulse length,  $<1.0E11$  ppp, few mm<sup>2</sup> spot (parallel?),  $D_p \sim 0.1\%$
- Issues to clarify:
  - Requires the removal of the DIRAC experiment – when?
  - Even after DIRAC removal there is a strong interest to reuse the area for electronics irradiation facility
- Total length for experimental area  $\sim 30\text{m}$ , difficult to prolong it – beam dump  $\sim 6\text{m}$
- A proposal is under study to renovate the East Hall Exp. Area → (next slide)
  - Time scale : earliest in 2012, or during the long shutdown in 2013/2014

S. Gilardoni, R. Steerenberg

# Using a PS Beam

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Area layout – after the proposed



Beam line  
for PWA

# USING AN SPS BEAM

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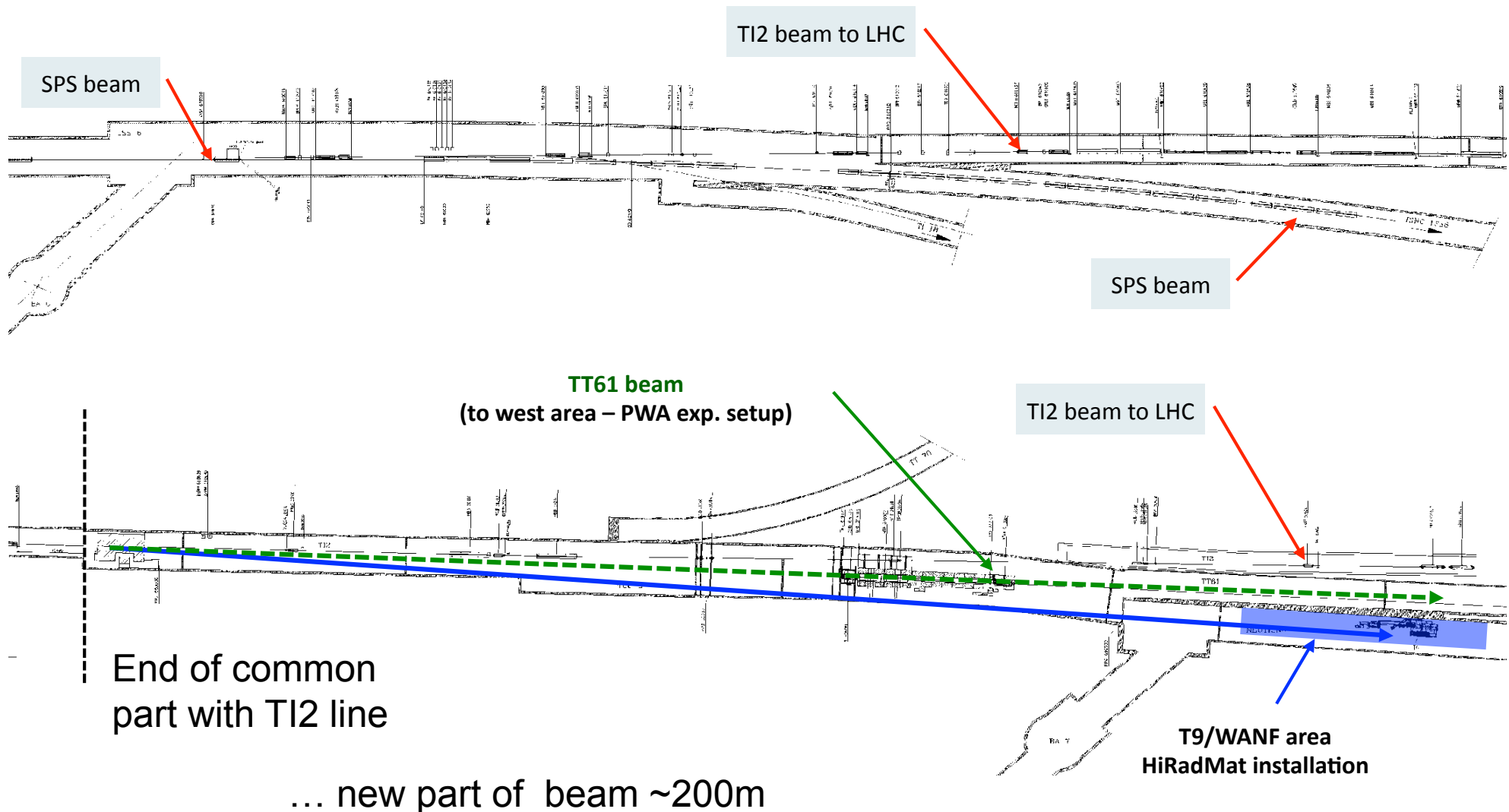
## TCC6/TT61 option

- Use the extracted beam (LHC type) from SPS to TI2 line
  - ▣ 400/450 GeV/c beam – (*can be lowered to ~300 GeV*)
  - ▣ Protons: 25ns bunches, intensity variable  $10^9 \div 10^{11}$  ppb
  - ▣ Ions : also possible
  - ▣ Single bunch extraction possible (LHC pilot beam)
  
- Layout:
  - ▣ Branch off at some point after the extraction to bring the beam towards the TT61 tunnel (old West Area beam and Experimental Area)
  - ▣ Switching magnet location already foreseen in the present layout of the TT66 line to HiRadMat

# TT61 beam line layout

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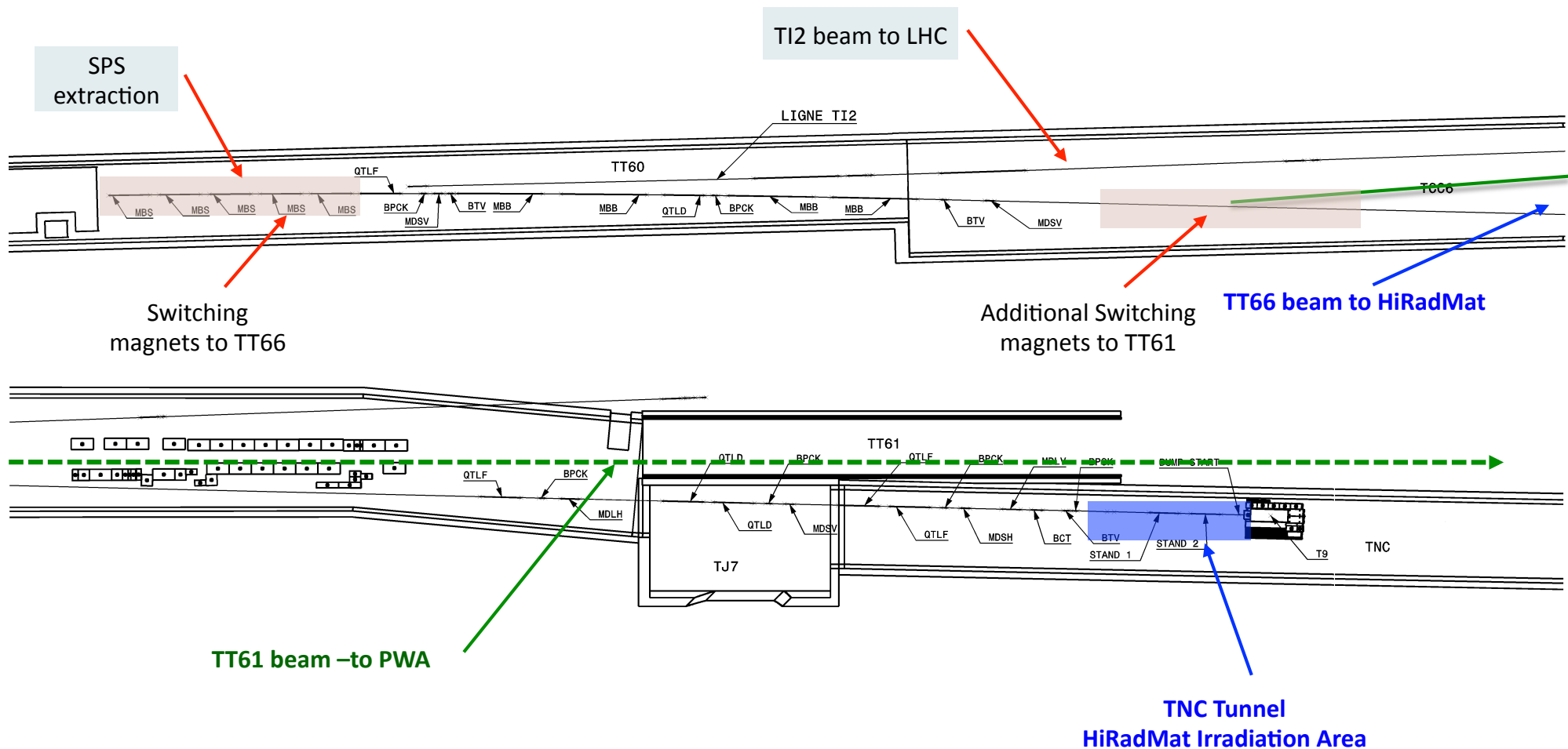
The proton beam (LHC type – fast extraction from SPS)



# TT61 beam line layout

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The proton beam (LHC type – fast extraction from SPS)

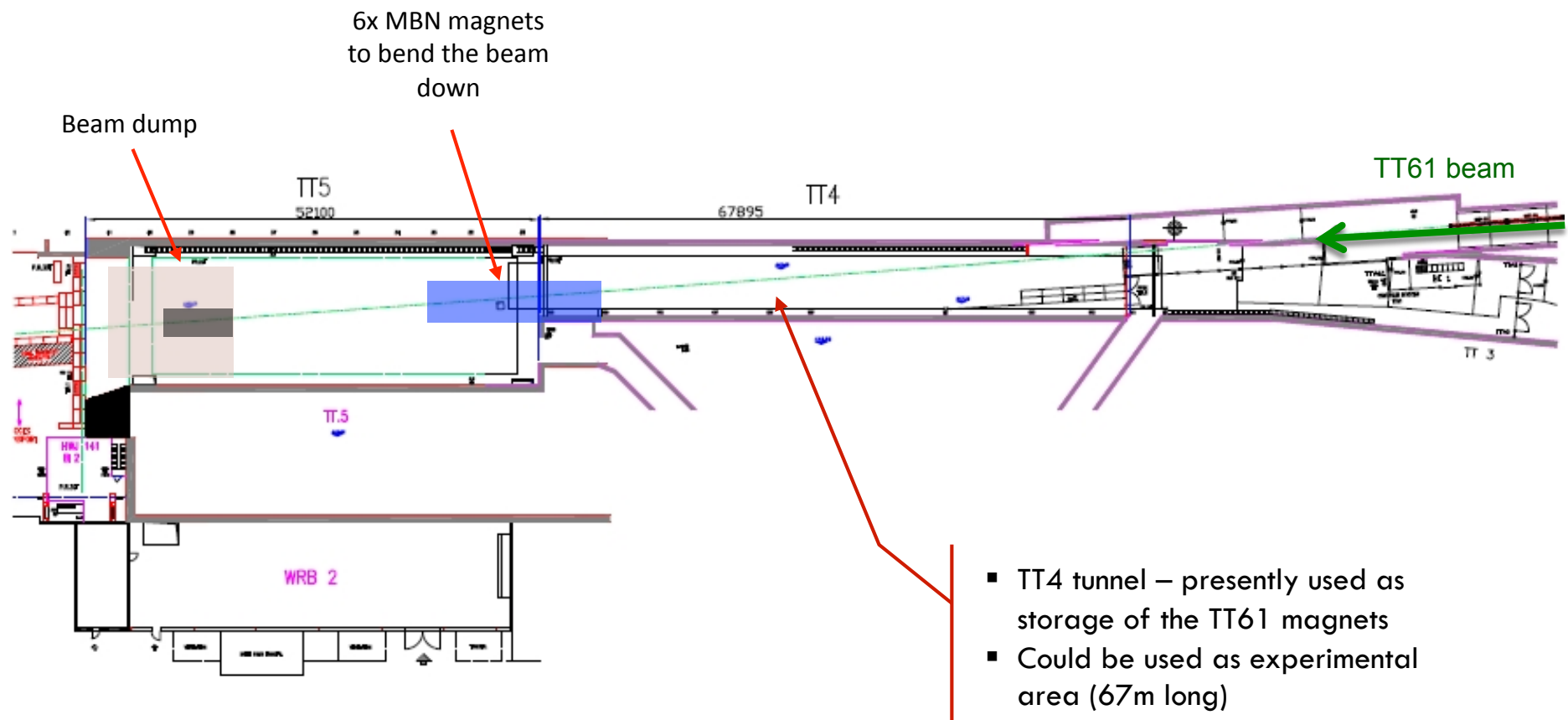


beam line design : C. Hessler, M. Meddahi

# TT61 beam line layout

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TT4 – TT5 areas – future exp. area



# USING AN SPS BEAM

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## TCC6/TT61 option

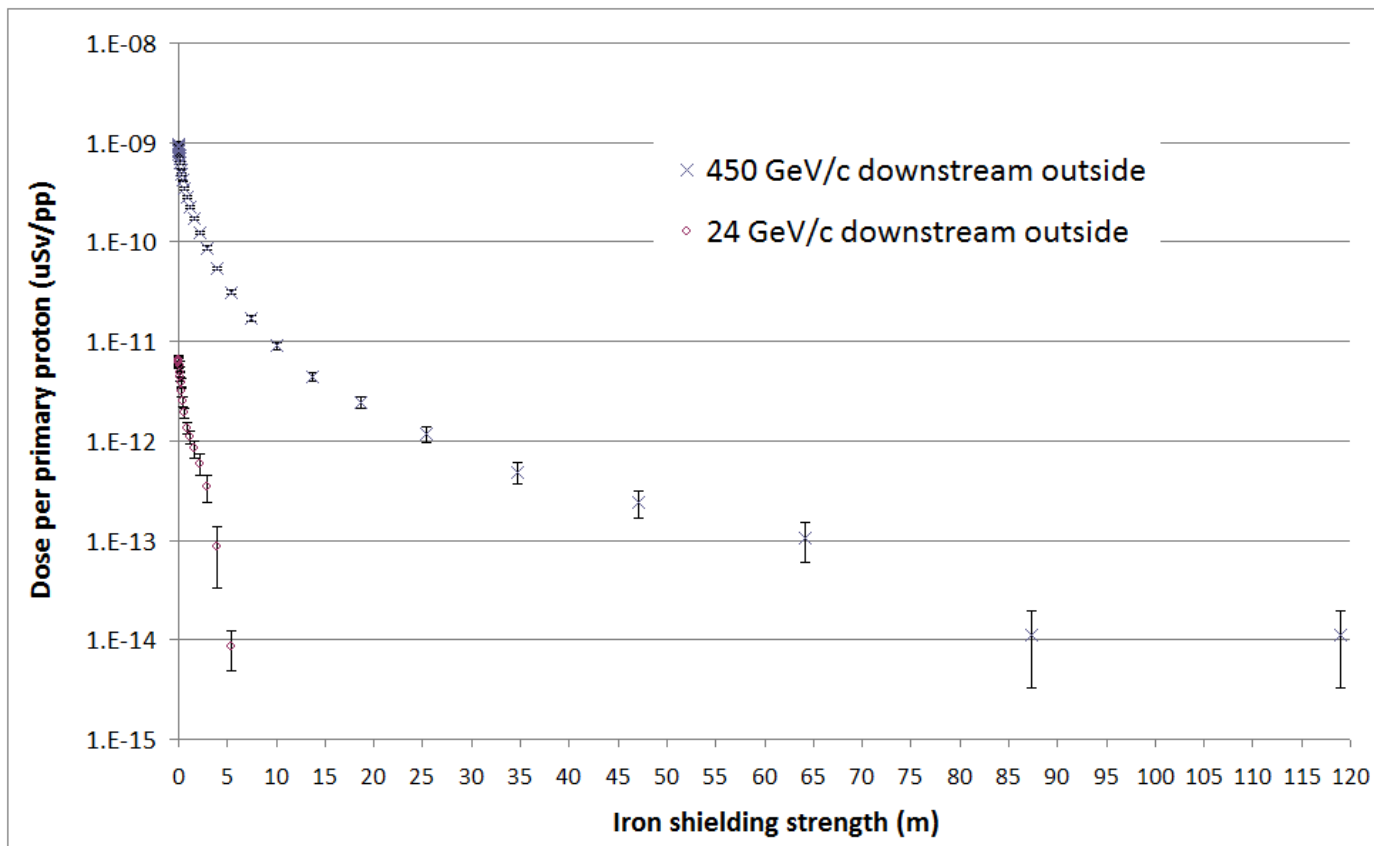
- **Pros:**
  - ▣ Adequate beam parameters
  - ▣ Available space for initial and future configurations
  - ▣ Possibility of office & lab spaces nearby (old West Area) for experimental teams
  
- **Issues to clarify**
  - ▣ Beam dump design to protect b.183 & b.180 labs
    - mainly muons → bend the beam downwards (requires space...)
  - ▣ If PWA experiments limited to second half of TT61 tunnel (last 200m) access could be decoupled to HiRadMat & T12 operation
    - a new beam stopper and intensity attenuator would be required for safety
  - ▣ Status of the available infrastructure, i.e. ventilation, services, electricity, etc.
  - ▣ The line is long so the availability of magnets and power supplies may have an impact on the cost.
    - except of the switching magnets, the rest should be available from old installations

# USING AN SPS BEAM

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Beam dump – use TT5 tunnel ???

□ Simulated muon flux from beam impact



Hel. Vincke, DG/SCR

- For 10E11 beam and few pulses/hour → 10m of iron would reduce the flux to ~1uSv/h
- Beam must be bend downwards

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# Backup

Photos from the tunnels,

→ Possible visit this afternoon at 15:30PM

# TT61 tunnel

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Status today – after partial dismantling of the old line



- Note the TT61 tunnel has a quite steep slope 6-7%
- A battery of bends is needed to bring the beam upwards → dispersion?



# TT61 tunnel

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Status today – after partial dismantling of the old line



- Services and infrastructure still in place from the old beam line
- However the power supplies have been dismantled and used as spares for the SPS North Area



# TT61 tunnel

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Status today – after partial dismantling of the old line



# TT61 tunnel

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Status today – after partial dismantling of the old line



# TT61 tunnel

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Status today – after partial dismantling of the old line



# TT61 tunnel

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Status today – after partial dismantling of the old line



# TT61 tunnel

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Status today – after partial dismantling of the old line



# TT61 tunnel

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Status today – after partial dismantling of the old line



# TT61 tunnel

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Status today – after partial dismantling of the old line

End tunnel to be converted to  
**beam dump** (see next slides)



“Up” bends (bring beam horizontal to the old exp. area) - can be used as the spectrometer



EDMS No:

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# TT61 tunnel

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End tunnel - surface

- No buildings directly behind – should be ok for radiation for a  $1.0E11$  beam

