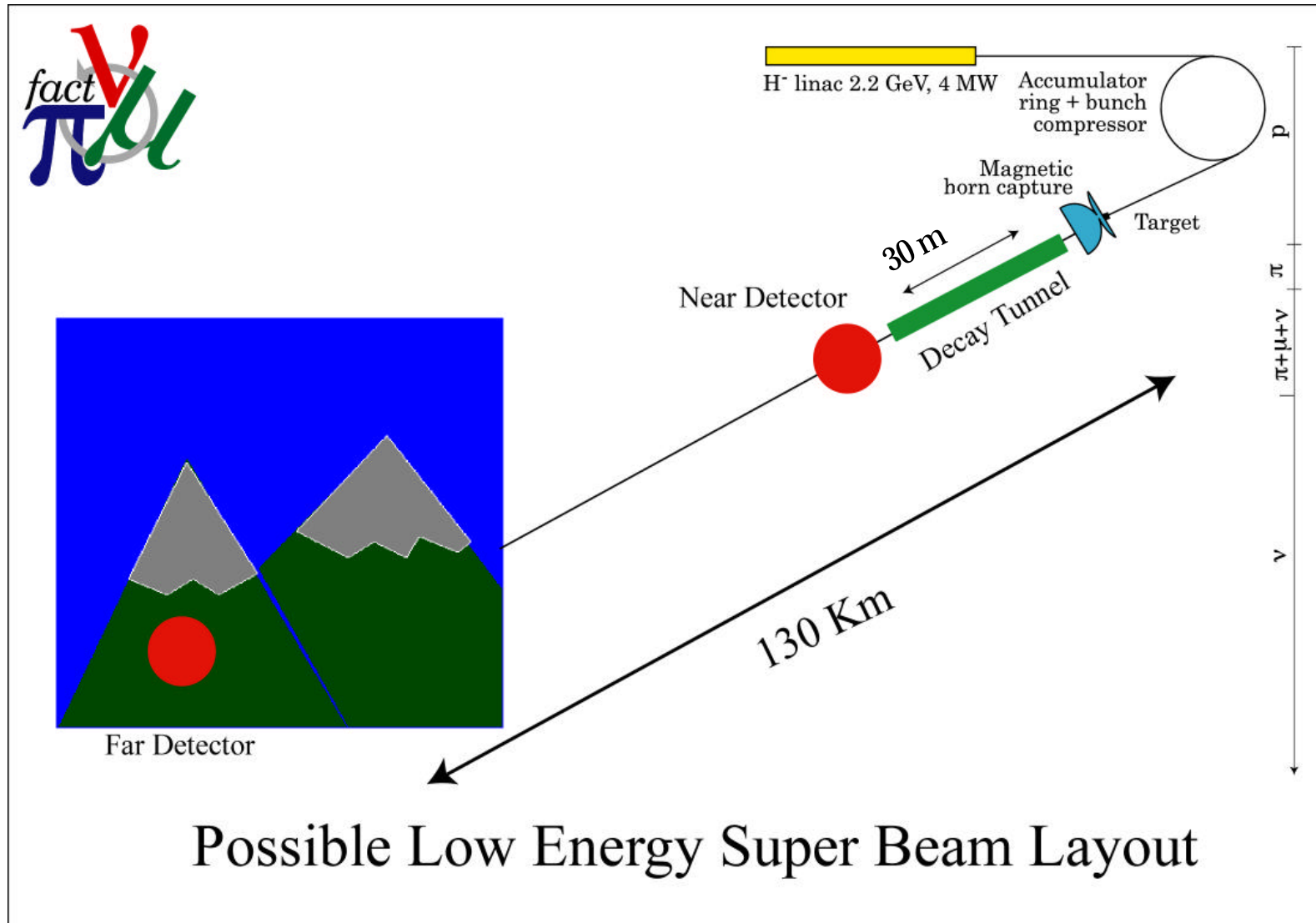
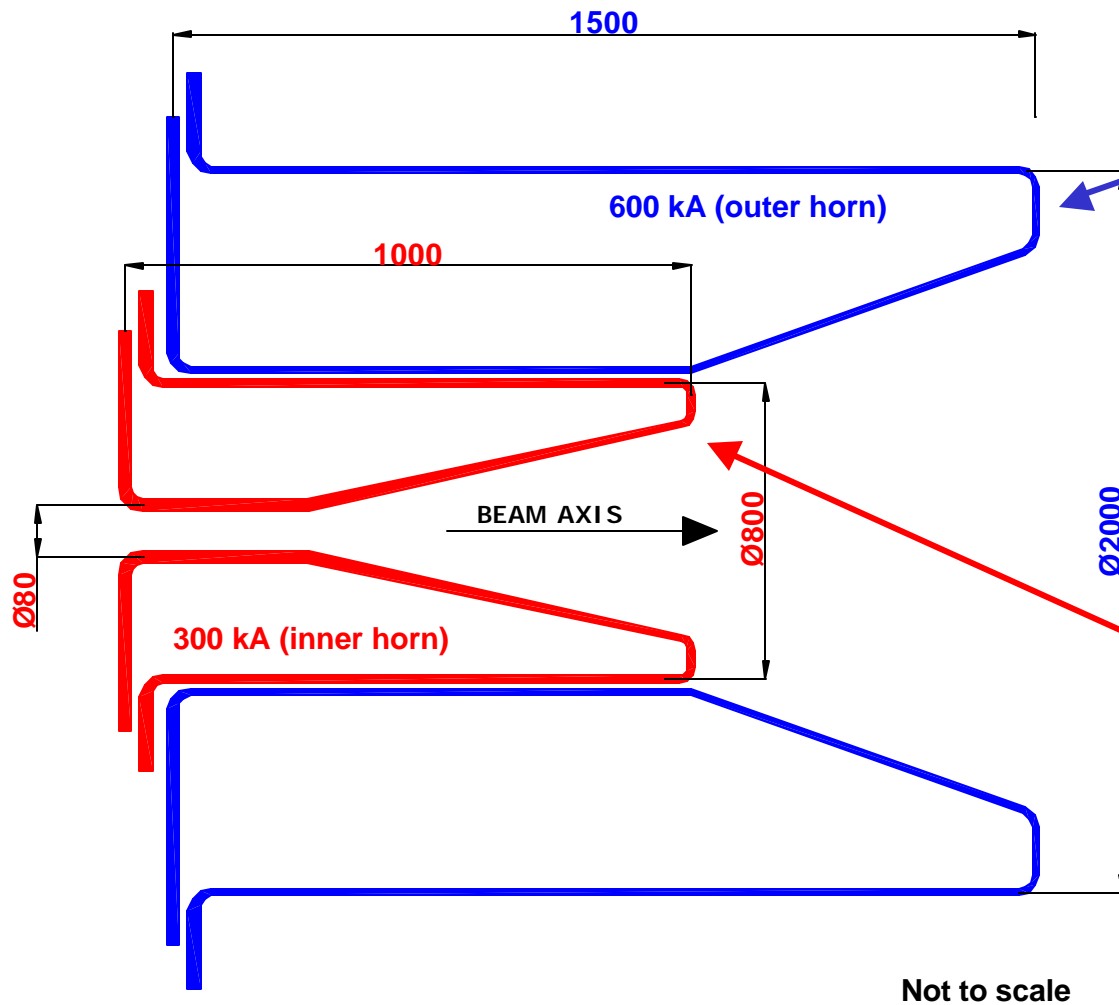


New optics for the SPL Superbeam

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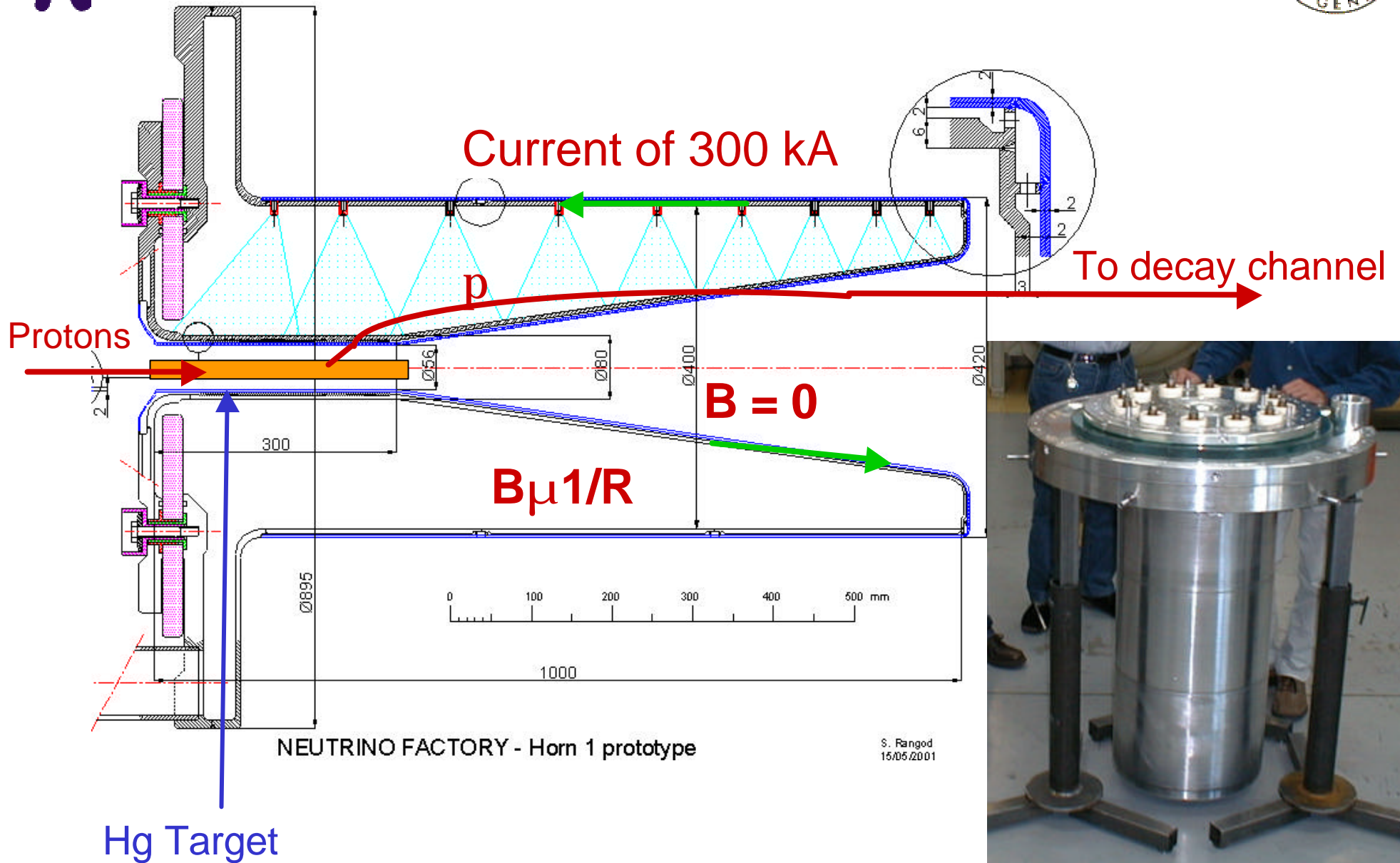
UNIGE 25.04.2001, Mauro Donegà



Outer horn
Reflector like
Optimized for
SuperBeam

Inner horn
Same as Nufact

Magnetic horn



- Useful pions:
 - $E_k = 500 \text{ MeV}$
 - Max Neutrino Energy $\approx 270 \text{ MeV}$
 - Max point-to-parallel production angle
 - $I = 300 \text{ kA} \Rightarrow \theta_{\text{max}} = 12 \text{ degrees}$
 - $I = 600 \text{ kA} \Rightarrow \theta_{\text{max}} = 17 \text{ degrees}$

- Geometrical constraints:
 - Nothing in front of the primary proton halo
 - Nothing along the mercury direction
 - Maximum energy stored in the magnetic volume



New ν_μ fluxes with new horn



- Fluxes at 50 km
- Decay channel 30 m
- Detector 100 m²

To be compared with:

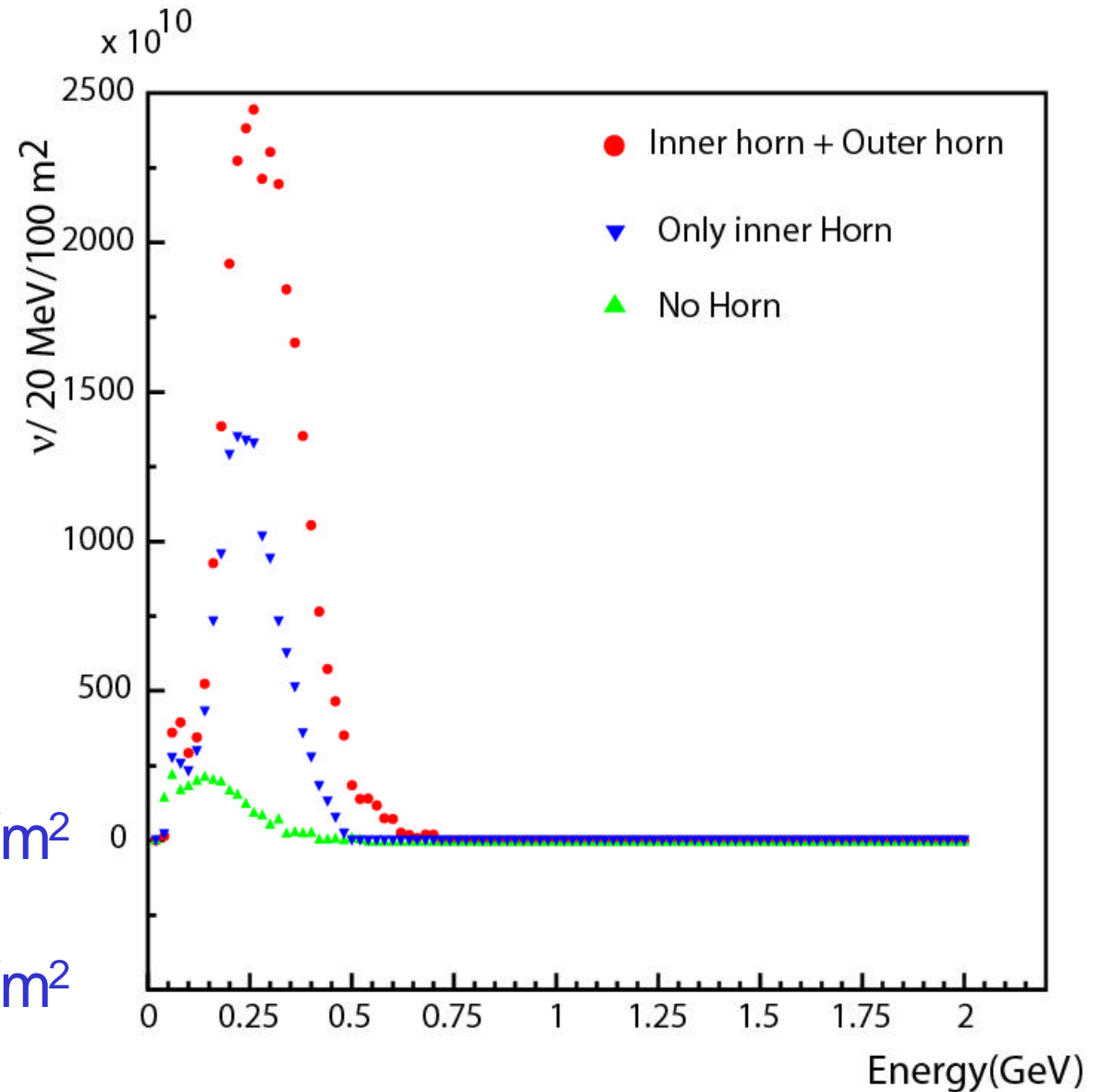
NufactNote 95

Old:

$$1.7 \cdot 10^{12} \nu_\mu / 10^{23} \text{pot/m}^2$$

New:

$$2.7 \cdot 10^{12} \nu_\mu / 10^{23} \text{pot/m}^2$$



- New ν_μ fluxes higher than before but:
 - ν_e background from μ decay increased from 0.35% to 0.49%
- Further optimisation?
 - More funny shapes?
 - Longer horn but with lower current
 - Classical reflector à la CNGS
 - Reflector à la Miniboone
 - Shorter target?

- New neutrino fluxes available for physics study
- Study still under development:
 - Frozen for horn mechanical test
- Proposition:
 - Once the kaon threshold is known:
 - ⇒ possible increase of the primary proton energy
 - ⇒ probably optics redesign