

# ***Welcome and News***

- ✓ *CERN Medium-Term Plan for the period 2016-2020*
- ✓ *Addendum to the SHiP Technical Proposal*
- ✓ *Review by the SPSC referees: further steps*
- ✓ *Overview of the meeting agenda*

# ***Extracts from the CERN Medium-Term Plan for 2016-2020***

## ***Observations of the Director-General (very pragmatical approach driven by the current CERN budget)***

Although remaining broad, the scientific programme of CERN for the period covered by this MTP is nonetheless curtailed, resulting in missed potential physics opportunities for the Laboratory in the short term, in order for the MTP to meet the Council directive for CERN's cumulative budget deficit for this period to be reduced as much as possible.

*Effects on scientific programme:* re-schedule of LHC running and long shutdown periods; adjustments in budget for FCC study; at this stage no new projects at CERN unless funded fully from external sources; abandon the possibility of the TSR (Test Storage Ring) installation at HIE-ISOLDE and make no provisions for the SHiP experiment at the SPS (presently under consideration in the SPSC); reduced CLIC activities; and a later re-start of the fixed-target physics programme due to the prolonged LS2, in line with the new start-up schedule for LHC Run III.

*Effects on non-scientific activities:* reduce general consolidation budget; and reduce the number of Fellows from the central CERN budget.

# Addendum to the Technical Proposal

Contains 4 sections:

- ✓ **Updated background estimates (see talk by Nico)**  
*New estimate, based on the increased MC data samples, firmly confirms the TP estimate of zero background.*
- ✓ **Updated signal sensitivities (see talk by Nico)**  
*The signal yield now includes the production of charm and beauty in cascade processes; the yield is increased by 40-50%.  
All sensitivity plots will be updated.*
- ✓ **Comparison of the SHiP sensitivities with CERN, FNAL and JPARC beams (see next 3 slides)**
- ✓ **Project planning and cost (see talk by Richard)**  
*New schedule and funding profile reflects the recently modified accelerator schedule. It allows a significant shift in the project funding, and at the same time keeps the planned start of data taking unchanged.  
**This section also contains a list of most critical milestones to be addressed in the TDRs.***

# Comparison of the SHiP sensitivities with CERN (400 GeV), FNAL(120 GeV) and JPARC(50 GeV) beams

- ✓ SHiP @ 120 GeV FNAL beam assuming slow extraction (1s spill duration) and fully dedicated beam  $\rightarrow 5.9 \times 10^{20}$  p.o.t. per year (high power target concept has to be demonstrated)

To be compared with  $8.5 \times 10^{19}$  p.o.t. per year for SHiP at SPS with 80% beam availability

For the 120 GeV beam the distance between target and spectrometer can be reduced to 31 m  $\rightarrow$  the acceptance ratio FNAL / CERN = 0.6 for 1 GeV mass HNL

$$\sigma(cc)_{\text{FNAL}(120 \text{ GeV})} / \sigma(cc)_{\text{CERN}(400 \text{ GeV})} = 0.16$$

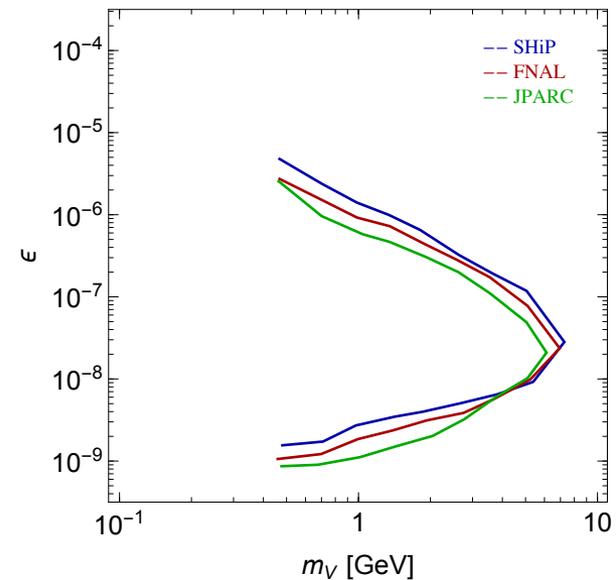


**Overall HNL yield FNAL(120 GeV) / CERN(400 GeV) = 0.7**

## Dark photon yield

The most sensitivity reach comes from the dark photon production in QCD reactions

*SHiP at CERN has slightly better mass reach due to the higher energy proton beam at CERN*



## Dark scalar yield

The acceptance ratio  $FNAL / CERN = 0.25$  for 1 GeV mass dark scalar

$$\sigma(bb) \text{ FNAL}(120 \text{ GeV}) / \text{CERN}(400 \text{ GeV}) = 0.0016$$

**→ Overall HNL yield  $FNAL(120 \text{ GeV}) / CERN(400 \text{ GeV}) = 1 / 400$**

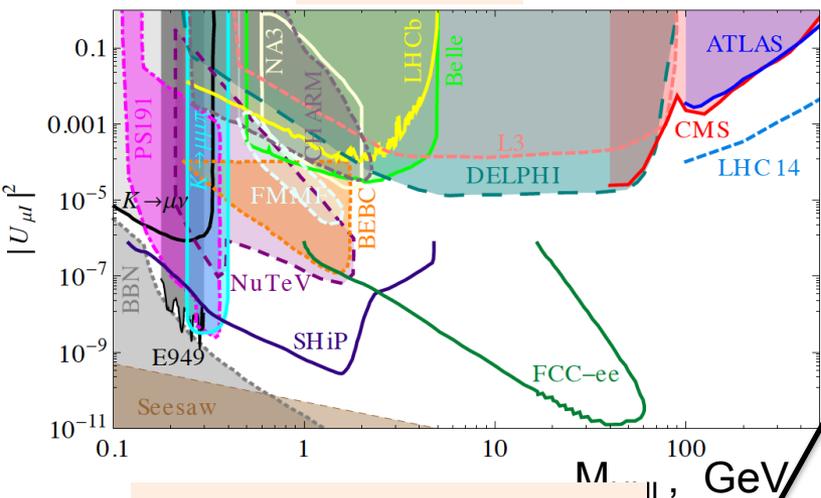
## Tau neutrino yield

*The yield of  $\nu_\tau$  CC interactions at CERN SPS is 7 times higher than at FNAL*

*At JPARC the number of p.o.t. is  $\sim 60$  times higher than at the CERN SPS, but  $\sigma(cc)$  at 30 GeV is 200 times lower, and no beauty is produced*

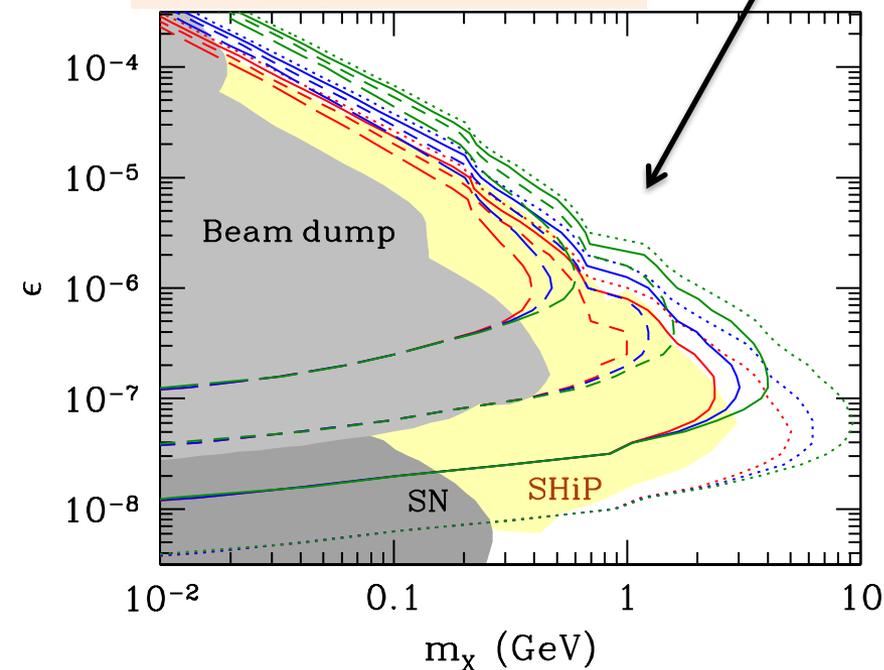
# Comparison with other competing experimental programmes

## HNL

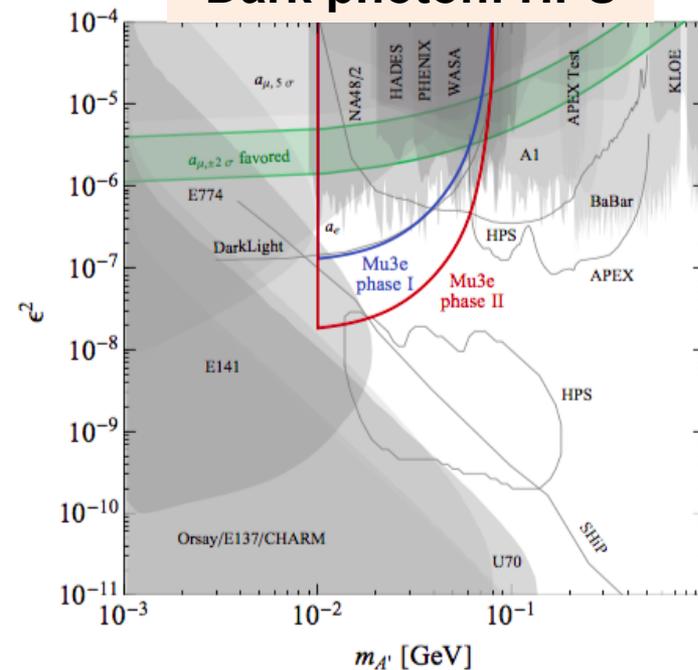


- ✓ FCC-ee or ILC based experiments will extend the SHiP sensitivity to higher HNL and dark photon masses
- Dark photons can be produced at ILC in bremsstrahlung reactions
- ✓ HPS will soon provide data sensitive  $\epsilon \sim 10^{-4} - 10^{-5}$  in the mass range  $20 - 120$  MeV

## Dark photon: ILC



## Dark photon: HPS



## ***Interactions with the SPSC referees*** *(the review process is ongoing)*

- ✓ *The responses to the 1<sup>st</sup> set of questions has been sent to the referees  
The addendum and responses will be discussed with them  
on Friday this week.*
- ✓ *Meanwhile the referees have prepared the 2<sup>nd</sup> set of questions,  
mainly addressing the Physics paper. We are going to agree on  
the final schedule of the SHiP review this week. We plan to complete  
the review process by the end of this year.*
- ✓ ***We are looking forward for very positive feedback  
and approved plan of milestones.***

# Overview of the 6<sup>th</sup> SHiP meeting

## Today: News from sub-detectors and CRB

### Detector - Room Georges Charpak (Room F) (13:30-19:50)

time	[id] title	presenter
13:45	[0] Welcome and news	GOLUTVIN, Andrei
14:00	[1] News on physics and sensitivity studies	SERRA, Nicola
14:30	[2] Progress with tau neutrino detector	DE LELLIS, Giovanni
14:35	[35] Tau neutrino detector: SciFi for the Target Tracker	MALININ, Alexander
14:45	[36] Tau neutrino detector: Report on emulsion test beam	DI CRESCENZO, Antonia
15:00	coffee	
15:30	[3] Upstream tagger and Timing detector	KORZENEV, Alexander
15:40	[26] Surround background tagger	LACKER, Heiko Markus
15:50	[28] HS tracker	FERRO-LUZZI, Massimiliano
16:00	[29] Calorimeter test beam results	KOROLKO, Ivan
16:20	[30] Muon detector	BALDINI, Wander
16:30	[31] Trigger & DAQ	DIJKSTRA, Hans
16:40	[4] Plans towards TDR	JACOBSSON, Richard
18:00	[5] CRB meeting	

# Tomorrow: FairSHIP tutorial, OPEN SHiP session on the exploration of the Hidden Sector by various experiments and the SHiP Driiiiiink

## FairSHiP Tutorial: FairSHiP tutorial - 4-S-030 (08:30-11:00)

- Conveners: Graverini, Elena; Ruf, Thomas

## Exploration of Hidden Sector (open session) - Filtration Plant (11:30-12:30)

time	[id] title	presenter
11:30	[24] Introduction	GOLUTVIN, Andrei
11:45	[25] HNLs and Dark Matter	BOIARSKYI, Oleksii

## Exploration of Hidden Sector (open session) - Filtration Plant (13:30-18:30)

time	[id] title	presenter
13:30	[8] Hidden sector searches using displaced decays in ATLAS	MERMOD, Philippe
13:55	[9] Hidden Sector searches in the CMS experiment	TITOV, Maksym
14:20	[10] Searches for heavy neutrinos, long lived particles, etc, at LHCb	DETTORI, Francesco
14:45	[11] Constraining the Dark Sector at Belle (2)	GOLOB, Bostjan
15:10	[34] Search for Hidden Sector at BaBar	CHAUVEAU, Jacques
15:35	Coffee	
16:00	[12] Results and prospects from NA48 and NA62	GOUDZOVSKI, Evgueni
16:25	[13] The Heavy Photon Search experiment at Jefferson Lab	GUIDAL, Michel
16:50	[14] P348: search for new physics in missing energy events	GNINENKO, Sergei
17:15	[15] Search for dark photon in positron annihilations at Frascati: the PADME proposal	KOZHUHAROV, Venelin
17:40	[16] SHiP sensitivities for Hidden Sector	GRAVERINI, Elena

## Friday: New ideas on the optimization of the SHiP performance and physics

### FairSHiP Tutorial: FairSHiP Tutorial - (08:30-09:30)

- Conveners: Graverini, Elena; Ruf, Thomas

time	[id] title	presenter
08:30	[32] Running computations on the SHiP production cluster	BARANOV, Alexander USTYUZHANIN, Andrey
09:20	[33] Summary of the tutorial	

### Physics - Filtration Plant (09:30-12:25)

time	[id] title	presenter
09:30	[18] Report from CRB chair	
09:45	[19] Optimisation of the SHiP geometry and muon shield	DIJKSTRA, Hans
10:15	[20] Neutrino scattering inside the vacuum vessel	CHETELAT SOTO, Nathalie Evelyne
10:45	Coffee break	
11:15	[21] Electron neutrino as a probe of charm production in the target	BUONAURA, Annarita BUONAURA, Annarita
11:45	[22] Sensitivity of SHiP to violations of lepton universality in $\nu_\tau$ scattering	HOSSEINI, Behzad
12:15	[23] Conclusion	GOLUTVIN, Andrei