



# 3<sup>rd</sup> Beta-Beam Task Meeting

## Introduction and Status

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# General work planning



- **Objectives from Annex 1 EURISOL DS:**

## Description of work

The work is organized as follows:

1. Development of a conceptual design and a continuous follow-up of the beta-beam accelerator complex evolution. A parameter list for the conceptual design will be provided.
2. Design of new accelerators: preliminary optics, beam dynamic design and simulations will be collected in an intermediate report; afterwards the optics will be refined identifying critical processes, and the technical design work to show the feasibility of critical or novel hardware will be investigated.
3. The feasibility of accelerating radioactive ions in the existing PS and SPS machines at CERN will be explored. In particular various upgrades and new machine designs to replace PS and/or SPS will be analyzed.

- **First 18 months for conceptual design, first optics and PS/SPS analysis.**
- **Second 18 months for biggest technical issues, new PS and cost estimate**



# Progress during first 18 months



- **Conceptual design:**
  - Optimization of cycling of the complex, number of bunches, etc.  
→ BASELINE VERSION 2
  - LE accumulation ring (non-baseline)
- **Optics and machine design:**
  - RCS: optics, injection, RF parameters, magnet parameters.
  - PS & SPS: decay losses and dynamic effects, lattices optimized for decay-loss collimation.
  - Decay ring: optics, accumulation (injection & merging), decay losses and collimation
- **Parameter list**
  - Oracle based parameter list.
- **Progress and achievements correspond to planning and milestones**



# From TM2 to TM3

09:00	Welcome	P. Spiller
09:10	Introduction and Status	M. Benedikt
09:35	Parameter list	E. Wildner
10:00	Coffee	
<b>Beta-Beam Task – Status and Progress</b>		
10:15	RCS design status	A. Lachaize
10:50	Vacuum simulations of RCS, PS, SPS and stabilization	M. Kirk
11:25	STRAHLSIM	C. Omet
11:40	Lattice optimization for collimation	J. Stadlmann
12:15	Lunch	
13:15	Visit of GSI facilities	
14:15	Decay Ring optics, injection/collimation layout	A. Chance
14:50	Decay Ring stacking simulations	S. Hancock
15:25	Decay Ring collimation and absorption	A. Fabich
15:45	Coffee	
16:00	Status of Accumulator Cooling Ring	A. Simmondson
16:20	Report from tasks 6, 9 and 10 on beam preparation	A. Fabich
16:30	Discussion and conclusions	all



# Target figures and top down approach



- **Physics target values:**

- An annual rate of  $1.1 \cdot 10^{18}$  neutrinos ( $^{18}\text{Ne}$ )
- An annual rate of  $2.9 \cdot 10^{18}$  anti-neutrinos ( $^6\text{He}$ )  
at  $\gamma=100$  along one straight section always for a “normalized” year of  $10^7$  s.
- Corresponds to  $1 \cdot 10^{14}$  of  $^6\text{He}$  or  $7.4 \cdot 10^{13}$  of  $^{18}\text{Ne}$  in storage ring.
- Announced to physics community at NuFACTs, ISS, BENE meetings.

- **Top down approach**

- Freezing the conceptual design (after TM2) fixed the cycling of the complex.
- Therefore the number of ions needed at any stage of the accelerator chain can be calculated from the target values in the DR.
- Defines requirements for each machine and “separates” machines to allow for independent design work.
- Makes Beta-beam study **“independent”** of progress in related EURISOL tasks (targets, beam preparation, etc.).



# Activities at CERN

- Analysis of consolidation and upgrade scenarios of the CERN accelerator complex (PAF working group).
  - Most relevant issue for Beta-beam is new PS2 machine.
    - Injection energy ~3.5 GeV.
    - Ejection energy ~50 GeV.
    - Cycling similar to present PS.
    - Normal conducting machine (SC fast cycling magnets considered as R&D option)
  - PS2 does not change present concept of beta-beam chain.
  - Many PS2 parameters are not yet fixed
    - Machine definition will be driven mainly by LHC needs but also other physics aspects (SPS fixed target, Kaons, BB, etc.)
    - We must avoid parallel developments and ensure compatibility of any study within BB with other requirements.
  - RCS ejection energy should be adapted accordingly?



# AIMS for TM3

- **Identification of most critical technical items on all machines**
  - Dynamic vacuum limitations
  - Absorption and collimation in decay ring
  - RF requirements in decay ring
  - ...
- **Discussion of parameter changes**
  - RCS energy (top energy PS2 compatible), effect on intensity
  - Emittance changes for space charge reduction in decay ring
  - ...
- **Agreement to top-down approach for technical design work**
- **Input for work planning for next 6-12 months**