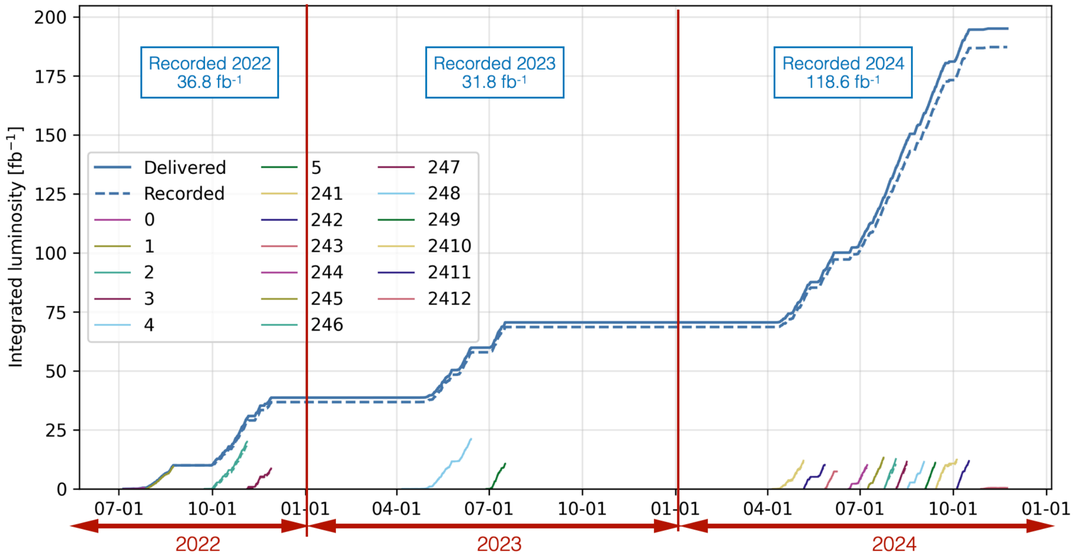
SND@LHC DATA TAKING: STATUS AND PERSPECTIVES

2022+2023 DATA TAKING

- emulsion replacement every ~20 fb^{-1}
- 5 full targets exposed (~6000 emulsion films)
- **~70** fb-1 integrated with emulsions



2024 DATA TAKING

- unexpected increase of the muon flux (factor two)
- change of the emulsion target replacement strategy: expose half-target (B1 and B2) for <10 fb^{-1}
- 1 full target + 8 half-targets exposed
- the equivalent of 5 full targets (5x1140=**5700** emulsion films) were assembled and developed
- **~100** fb^{-1} integrated with emulsions

2024	DAQ	Apr	May	Jun	Jul	Aug	Sep	Oct	TARGET MASS	LUMINOSITY
EMU RUN6	241								797 kg	12.0 fb^{-1}
EMU RUN7*	243								398 kg	7.3 fb^{-1}
EMU RUN8*	244								398 kg	10.1 fb^{-1}
EMU RUN9*	245								398 kg	13.3 fb^{-1}
EMU RUN10*	246								398 kg	12.7 fb^{-1}
EMU RUN11*	247								398 kg	11.5 fb^{-1}
EMU RUN12*	248								398 kg	11.5 fb^{-1}
EMU RUN13*	249								398 kg	11.1 fb^{-1}
EMU RUN14*	2411								398 kg	11.8 fb^{-1}

2025 DATA TAKING

- ~100 fb^{-1} expected to be delivered
- 5 full targets will be produced by Nagoya
- different beam optics configuration under discussion
- activities in the dark room similar to 2024

2026 DATA TAKING

- extension of the Run3 approved
- half year data taking

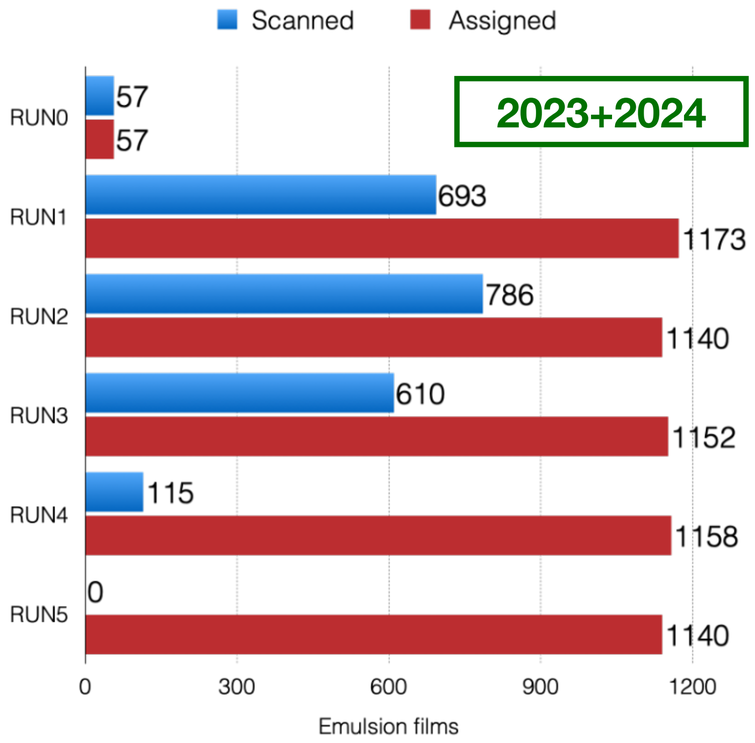
EMULSION TREATMENT AND SCANNING

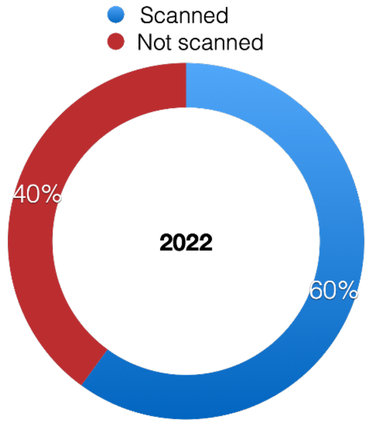
EMULSION DEVELOPMENT

- Coordinators: Adele and Cristina
- 5700 emulsion films developed in Jun-Dec 2024
- More 15 people covering ~50 eight-hours shifts
- Same amount expected in 2025

EMULSION SCANNING

- Scanning status on Dec ’24





60% of 2022 emulsion films scanned
10% of 2023 emulsion films scanned
27 fb^{-1}

GLYCERINE TREATMENT

- Coordinators: Eda and Ceren
- 1500 emulsion films cleaned (~25%)
- 600 emulsion films underwent glycerine treatment (~10%)
- Next cleaning

- Scanning laboratories (Status on Dec ’24):
  - **Napoli**: 3 systems - scanning rate: 25 films/week
  - **Bologna**: 2 systems - scanning rate: 4 films/week
  - **CERN**: 4 systems - scanning rate: 15 films/week
  - **Santiago**: 1 system - scanning started
  - **Nagoya**: scanning started

Assuming 50 emulsions scanned/week:

- Time needed to complete **2022** scanning (37fb^{-1}): **28 weeks**
- Time needed to complete **2023** scanning (32fb^{-1}): **41 weeks**
- Time needed to complete **2024** scanning (119fb^{-1}): **114 weeks**

DATA ANALYSIS

ELECTRONIC DETECTORS:

- First observation of muon neutrino at colliders (2022 data)
  PRL 131 (2023) 031802
- Observation of 0mu candidates in 2022-2023
  Submitted to PRL: https://arxiv.org/abs/2411.18787
- Muon neutrino search in 2022-2023 data with hadronic energy measurement
  Being finalized
- Observation of muon tridents
  Being finalized

EMULSIONS:

- Neutrino candidates search (Valeri, Fabio, Tatiana, Daria)
- Electromagnetic shower identification and energy measurement (Valeri, Fabio, Nicolò)
- Matching with electronic detecters (Daniele,?)
- Search for muon DIS interactions (Daniele)

SND@Hi-Lumi LHC (>2030)

Detector upgrade beyond Run3

- Silicon trackers as vertex detector
- Iron-core muon spectrometer
- Improved HCAL and timing detectors

- Letter of Intent
  https://cds.cern.ch/record/2895224/files/LHCC-I-040.pdf
- Addendum
  https://cds.cern.ch/record/2909524/files/LHCC-I-040-ADD-1.pdf

Physics performances

- 180k ν interactions expected (2k ν_τ)
- High-energy ν physics with unprecedented statistics
- Constraint charm production in unexplored pseudo-rapidity range
- First tagged (with ATLAS) ν interactions

Activities @Napoli

- Mechanical design of Silicon target stations
- Development of electronics for Silicon detector
- Construction of first prototype of Si station
- Coordination of test beam in 2025