# Test Beam preparation

FCC-NA, 09/01/2024

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# Other test beam

- Calvision has already asked for and received a slot at DESY the week of April 22-29, to which we can participate/contribute (according to MiBi. They will participate a couple of days).
  - Desy offers electron/positron beams with user-selectable momentum from 1-6 GeV/c.

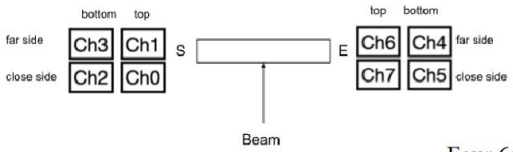
- Marco Lucchini applied for 1 week at SPS CERN between 17 and 31 July (not confirmed yet):
  - "Electrons / positrons, E>=4 GeV/c , E<=100 GeV/c, 1k to 10k per spill, 5 - 25 mm"

info on their application on their meeting (we unfortunately missed) indico page: https://indico.cern.ch/event/1354598/

# what others already did?

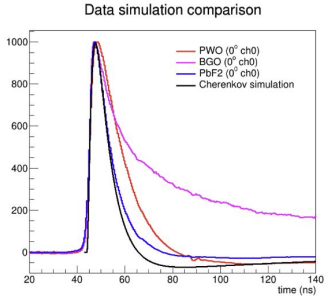
## June 2023 Test Beam @Fermilab Setup

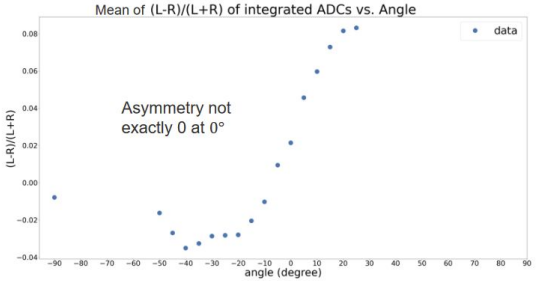
- 120 GeV protons, ~45k protons evenly distributed in 4 s
- Only one spill per minute, 8 mm horizontally and 4 mm vertically
- Only at most one proton expected in our readout window




Four 6mmx6mm SiPMs on each side
0-3 on the S side
4-7 on the E side

| Crystal | Size | Filter (S side only) | Run # | Angle (°) |
|---|---|---|---|---|
| PbF2 | 6x2.5x2.5 $cm^3$ | No filter | 11-29 | 0 to ±90 (10° interval) |
| PWO | | R60 | 31-66 | 0 to ±90 (5° interval, except ±85°) |
| | | No filter | 103-121 | 0 to -50 (5° interval), 0 to +25 (5° interval), ±90 |
| BGO | | U330 | 68-101 | 0 to -45 (5° interval), 0 to +50 (5° interval), -55, -65, -75, ±90 |




- waveform acquisitions
- timing distributions and angular dependence analysis
- comparison with simulation

# BTF call

Current call cover beam time request from **February 12, 2024 (week 7) up to June 2, 2024** (week 22). The submission period end in **January 12, 2024**.

They foresee the next call will start in March 2024, for getting beamtime in Summer 2024, while they claim no beam time will be available to users in Autumn 2024.

# BTF call

They assign beam periods in units of weeks, from Monday (starting from 12:00) to Sunday, with an admitted overlap on the subsequent Monday morning (up to 12:00) for setup decommissioning and removal.

We (Marco and Marcello) have identified two possible periods (according to our availability) in which to apply:

- current call: weeks from **May 5 to 27**. (before that we will no be ready).
- next call:
  - weeks in July (June is uncertain for Marco due to resumption of MEG beamtime).
  - September?

# BTF occupancy

# BTF environment

Beam parameters:

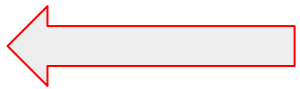
- electron energy up to 500 MeV;
- maximum multiplicity is 10^6 particles/s;
- average of 10 spill/s (24 max), depending on DAFNE operations;

Beam monitoring -> they provide:

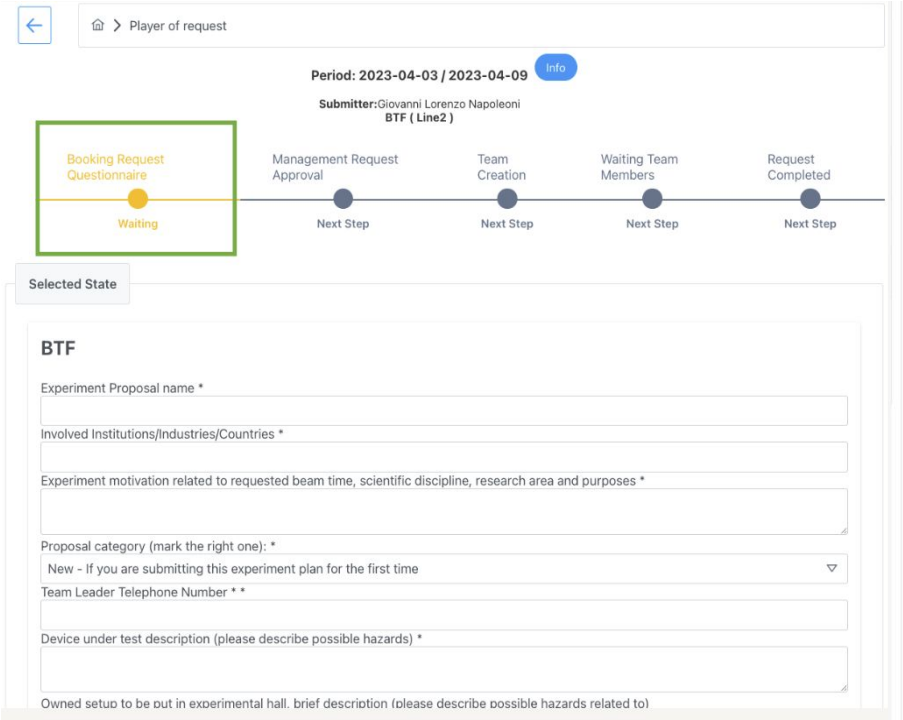
- a Silicon pixel detector at the beam output to monitor the beam spot and multiplicity (output data need to be synchronized offline with ours -> may be not trivial);
- a Pb glass calorimeter downstream;

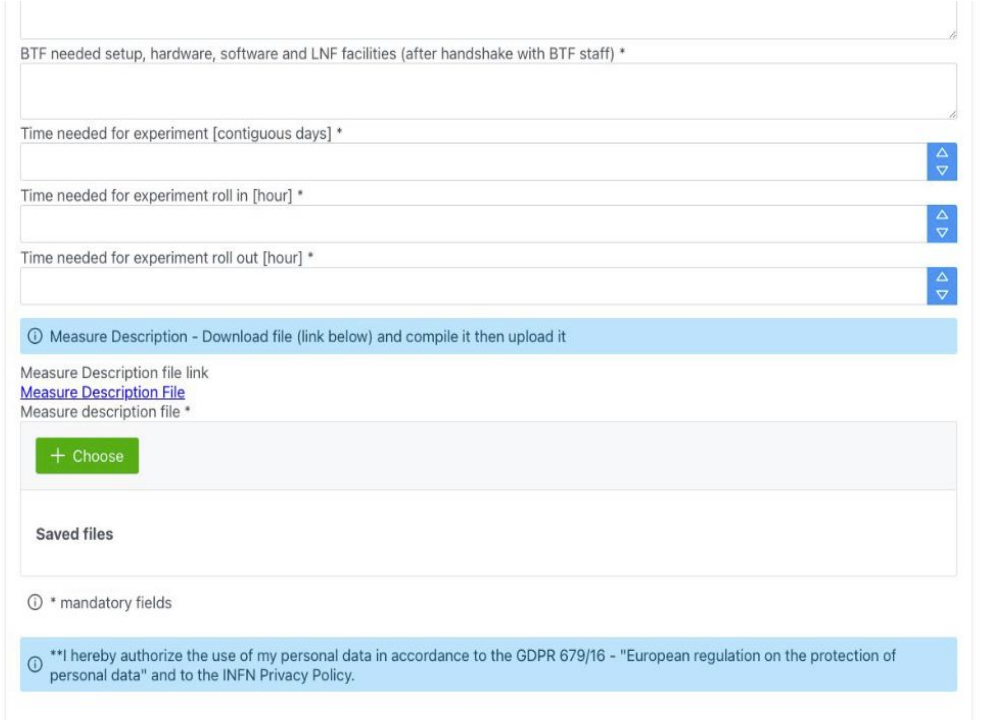
**BTF2/BTFEH2 is the line/hall available to users with some limitations:**

- **gas feeding is not available**.



# BTF application



# BTF test beam preparation/readiness (still to be filled)

What we will need:

- a trigger system:
  - Two scintillator fingers in front of the crystal;
  - NIM modules to form the logic;
  - (this is something which resembles the current setup, but we need to work on the finger scintillators);
- mechanics:
  - a small dark box, with a low material budget at the beam entrance window;
  - a mechanical system for the rotation of crystals;
- a DAQ system (strongly depends on new instruments (oscilloscope) arrival time);
  - the current one may be inefficient due to oscilloscope-PC read-out dead time and the low number of channels (2x crystal sipms + 2x fingers already saturate the oscilloscope);
- a simulation of the expected scintillation/cherenkov photons;
- …….