

# Start counter review

FOOT general meeting, Cherasco 16<sup>th</sup> December 2024



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**FOOT general meeting - Cherasco 16 December 2024** 

16/12/24

# ST design (I)



**Detector technology**: layer of plastic scintillator (EJ-228) 5x5 cm<sup>2</sup>, **250 µm** thick

**Design rationale:** minimizing the pre-target fragmentation while keeping an excellent time resolution (<< 100 ps on ion beam)

> Start counter role in FOOT: >Minimum bias trigger >Incoming ion counter Fragment ToF measurement for PID (start)







# ST design (II)

Read-out and SiPM power supply provided by WaveDAQ system, which includes a set of waveform digitizers based on DRS4 with a sampling speed programmable from 1 to 5 GSPS

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 Read-out performed by 48 (3x3 mm<sup>2</sup>) SiPM ASD-**NUV3S-P**, (8 boards of 6 SiPM connected in series)

• The SiPMs are side-coupled to the scintillator, instrumenting 3.6/5 cm per side





## Evaluation of ion beam arrival time



### 8 single channel waveforms

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## Time resolution

### Measured @ Heidelberg in 2022 with He,C,O ions at different kinetic energies





## Time resolution @ CNAO 2024 and conclusions

- Applying the self-consistent method we get a time resolution of 52 ps, which is consistent with expectations
- Looking at ToF distribution with respect to the central TW bar we get a ~70 ps ToF resolution (i.e. including TW resolution)
- Still have to investigate the possibility of use FFT like CNAO2023...



