PCRM Scintillating Fiber Hodoscopes (SFHs): Update

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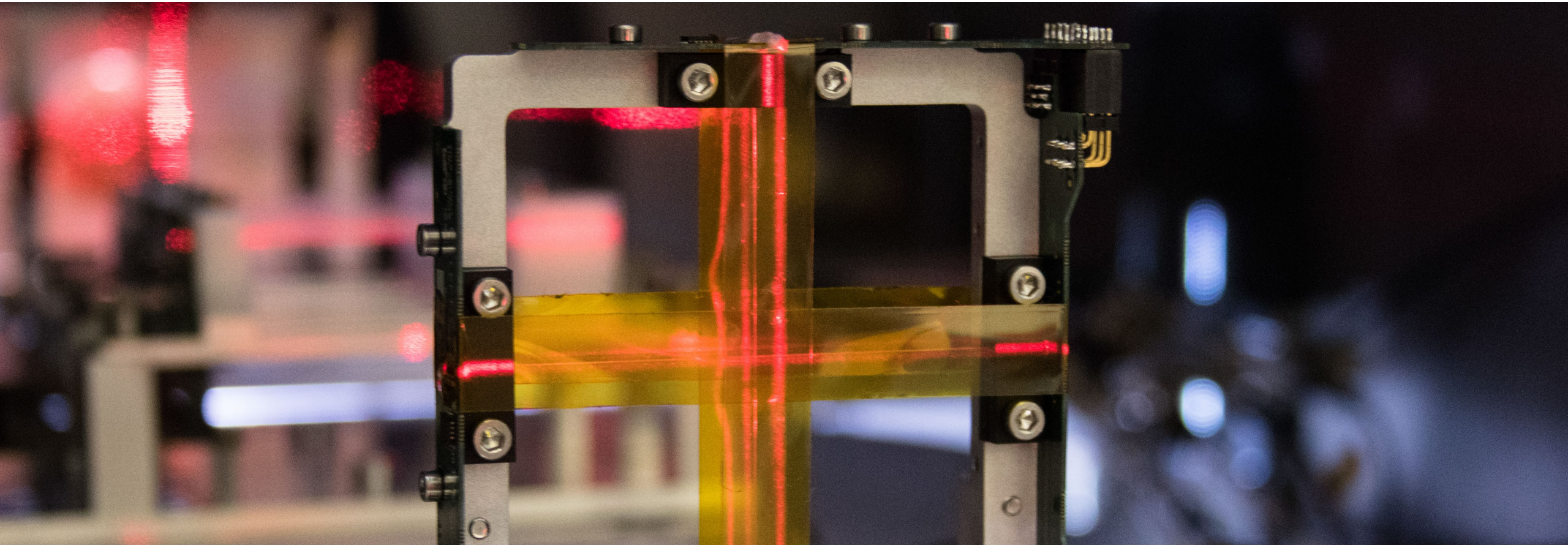


Funding

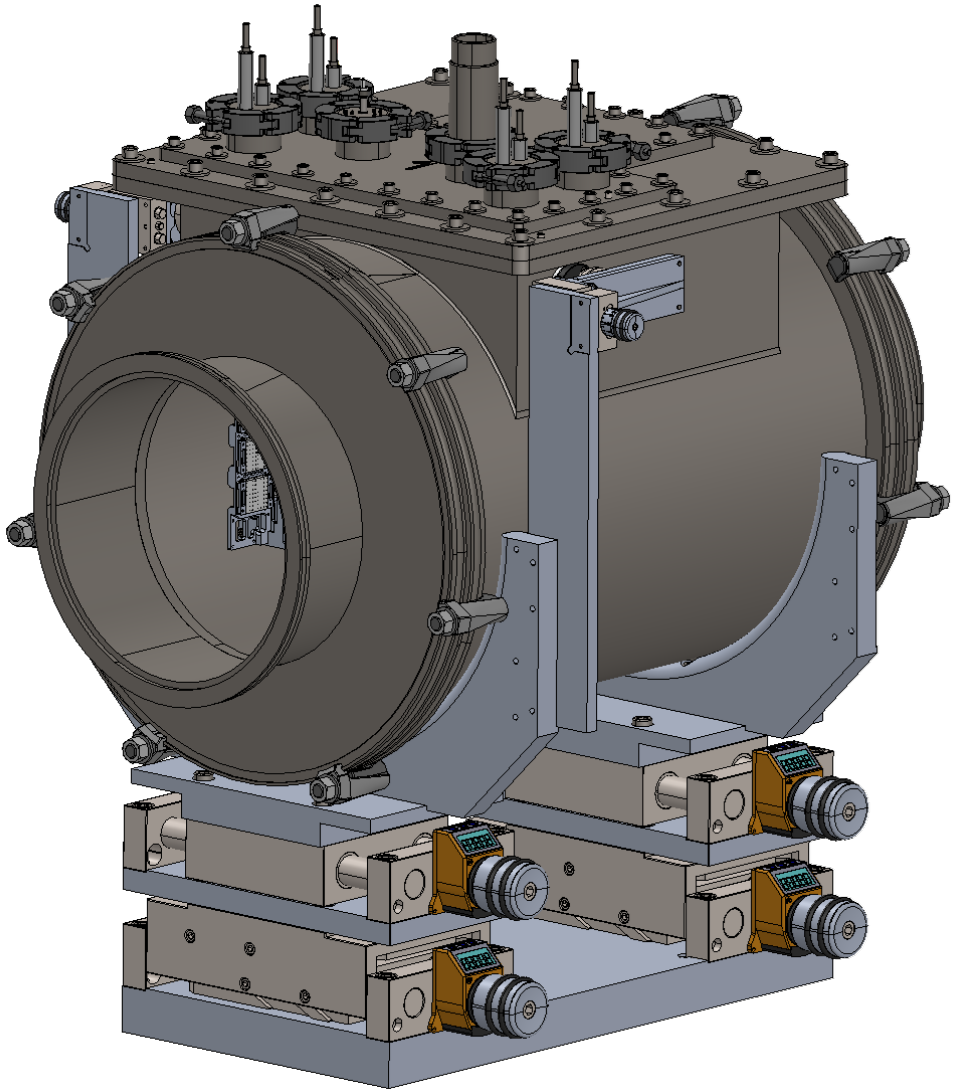
Tracking-Station Mechanics and SFHs

- We received full funding at TUM for the SFHs and the tracking-station mechanics
  - 60 k€ for vacuum vessel and feedthroughs for power, data, and cooling (for SFHs)
  - 30 k€ for alignment system
  - 18 k€ for SFH cooling system (can possibly be shared with SPDs/ALPIDEs)

➢ **We plan to have one tracking station ready for testing in 2021, including alignment system**

- Offers for mechanics (TUM workshop) and alignment system (MM Engineering GmbH) received
  - Budget and delivery times work out

➢ Coordination with Maxime, Stefano, Johannes, … in the coming weeks to finalize design



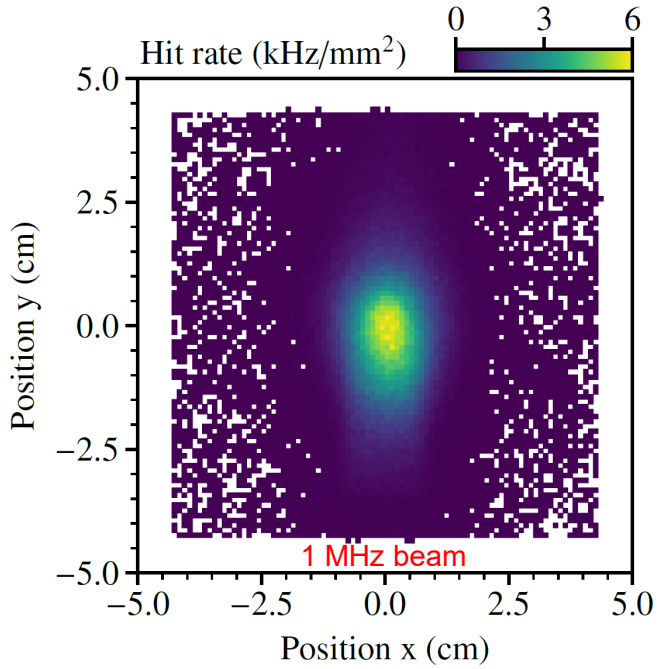
Expected Hit Rates

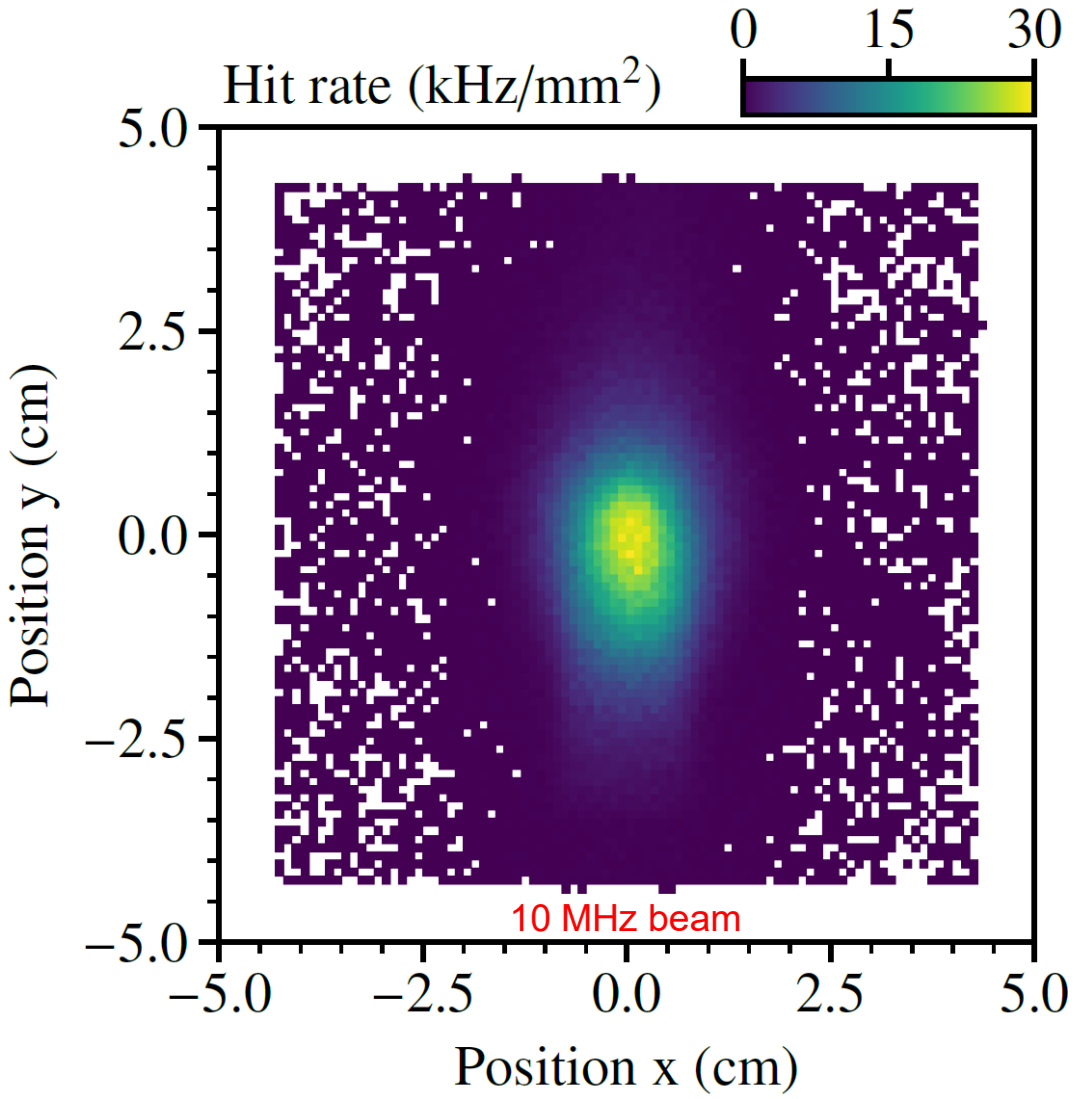
From Beam Profile

- Expected rates from rescaling beam profile at SFH/SPD position in target area
- 10 MHz integrated beam rate (design target)

➢ **Hit rates of >100 kHz for central fibers**

➢ Rates of >40 kHz even for 1-MHz beam rate





SFH Readout

Replacement for NINO ASIC

	CMAD #1	CMAD #2	Triroc	Petiroc	Citiroc
Sensitivity	< 1 pe^-	< 1 pe^-	< 1 pe^-	< 1 pe^-	1/3 pe^-
Dynamic range	< 3 pe^- Attenuator required	< 3 pe^- Attenuator required	~3000 pe^-	~3000 pe^-	~2500 pe^-
Max. hit rate	>5 MEvents/s per ch.	>5 MEvents/s per ch.	50 kEvents/s	40 kEvents/s (digital) >1 MEvents/s per ch. (analog)	20 MEvents/s per ch.
Power consumption	26 mW/ch	26 mW/ch	10 mW/ch	6 mW/ch	7 mW/ch
Gain / bias adjust.	no	no	yes	yes	yes
Channels per chip	8	8	64	32	32
PCB space for 192 channels (chips only)	>60 cm^2	>60 cm^2	<5 cm^2	<10 cm^2	<10 cm^2
Development effort	Array backplane CMAD carrier iFTDC firmware adaption Multiplexer / coincidence	Array backplane (incl. µC) Firmware CMAD carrier Multiplexer / coincidence	Array backplane (incl. FPGA and µC) Firmware Multiplexer / coincidence	Array backplane (incl. FPGA and µC) Firmware Multiplexer / coincidence	Array backplane (incl. FPGA and µC) Firmware Multiplexer / coincidence
Comments				Choice of digital (time, energy) or analog readout (e.g., for tests) Max. analog rate TBC	Energy readout required external ADC
Cost (ASIC)	0 €	0 €	484 € (net)	330 € (net)	330 € (net)

SFH Delivery and Lead Times

As of May 2021

- Kuraray committed to a delivery of fibers in July
- Delivery of SiPM arrays for prototype by the end of June
  - Remainder of order by end of October
- Test boards for front-end/DAQ tests with Citiroc and iFTDC should arrive within 2 weeks

- Production time for prototype tracking-stations mechanics: ~2 months
- Lead time for alignment system: ~2 weeks