

Recent updates of the run 2b diagnostics

Collette Pakuza on behalf of AWAKE BI

AWAKE Collaboration Meeting, Liverpool, 11-13 March 2024

For Run 2B

The teams of BI and AWAKE continue to:

- **Support** the existing systems
- **Respond** to your needs
- **Develop** operational systems and conduct **R&D**

For Run 2B

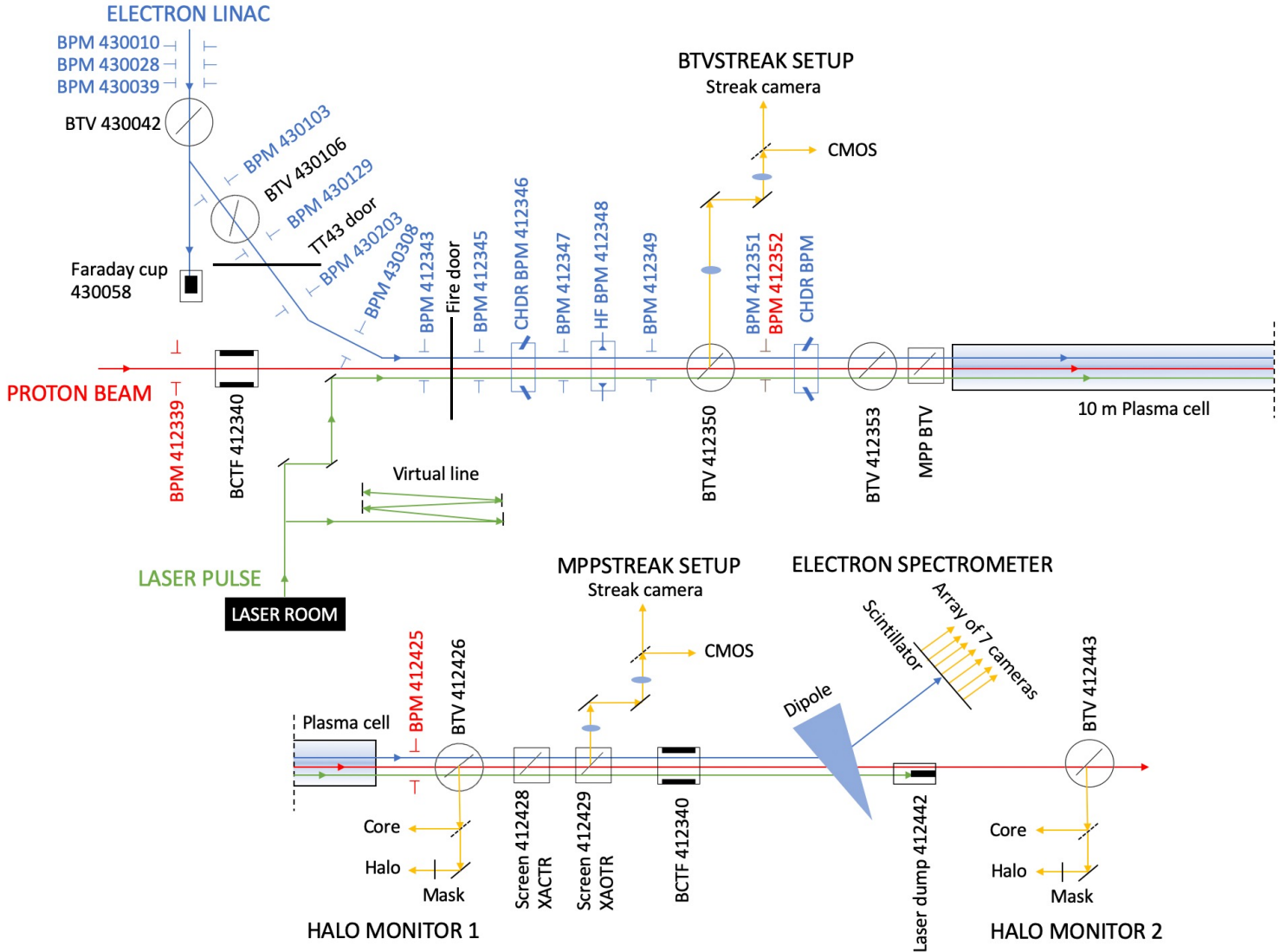
The teams of BI and AWAKE continue to:

- **Support** the existing systems
- Respond to your needs
- Develop operational systems and conduct R&D

Overview of existing systems

➤ Position:

- Electrons:
 - 7x 40 mm ID TRIUMF stripline eBPMs in the e-line
 - 5x 60 mm ID TRIUMF stripline eBPMs in the common line
 - 2 ChDR and 1 HF BPM
- Protons:
 - Total 21 pBPMs from SPS extraction with 2 in the common line



Overview of existing systems (2)

➤ Profile:

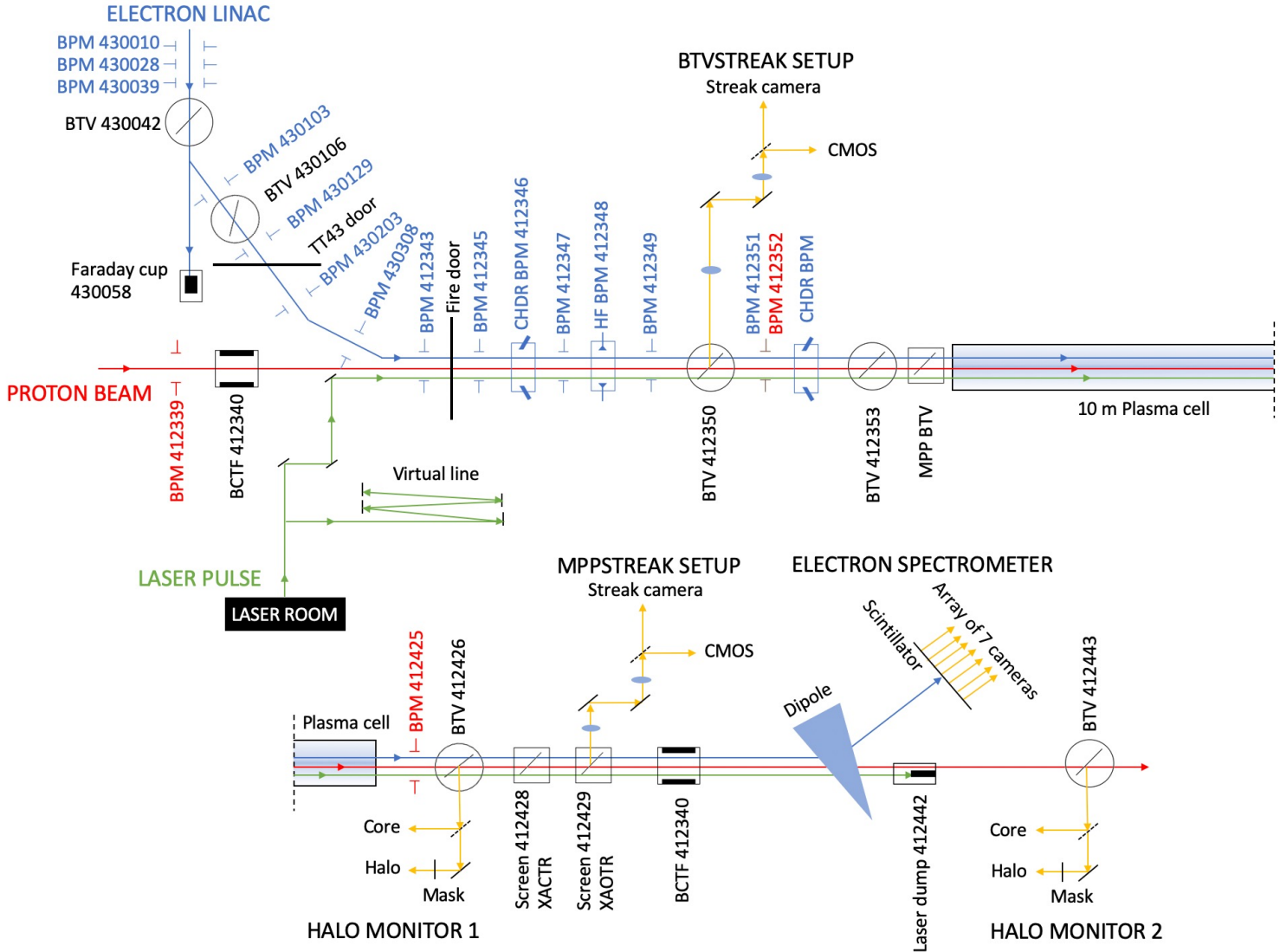
- 2 BTVs in the e-line, several BTVs and screens downstream the merge point

➤ Electron spectrometer

➤ Intensity:

- Faraday cup
- 2 CTs

➤ Needs SW, a lot of motors and cameras, support



Overview of existing systems (3)

➤ A large team of people dedicated to maintaining the systems for a smooth operation during the runs

Instrument	Responsible	Properties in NXCALs	FEC name	Logging
eBPM	Michal Krupa Eirini Poimenidou (FESA)	Acquisition	cfc-tsg4-bpmconc	OK
pBPM	Thierry Bogey Eirini Poimenidou (FESA)	ExpertAcquisition Acquisition	cfv-bb4-bpmlog	OK
BTV	Stephane Burger Athanasios Toupaloudis (FESA) Ana Guerrero (FESA)	Image Acquisition	cfv-tsg4-btv cfv-tsg4-btv2	OK
BCT + ICT	Tom Levens Athanasios Toupaloudis (FESA)	CaptureAcquisition	cfv-tsg4-bctf	OK
BLM	Christos Zamantzas Fabio Follin	Acquisition	UCAP.NODE.SPS.BLM. CONCENTRATOR	OK
BLM picoscope?	-	FileRead	cfc-tsg41-xeastreak	
Streak camera	Patric Muggli (MPP) Eirini Poimenidou (FESA)	StreakImage	cfc-tsg41-btvstreak cfc-tsg41-xeastreak	OK
Faraday Cup	BI AWAKE Steen Jensen (FESA)	Acquisition	cfv-tsg4-bcf	OK
Spectrometer	David Cooke (UCL) Fern Pannell (UCL) Eirini Poimenidou (FESA)	CameraAcq ImageAcq	cfc-tsg4-xspect	OK
Pepper Pot	University of Manchester David Medina (FESA)	CameraAcq ImageAcq	cfc-tsg4-xppt	Not in operation

For Run 2B

The teams of BI and AWAKE continue to:

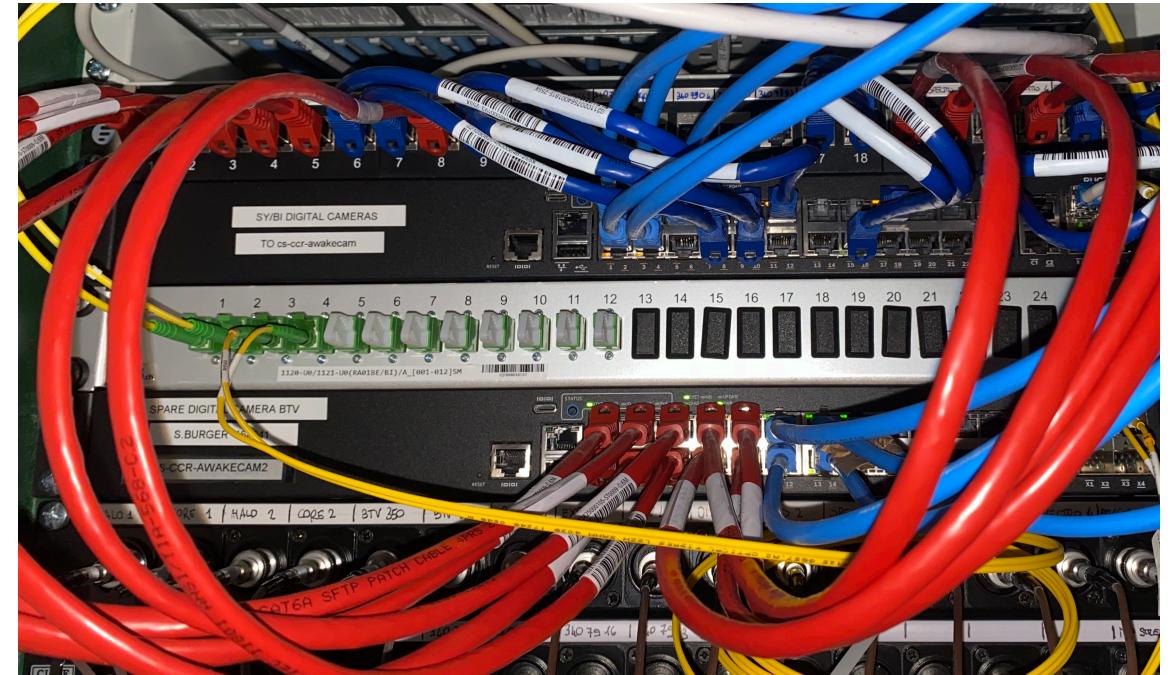
- Support the existing systems
- **Respond to your needs**
- Develop operational systems and conduct R&D

Digital cameras

- Total of 37 cameras in use at present
- Divided onto 3 servers each having 24 slots
- 14/24, 15/24 beam line cameras:
 - BTVs, Halo monitors
 - Other screens and service cameras
- 8/24 laser cameras:
 - Laser diagnostics
 - Laser virtual line
- Frame loss issues in the past due to high network load
- Mitigated by using ~half the free slots and delaying the time at which half of the cameras send the data

Fibre link

Camera ➡ PoE switch ➡ Server



Digital cameras (2)

- 10 plasma cameras installed for the last run
- For viewing plasma light
- Operation on SPS extraction went well on current servers
- Decided not to install additional server



Digital cameras (3)

- 3 cameras will be added to the spectrometer camera array as part of the upgrade, **see Fern's talk**
- Connected to the free slots of current server
- Plus one high-resolution camera close to the scintillator screen hung from above
- If triggered at ≤ 1 Hz, should have no BW issues
- Preparations are ongoing such as support construction, procurement of equipment etc.
- Should be tested before the start of the run



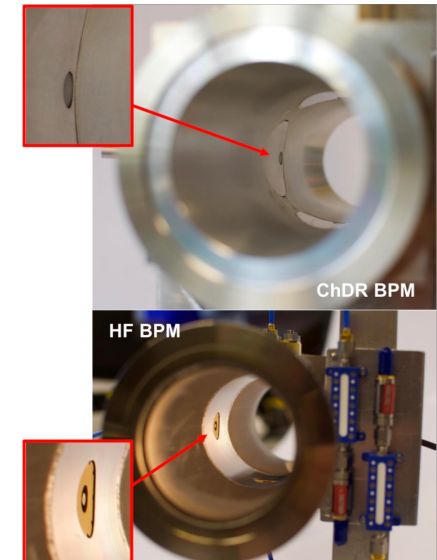
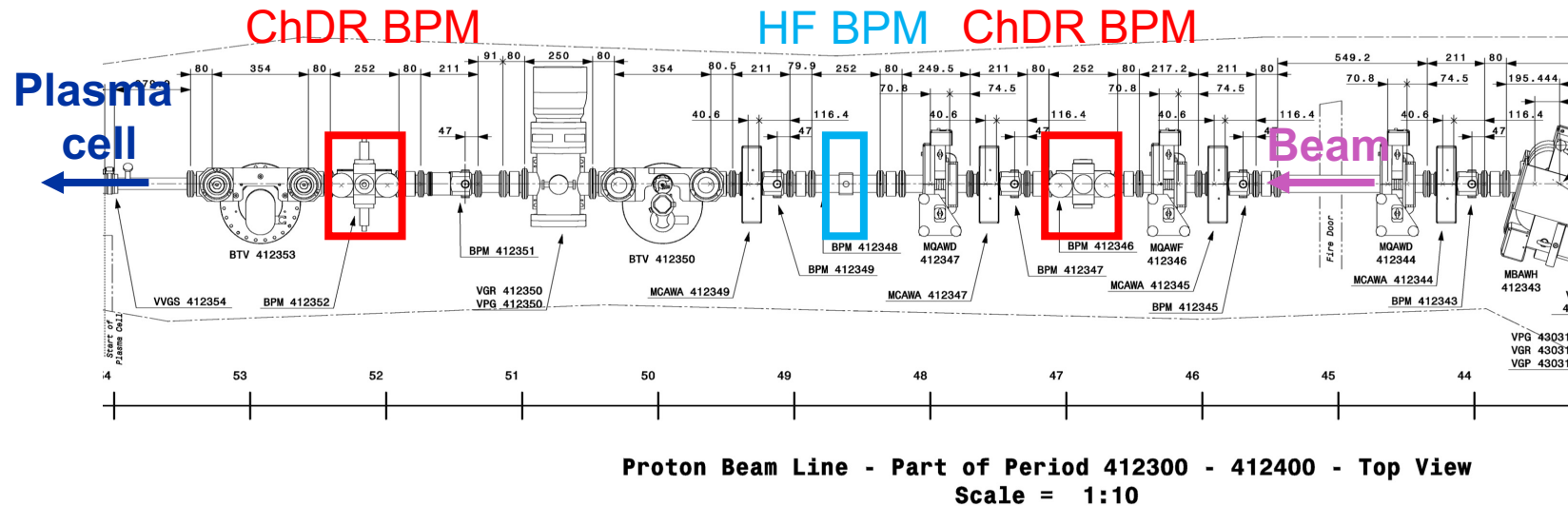
For Run 2B

The teams of BI and AWAKE continue to:

- Support the existing systems
- Respond to your needs
- **Develop operational systems and conduct R&D**

BPMs

- Two ChDR BPMs in the common line before plasma cell, one is connected to the scope for R&D (Beth)
- The other connected to the electronics developed by TRIUMF
- End of last year, one additional digitiser and LO was installed in order to compare data from HF BPM (DESY conical buttons) and ChDR BPM with the same readout system



BPMs (2)

- Calibration of the digitiser non-trivial and missing components/knowledge
- Last run: the horizontal plane of ChDR BPM and HF BPM was connected to one calibrated digitiser, **see Beth's talk for the results**
- Since then, removed the digitisers out of the tunnel to 867
- Fixed broken connector on the first digitiser and now in the process of calibrating
- Done by using home-made TRIUMF pulser and programmable variable attenuator to feed each channel, scanning through the attenuation to get the non-linear response of the diodes
- Last week, received the programmable variable attenuator
- In contact with Shengli, designer of the electronics module
- Hope to have ready by 22 March to coordinate with crane
- Plans for this year: continuous logging of both ChDR BPM and HF BPM during runs, possible dedicated R&D with electrons outside of the runs



Conclusions

- BI continue to support and maintain the beam instruments at AWAKE
- The additional cameras from last run are operating well on the existing server, 4 more will be added for the spectrometer upgrade
- Ongoing R&D on the ChDR and HF BPMs, data should be recorded with proton and electron beams in the upcoming runs

AWAKE BI meetings

- Monthly BI meetings <https://indico.cern.ch/event/1373952/>
- Join egroup 'awake-instrumentation' (egroups.cern.ch)

Thank you for your attention!



home.cern