

# BRANs beyond LS2



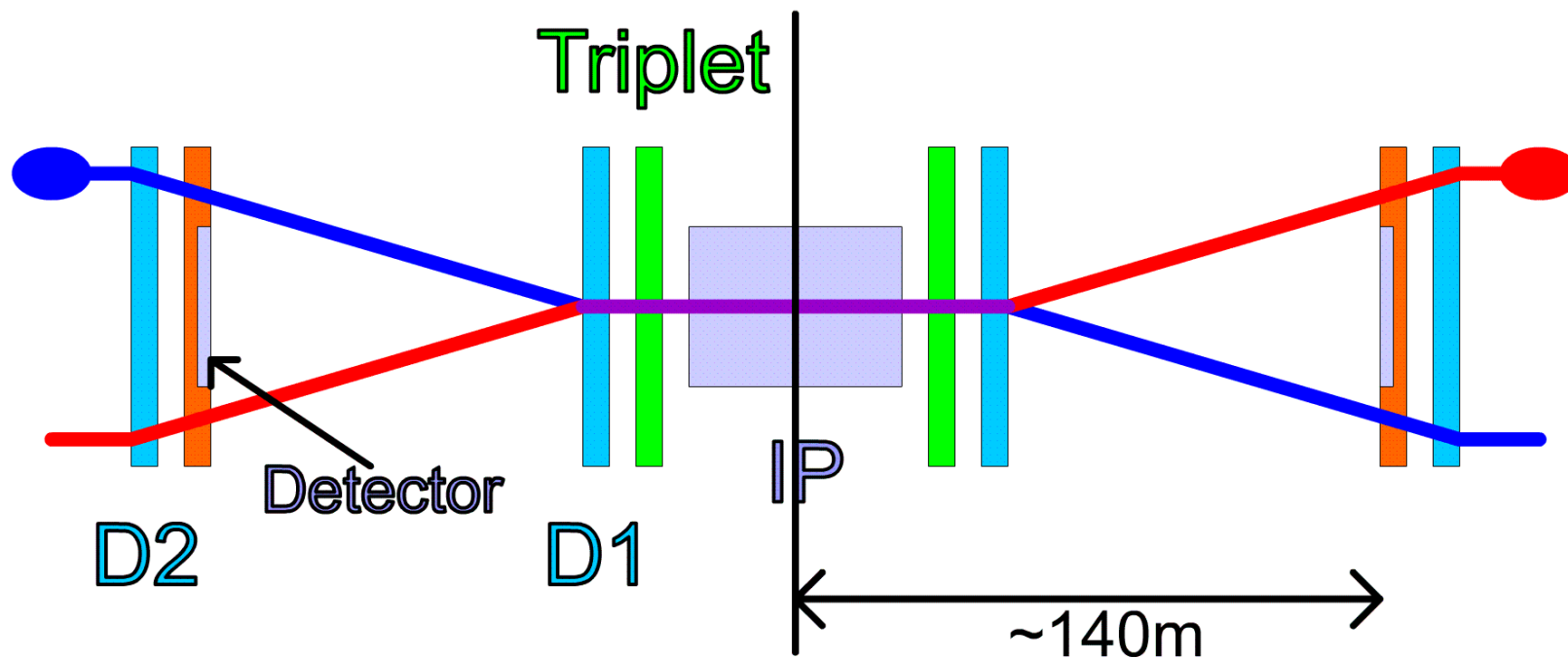
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# The BRAN detector principal

The Beam RAte of Neutrals, BRAN, monitors the collision rate in the LHC interactions points by converting neutral particles into hadronic showers.





# *BRANs at IP1/IP5*



# The currents BRAN A at IP1/IP5

Gas detectors.

The support of the detectors has needed and degradation of performance observed.

Therefore the detectors likely need to be replaced even before HL-LHC.

A prototype is being installed this year at IP1.

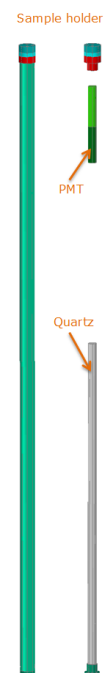
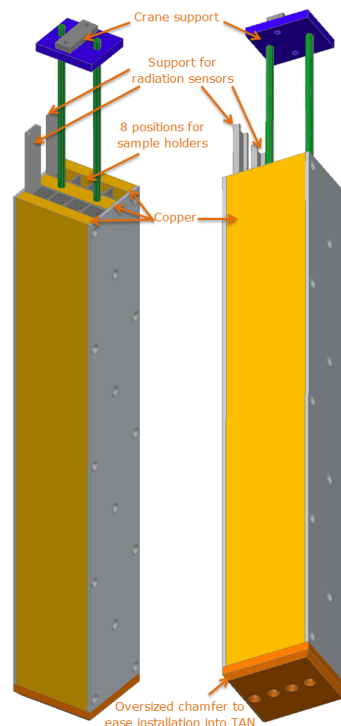
Detectors based on Cherenkov light in quartz or gas (air).

Light conversation by classical photomultiplier tubes.

The prototype replaces a copper block.

More information in the ECR:

<https://edms.cern.ch/document/LHC-BRAN-EC-0001/0.1/TAB3>





## *New BRANs at IP1/IP5*

Specification and technology not settled yet, but if the prototype is successful it would be a strong candidate.

The space needed is similar to the current BRAN\_A.

Additional space along the beam access (~15 cm total) would be beneficial.

Since the new BRANs might already be introduced with the current TAXN, it would be highly beneficial if the space in the new TAXN would be identical.

Transport/handling: The new detector will be made such that it can be installed with the current special crane over the TAN at IP1 and likely also IP5.





# *BRANs at IP8*





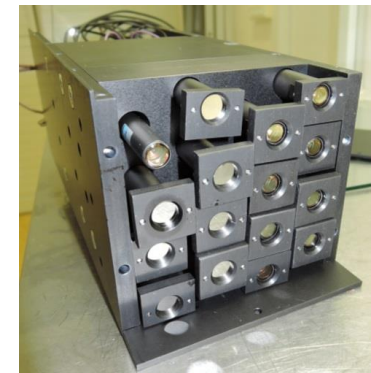
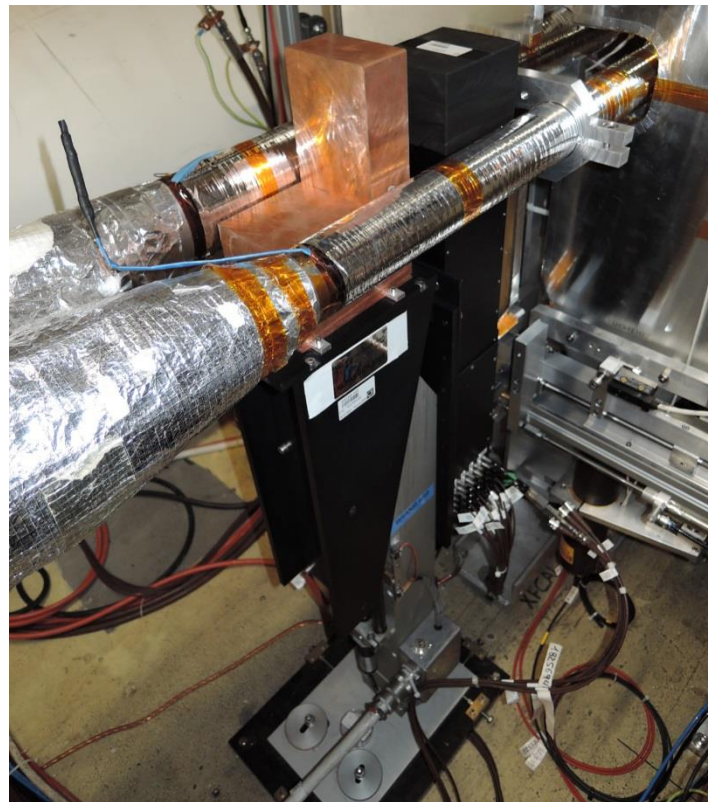
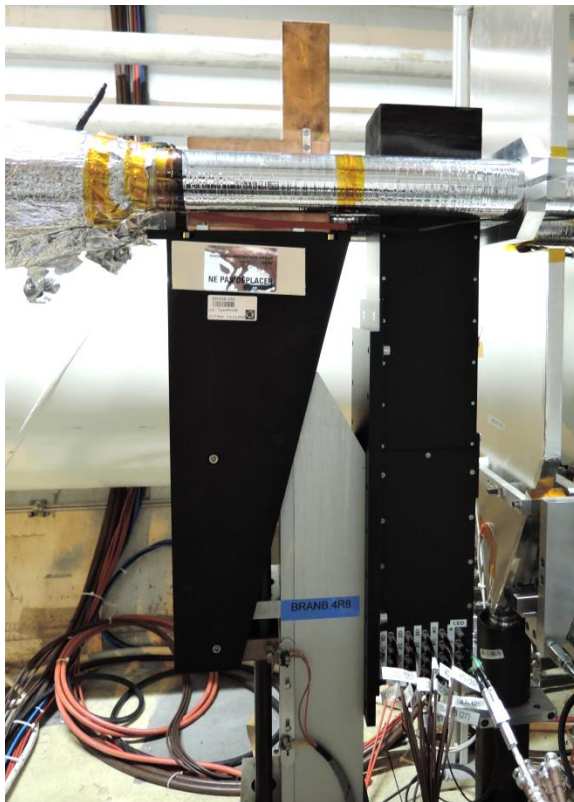
# The current BRAN for IP8

The original BRAN\_B died due to radiation in Run1.

New detectors (BRAN\_C) was developed during LS1 and installed before the start of Run2.

The new detectors are based on Cherenkov in quartz read out by classical photomultiplier tubes.

The performance in 2015 was excellent after the first few adjustments.





# *New BRAN for IP8*

## **Technology:**

The current detector has the desired performance and is expected to be radiation hard enough also for HL-LHC.

The current prototype at IP1 will give the final answer about the radiation hardness.

## **Space:**

The current BRAN will not fit inside a TAXN and a new mechanical design is therefore needed.

The desired space would be similar to the current detectors at IP1/IP5

Additional space along the beam access (~15 cm total) would be beneficial.

## **Absorber:**

Material (e.g. 5 cm of copper) is needed in front of the BRAN for making the hadronic shower.

It is highly desirable that the material thinness (in radiation length) are equal for the active area of the BRAN.

## **Handling:**

The detector will be light enough of install it by hand. However if the radiation level does not allow this a remote handling solution will be needed.

A crane similar to the current one at IP1 would be well suitable for the BRAN installation in the TAXN.