



“Performance of BTVs during the CNGS commissioning”

E. Bravin AB/BI

NBI 2006

**6th International workshop on Neutrino Beams and Instrumentation
4-9 September 2006 - CERN - Geneva**



Beam TV Observation Systems (BTV) for CNGS



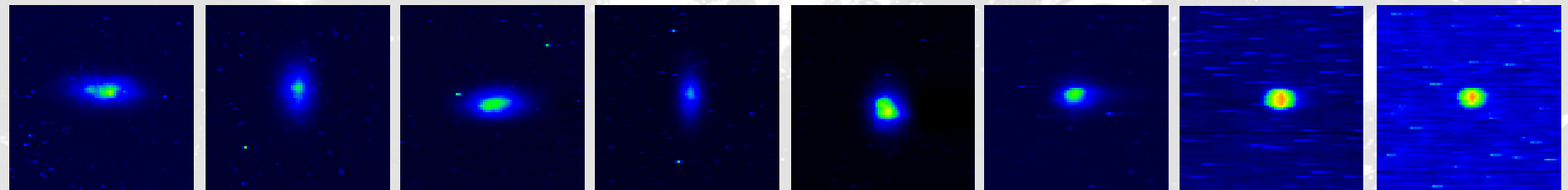
The devices are equipped with scintillating screens (Alumina) and/or OTR radiators (Titanium and Carbon)

There are two types of cameras: CCD (standard) and SYRA (radiation hard CMOS sensor)

- 2 BTVE in the SPS, one before and one after the extraction septa. (Alumina and Titanium + CCD)
- 3 BTV in LSS4 and TT40 (Alumina and Titanium + CCD)
- 6 BTVG in TT41 (Carbon and Titanium + CCD)
- 2 BTVG in the target area (Carbon and Titanium + SYRA)

Images (OTR)

Intensity $\sim 10^{12}$ protons



BTVG.410406

BTVG.410706

BTVG.411006

BTVG.411906

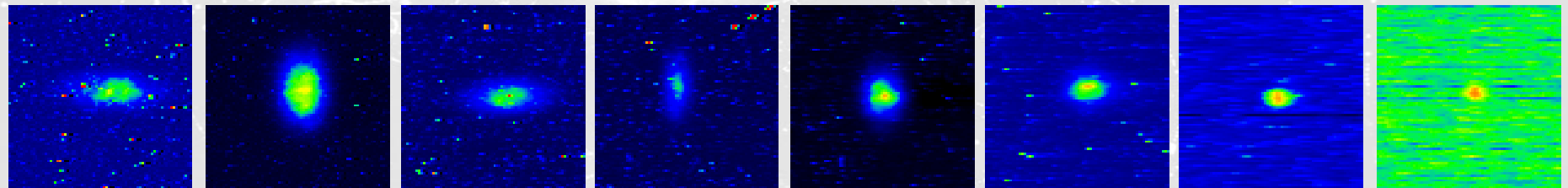
BTVG.412108

BTVG.412424

BTVG.412434

BTVG.412445

Intensity $\sim 10^{13}$ protons



BTVG.410406

BTVG.410706

BTVG.411006

BTVG.411906

BTVG.412108

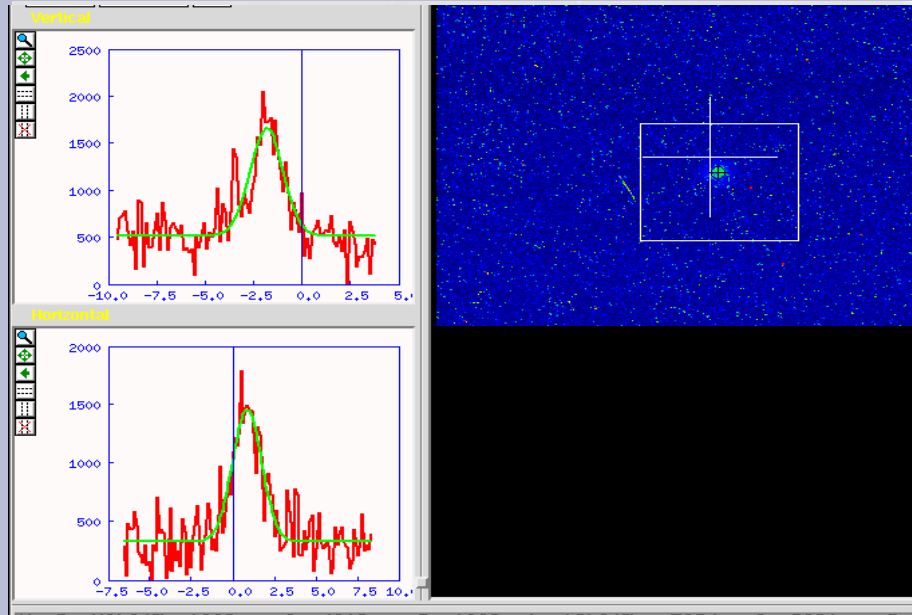
BTVG.412424

BTVG.412434

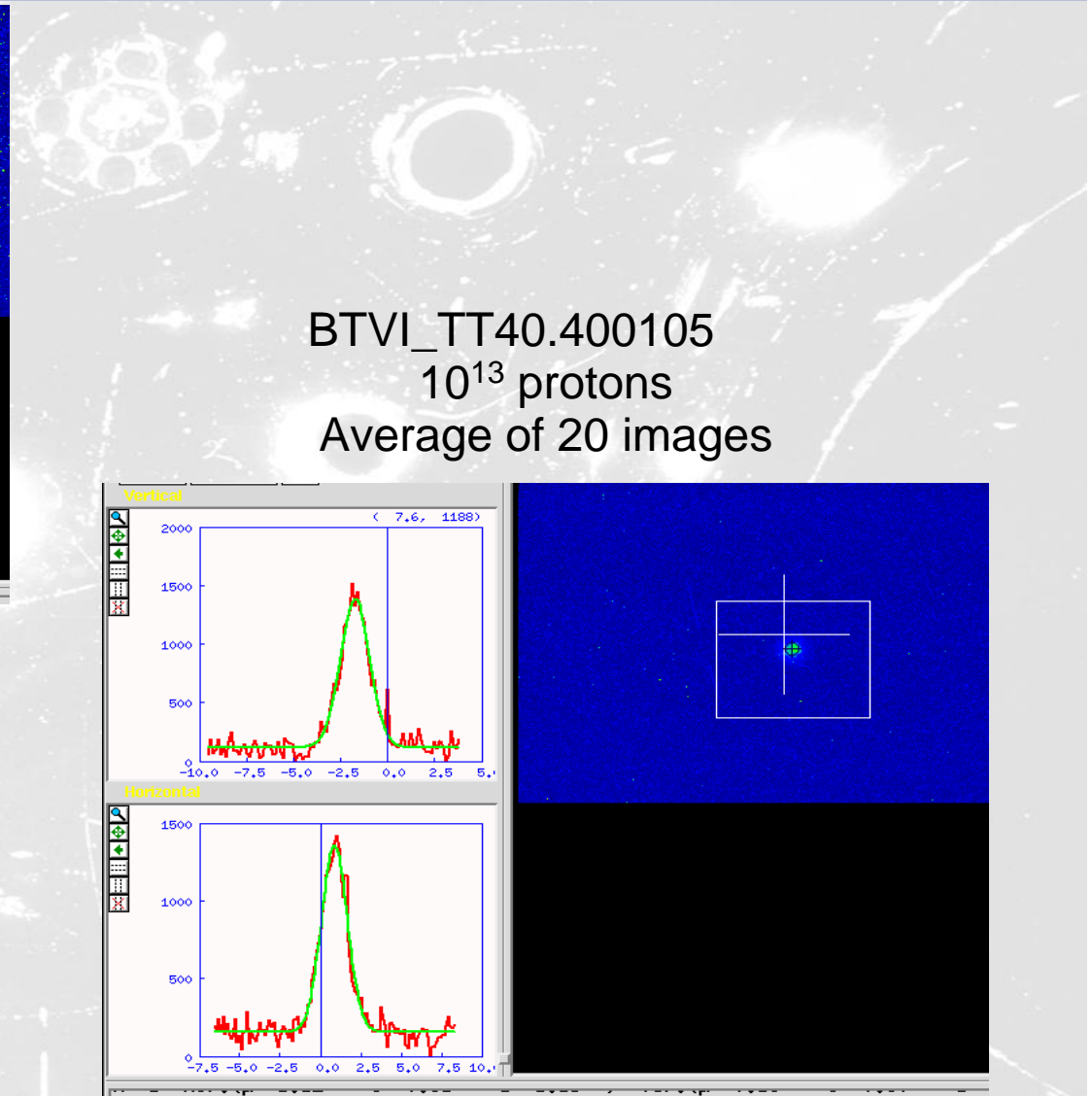
BTVG.412445



Radiation

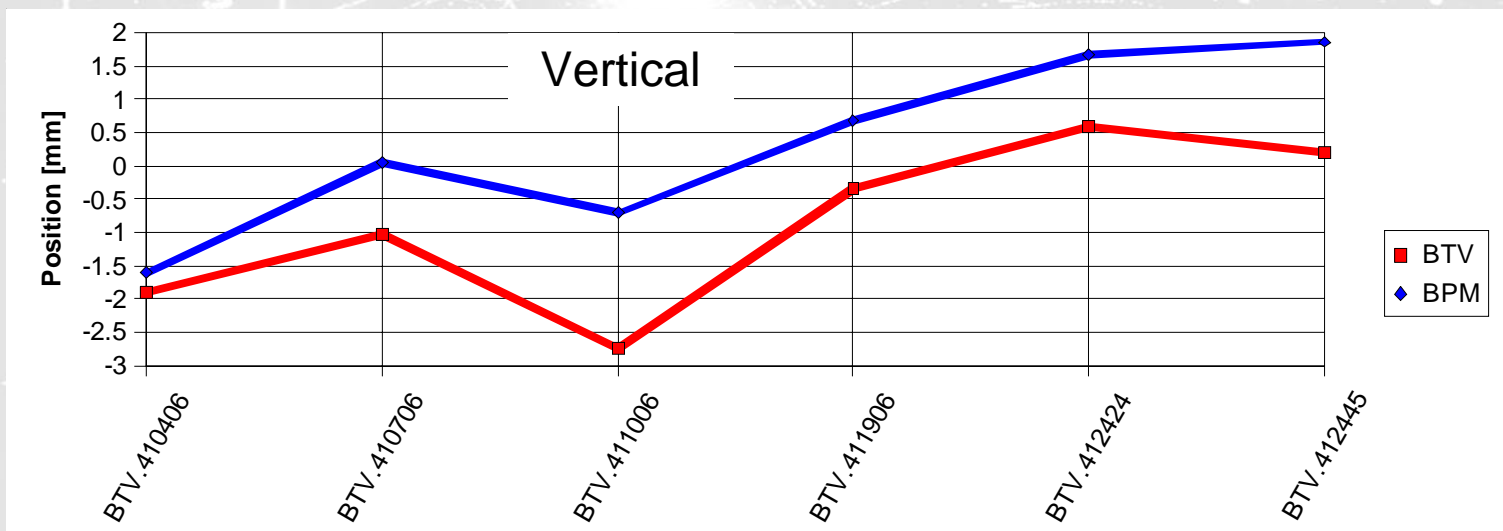
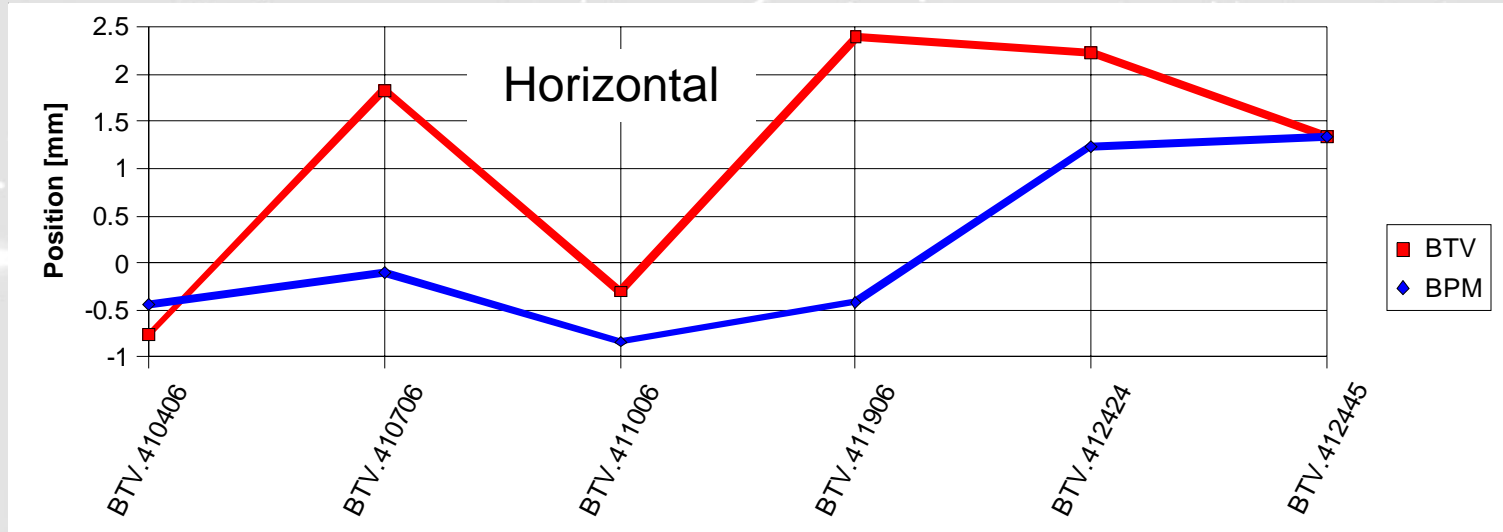


BTVI_TT40.400105
 10^{13} protons
Single image





TT41 BTVG Beam position





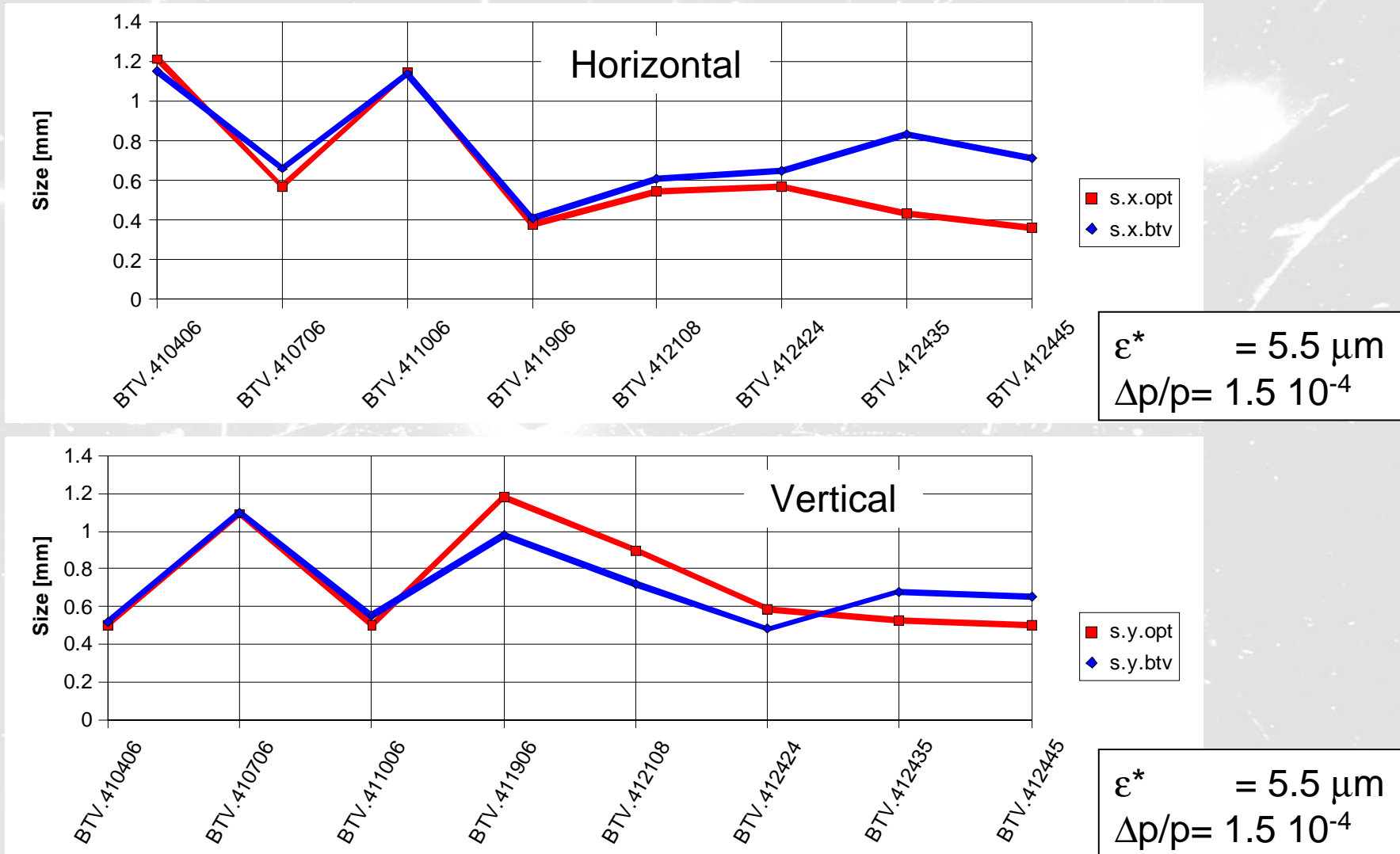
TT41 BTVG Beam position



- There is a considerable difference between the readings of the beam position monitors and the values calculated from the images.
- It looks like the values from the BPMs are to be trusted
- Investigations are ongoing in order to understand the discrepancy.
- There must be a problem during the different stages of the survey and alignment procedure.



TT41 BTVG Beam Size





TT41 BTVG Beam Size



- In the horizontal plane the measured beam sizes agree rather well with the optics parameters calculated by MAD.
- In the vertical plane this agreement is less good.
- The last two cameras do not have sufficient resolution at the moment and the measured sizes are in fact just the bandpass of the instrument.
- A problem in the alignment forced the adoption of a small magnification factor for the camera lenses of the last two devices. This will be corrected in the near future. In order to maximise the resolution the field of view will be reduced to $\sim 25 \times 25 \text{ mm}^2$.



Conclusions



- The BTV systems have been successfully used for the commissioning of CNGS
- A few issues remain to be solved:
 - Alignment errors
 - Resolution limit for the last two devices
- Differences between measured values and MAD optics to be understood
- Radiation damage to the cameras (especially last two devices) to be monitored