Reprocessing 2017 BCM1FSi data

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Why reprocessing Si data ?

BCM1FSI was not useful in 2017 because focus was on pCVD

- Only one channel working
- Wrong threshold setting caused high noise fills
- No albedo correction and noise subtraction yet
- Emittance scan data available made with SGconst (we know it's not good)

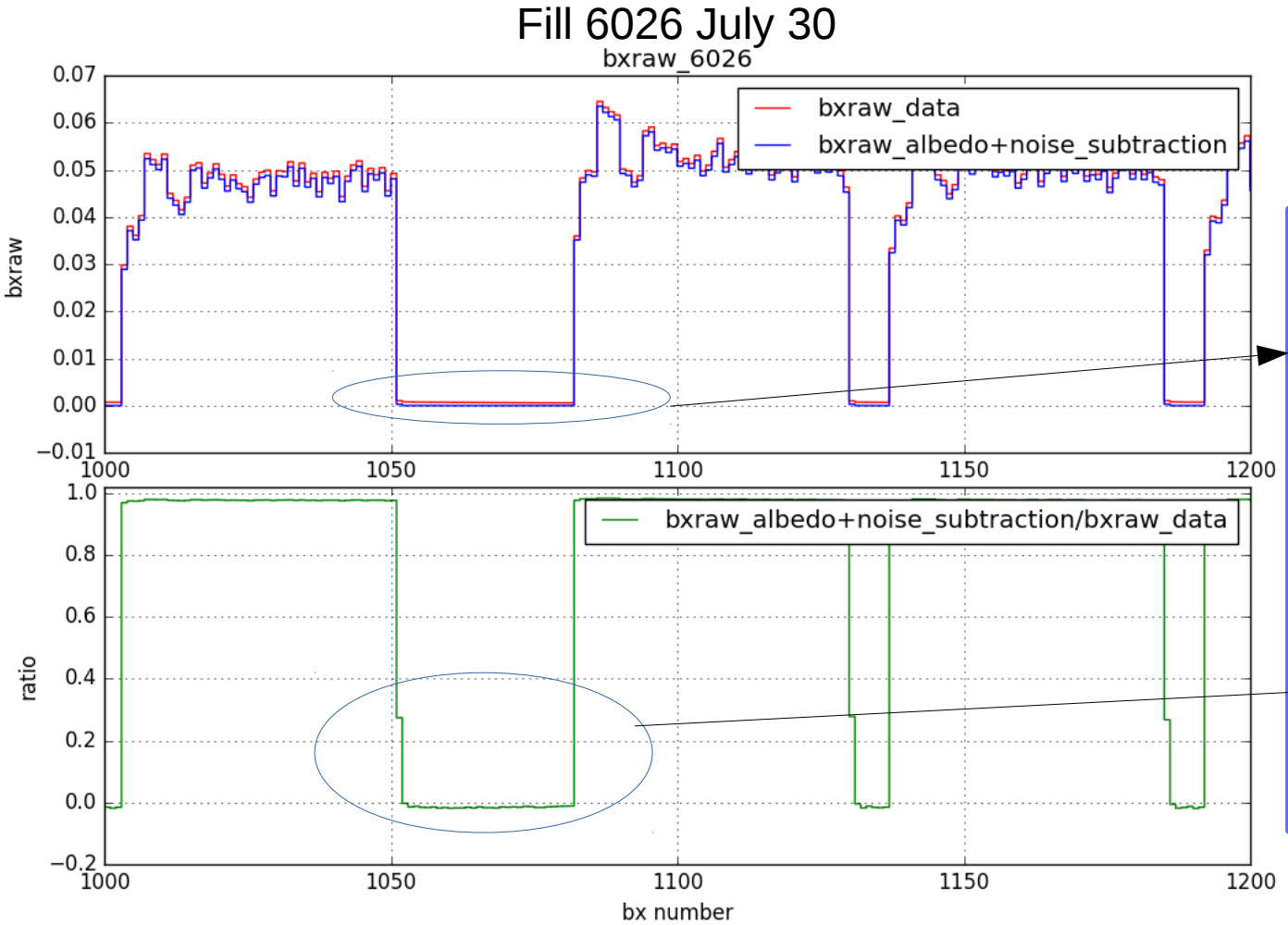
GOAL

Proof good linearity and stability of BCM1FSI

Strategy

- **Reprocess from agghist** (one histo per ch per 4 nibble)
  - Pick channel 16 only (the good Si ch)
  - Zero counting
  - Albedo correction (includes noise subtraction)
- **Calibration**
  - Analyze Emittance Scan (ES) results
  - Repeat VdM scan (DGBG)
  - Compare sigma and CapSigma with latest VdM
  - Compare instantaneous lumi for Si_pro (ES calib), Si_pro(VdM calib) and hfet (normtag hfet17v11) for some fills amoung the year
- **Preliminary lumi analysis**

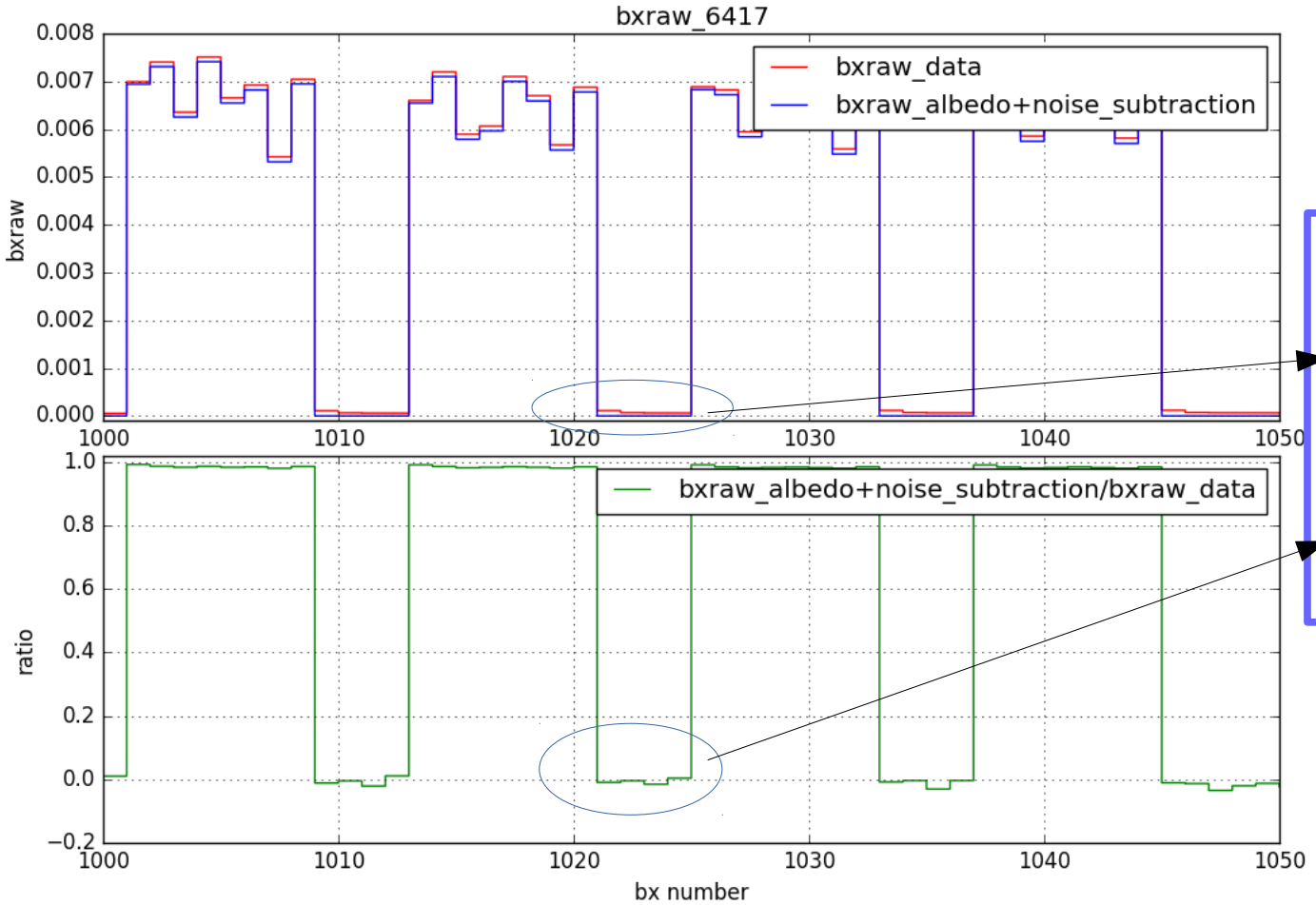
Reprocess from agghist



- **High noise fills before Nov** because wrong threshold
- **Albedo and noise subtraction is not properly working** but still it is an improvement (still there is small tale from albedo)

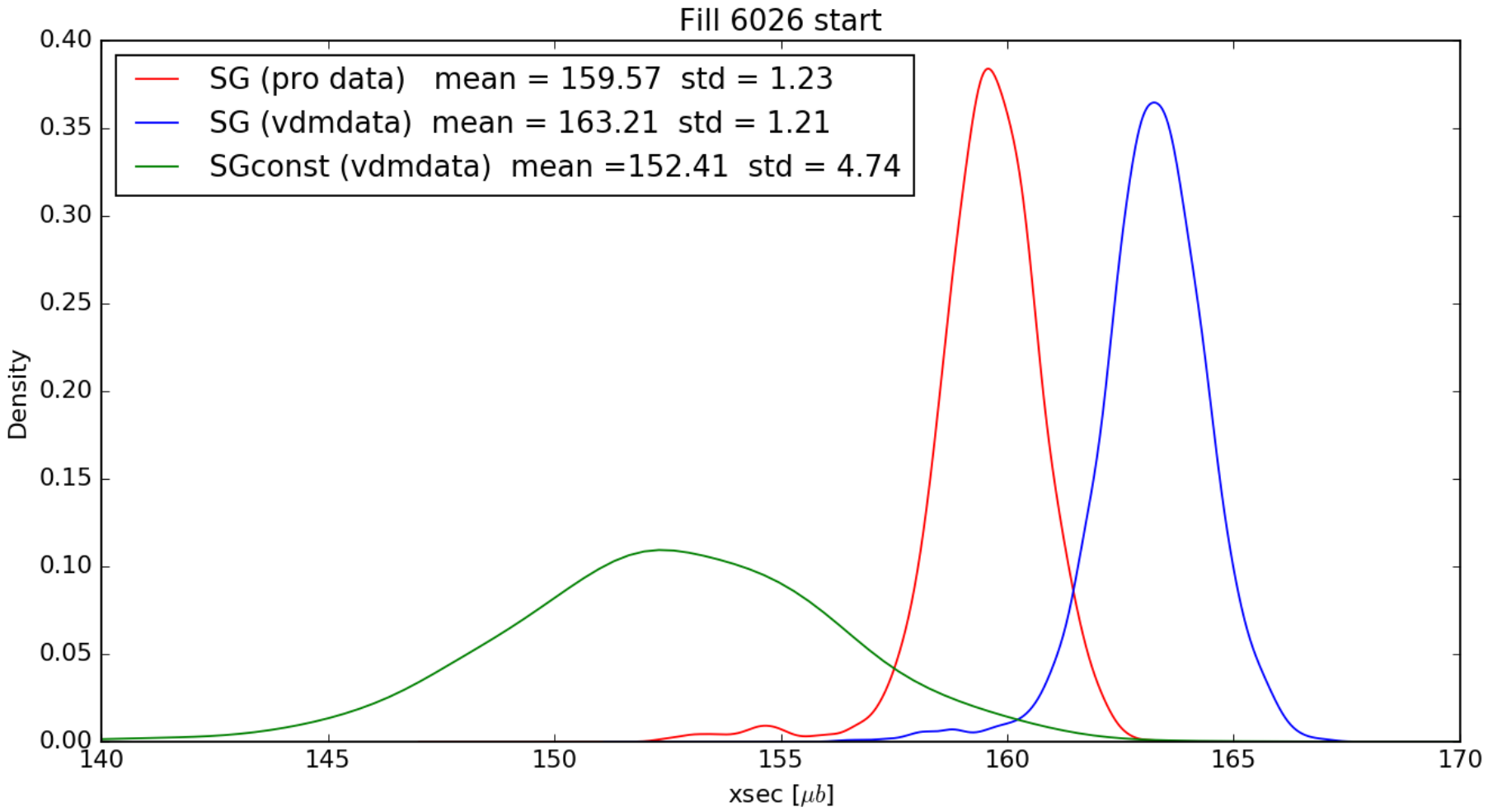
Reprocess from agghist

Fill 6417 November 25

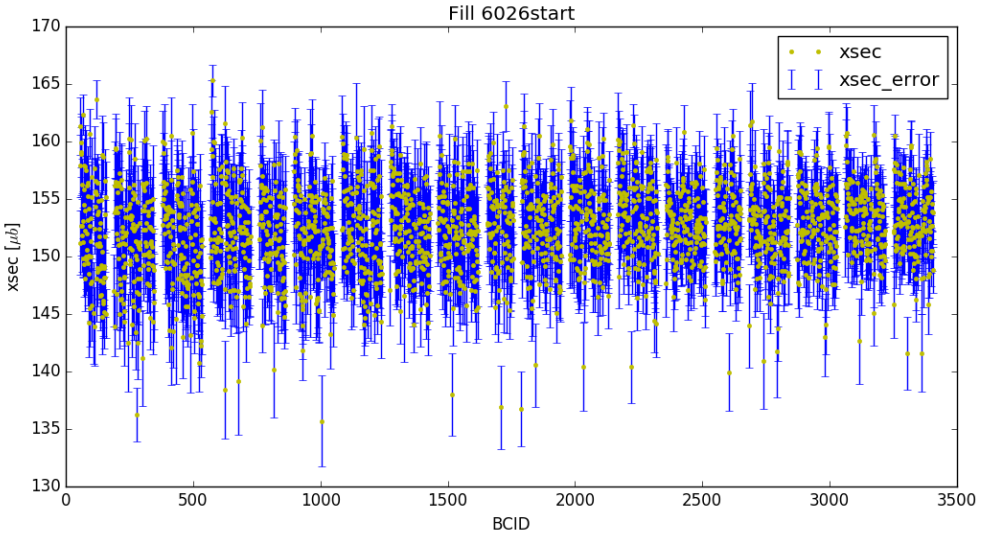


- **Low noise fills after Nov**
- **Albedo and noise subtraction is properly working**

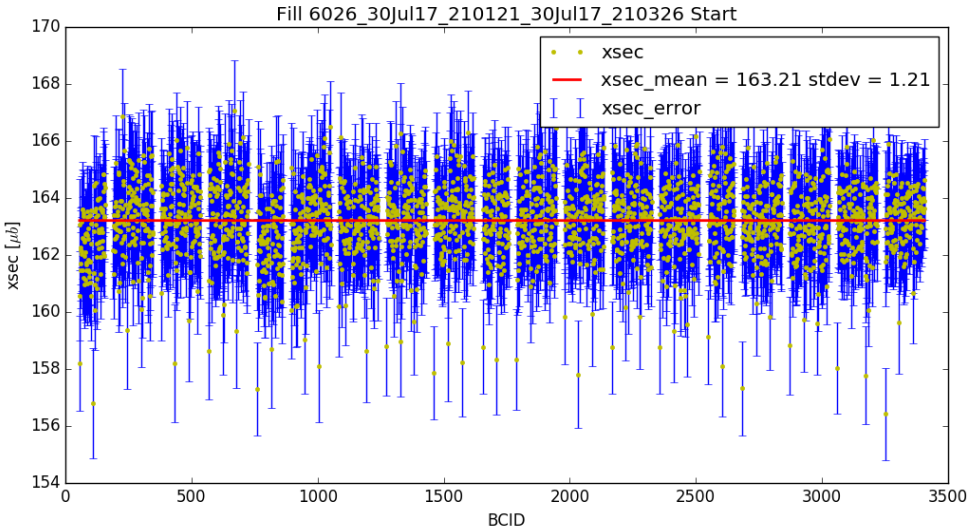
Emittance Scan (SG)



Emittance Scan (SG)

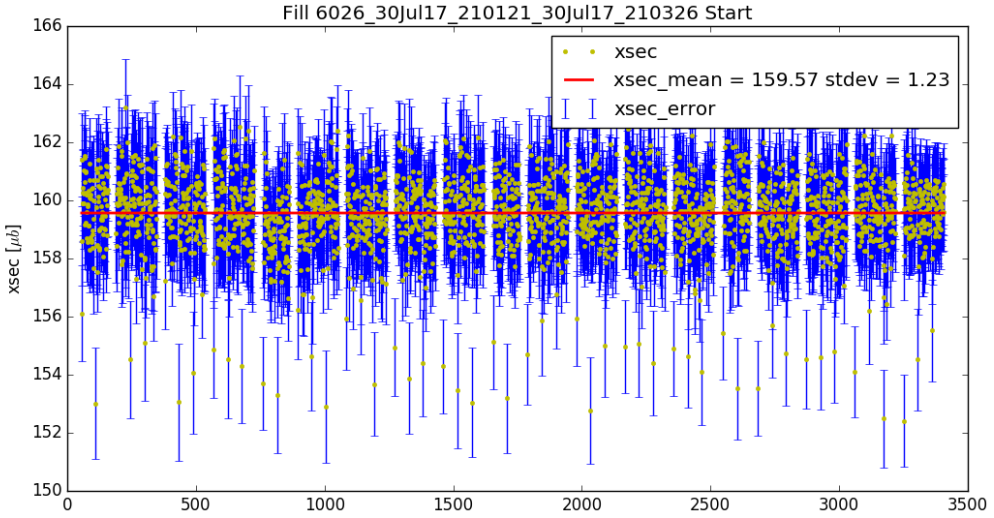


Emittance scan done with SG + constant (vdmdata) for fill 6026 at the start

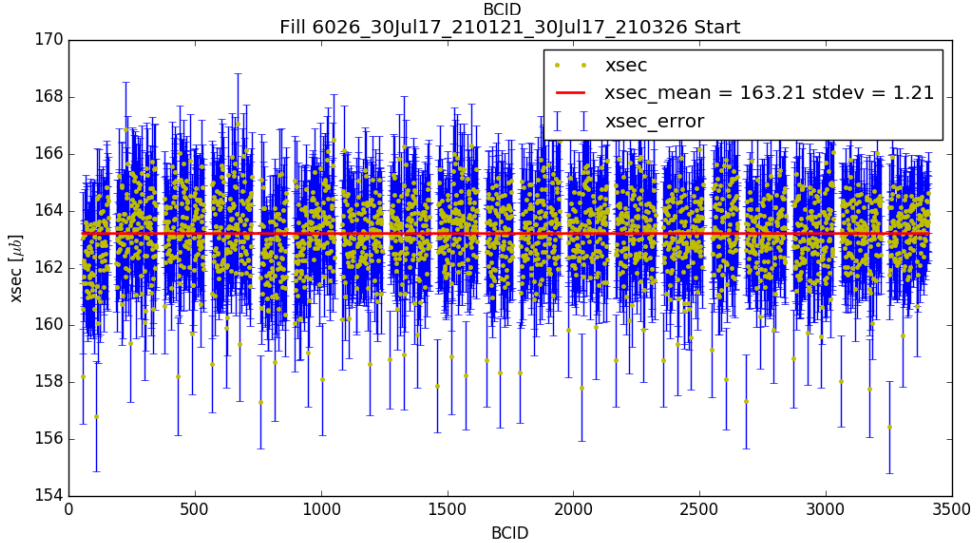


Emittance scan done with SG (vdmdata) for fill 6026 at the start

Emittance Scan (SG)

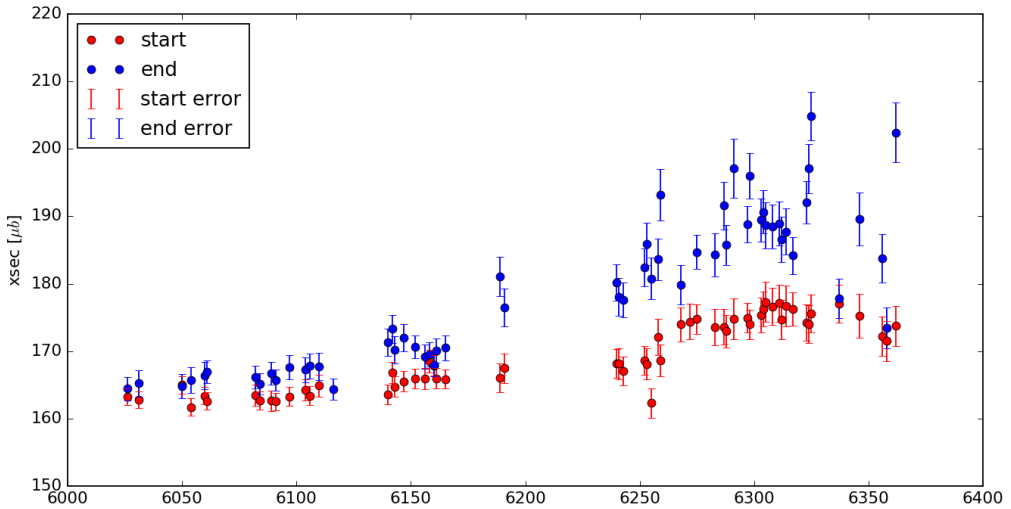


Emittance scan done with SG (processed data) for fill 6026 at the start

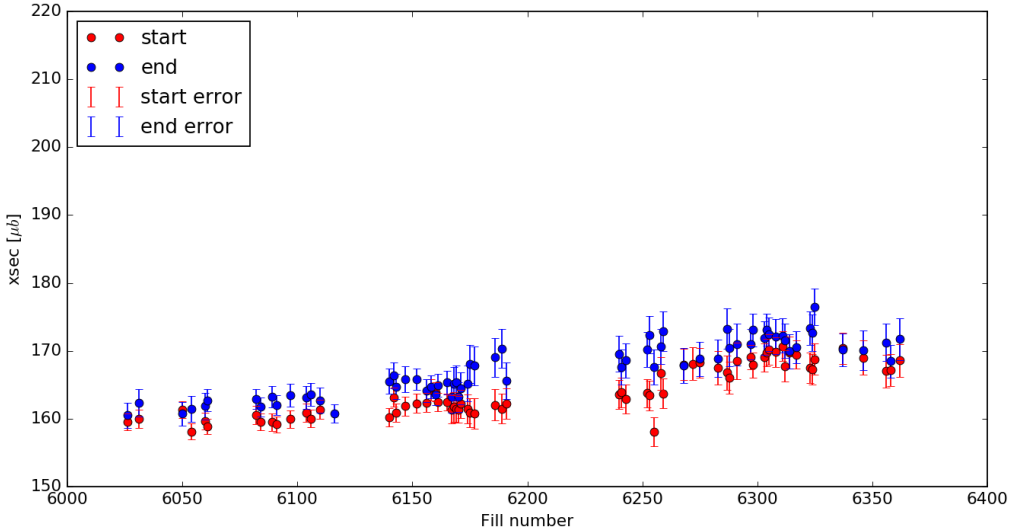


Emittance scan done with SG (vdmdata) for fill 6026 at the start

Emittance Scan (SG)



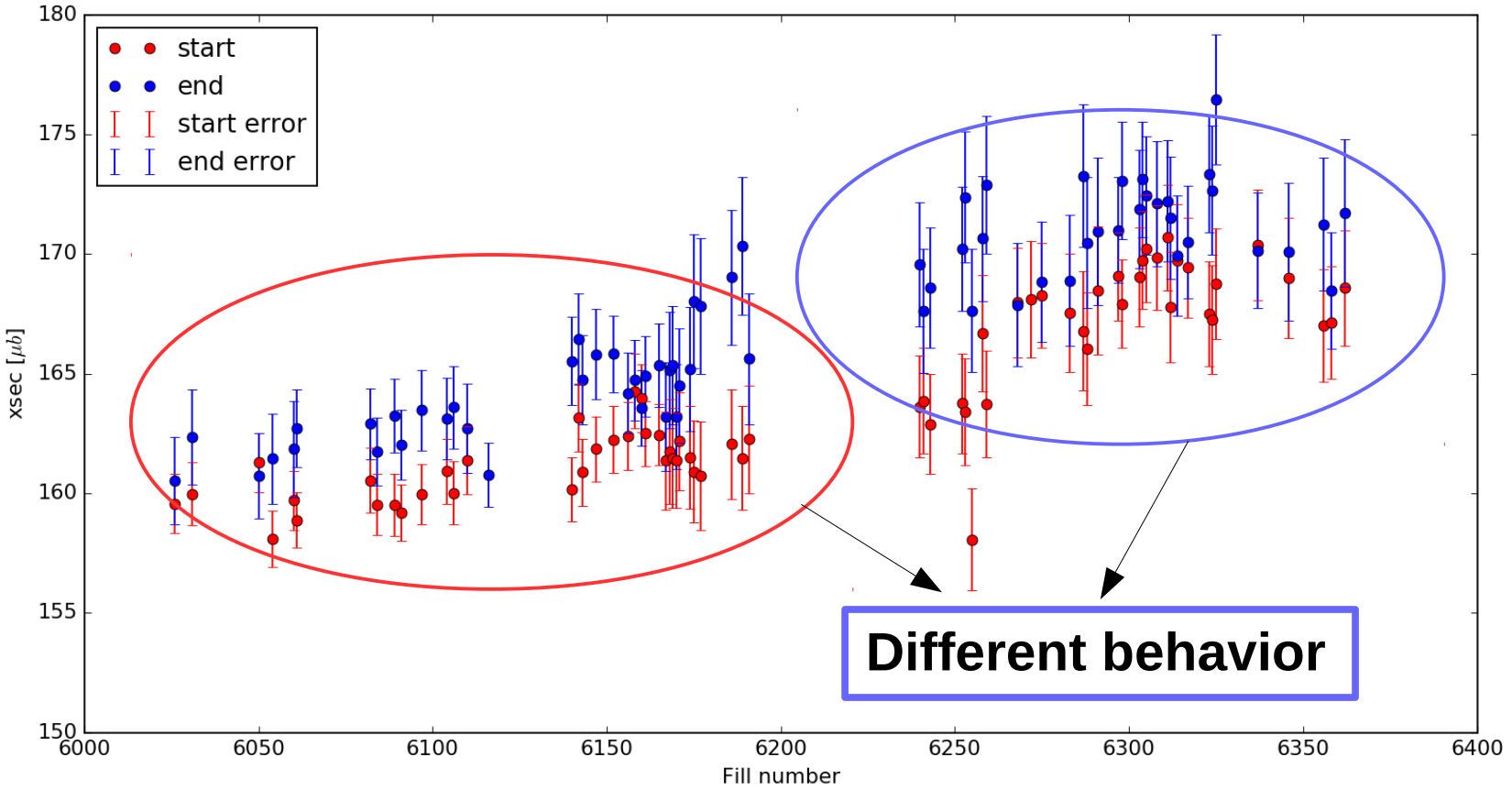
Emittance scan done with SG (unprocessed data)



Emittance scan done with SG (processed data)

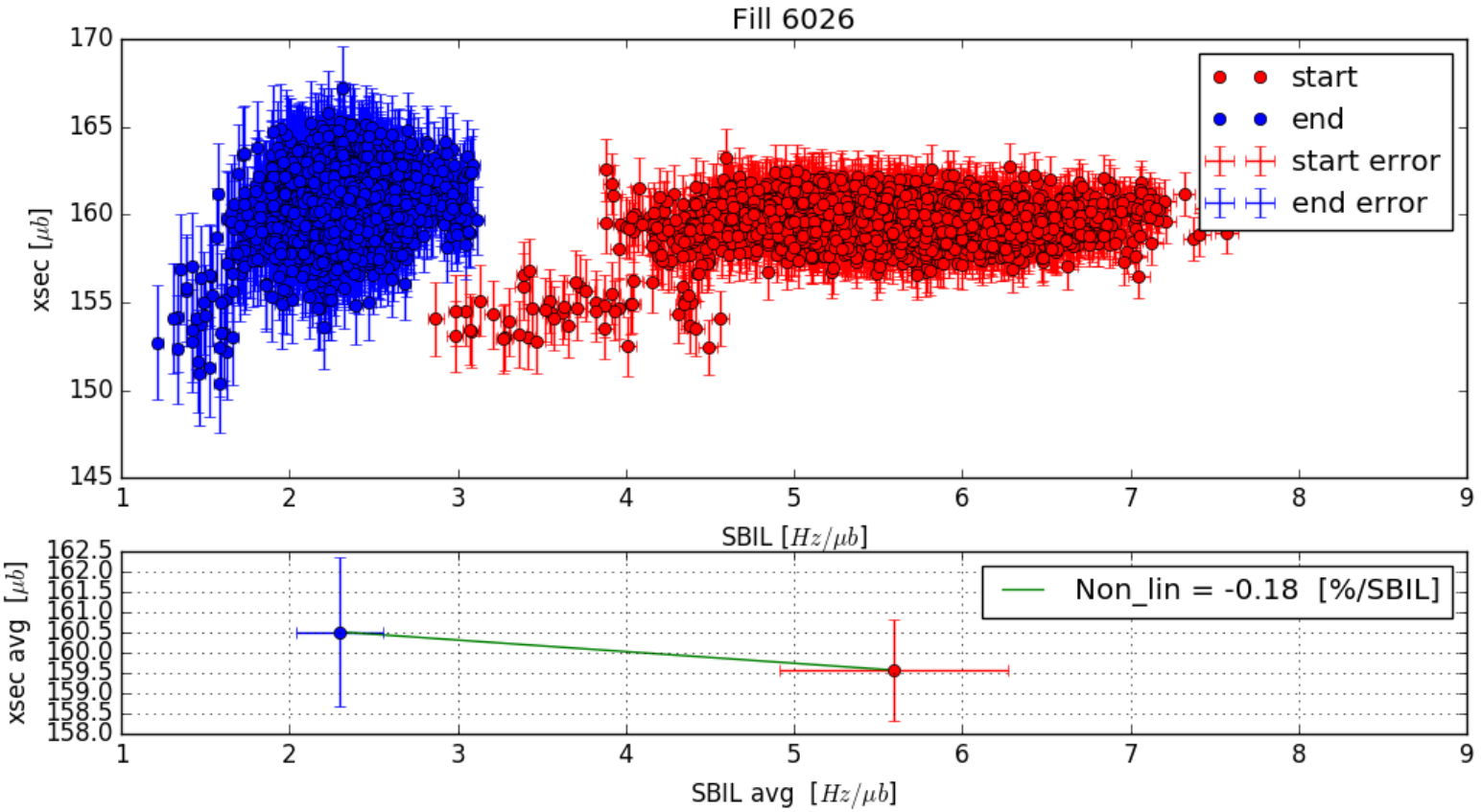
Emittance Scan (SG)

Emittance scan SG (**pro data**) for all fills at start and end



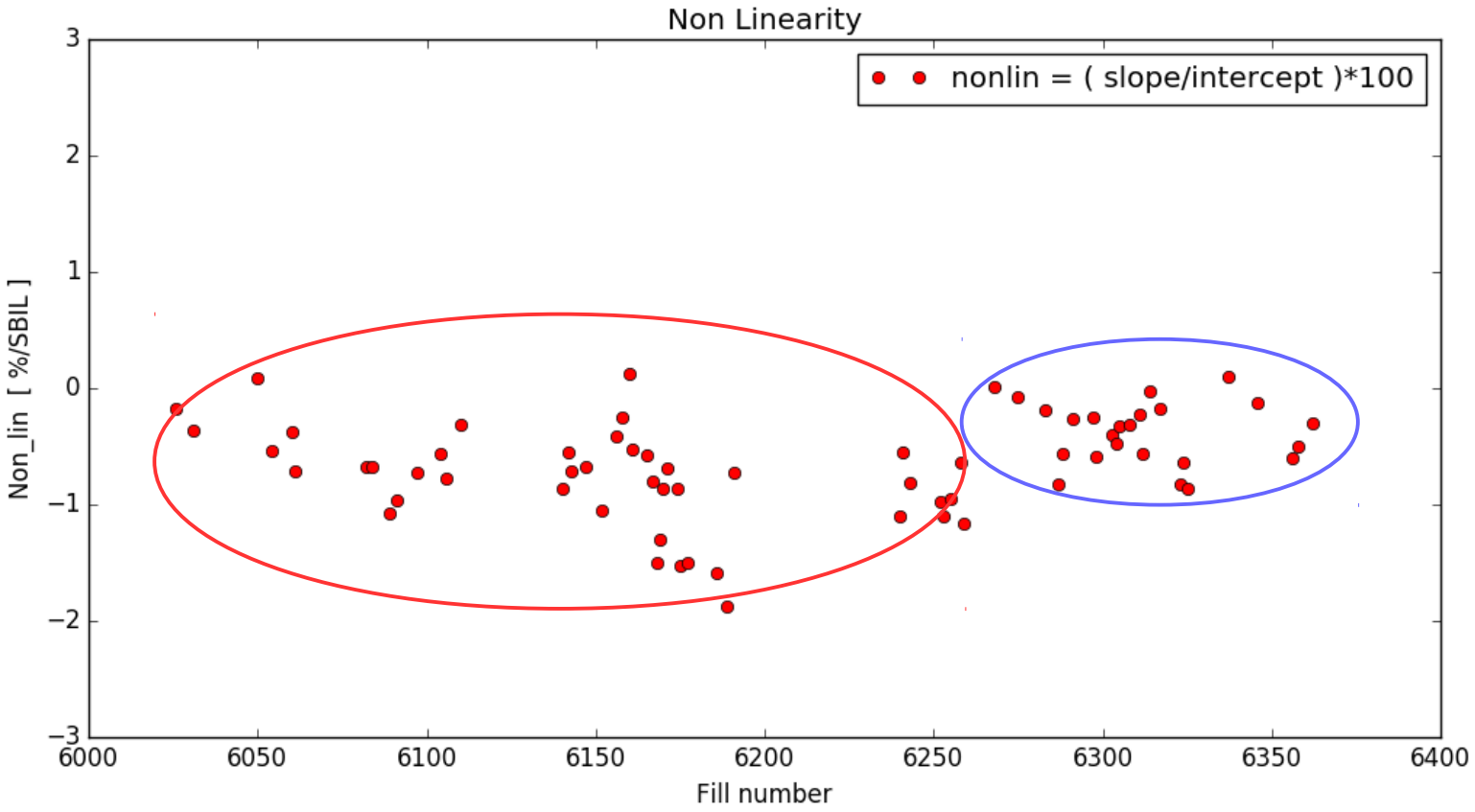
Emittance Scan (SG)

Preliminary linearity analysis



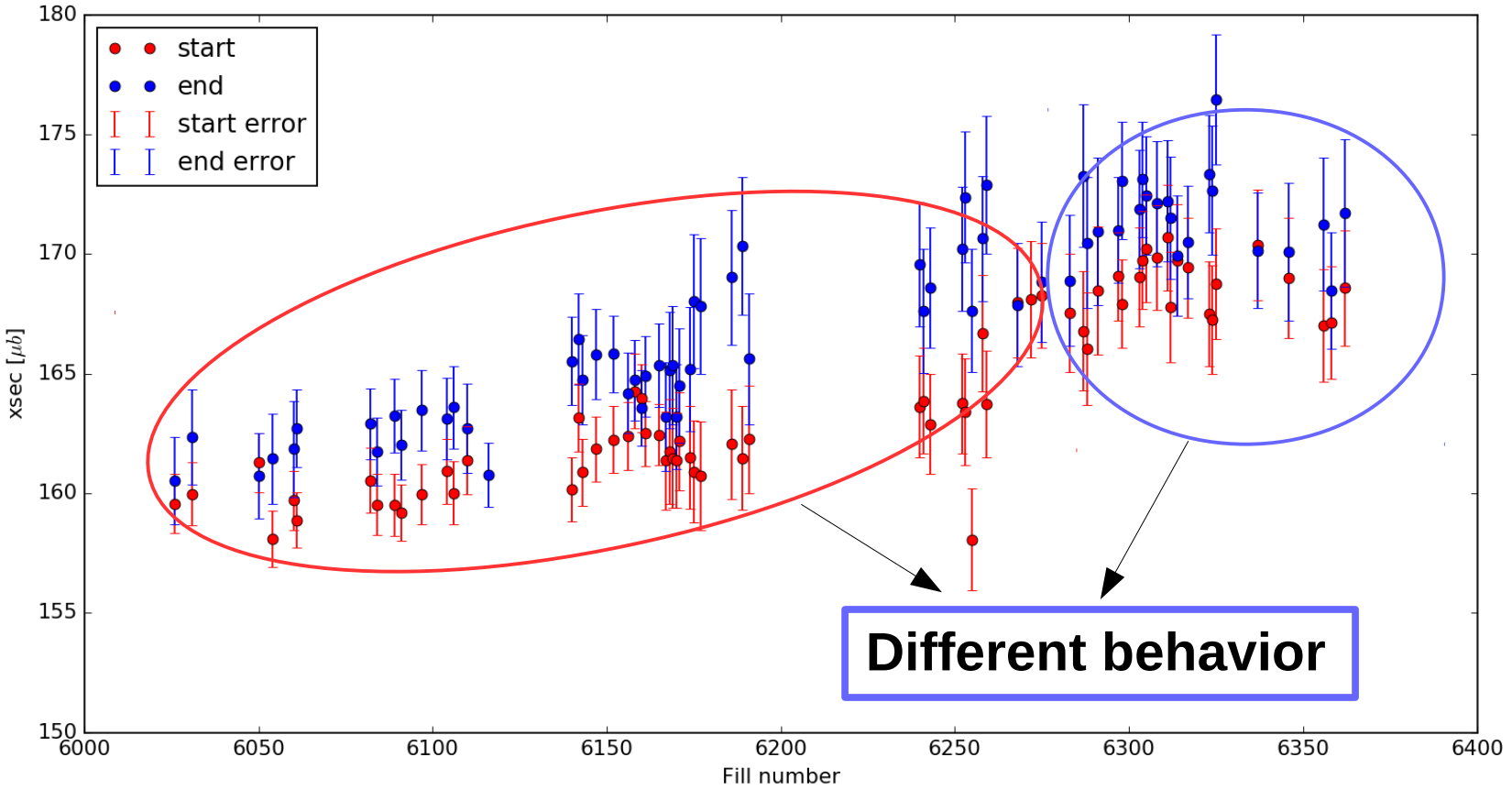
Emittance Scan (SG)

Preliminary linearity analysis



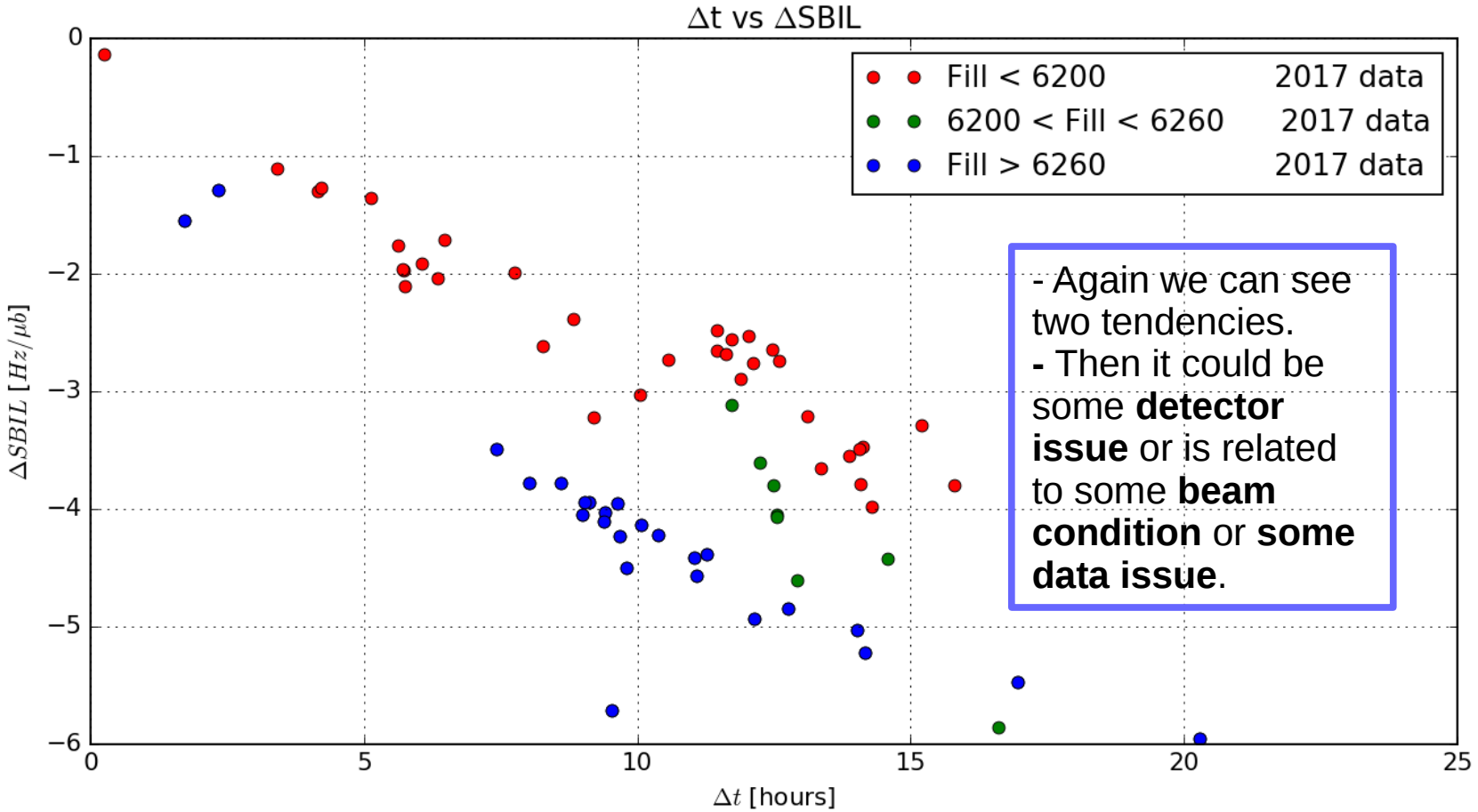
Emittance Scan (SG)

Emittance scan SG (**pro data**) for all fills at start and end



Emittance Scan (SG)

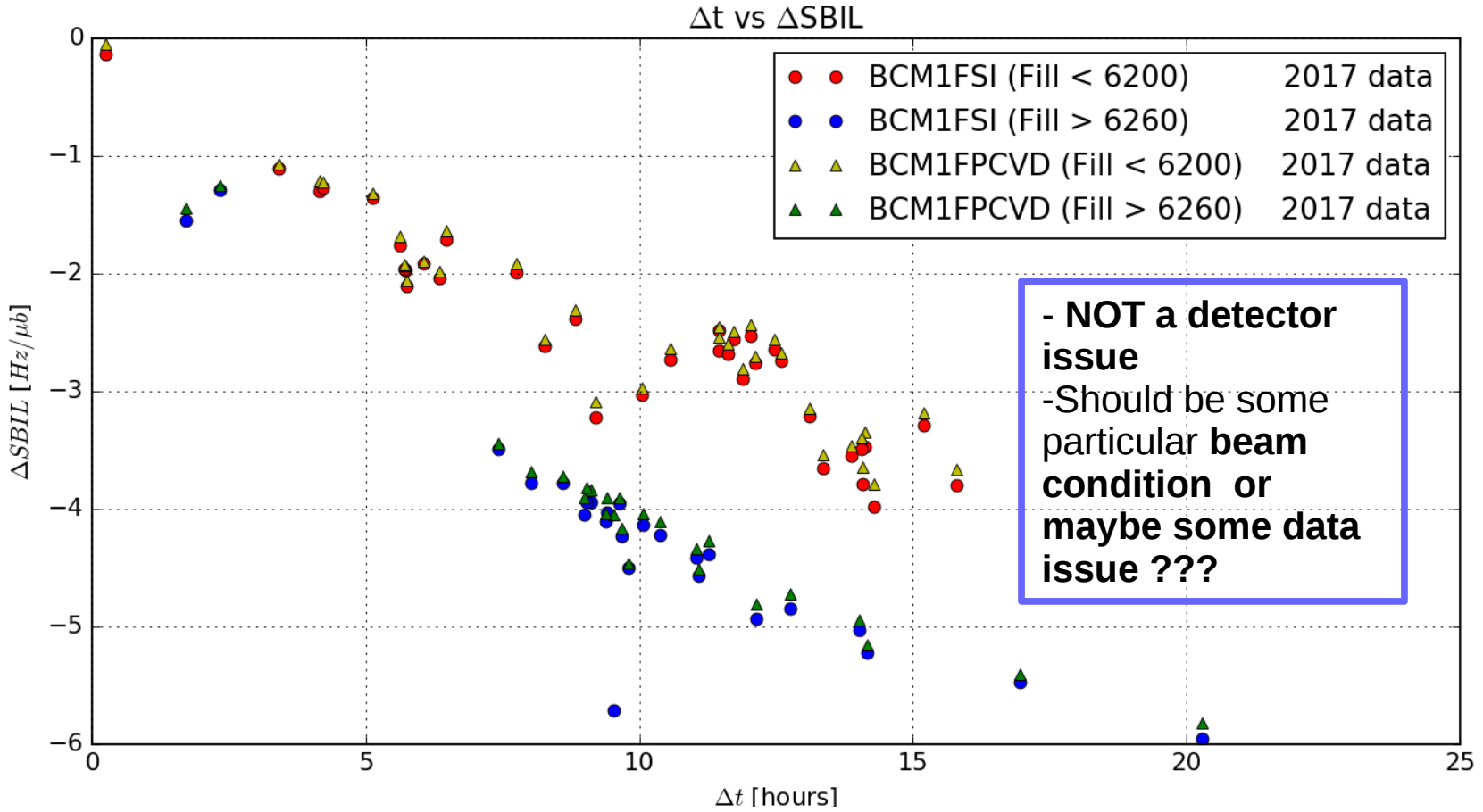
This behavior is also visible on Δt vs ΔSBIL



- Again we can see two tendencies.
- Then it could be some **detector issue** or is related to some **beam condition** or **some data issue**.

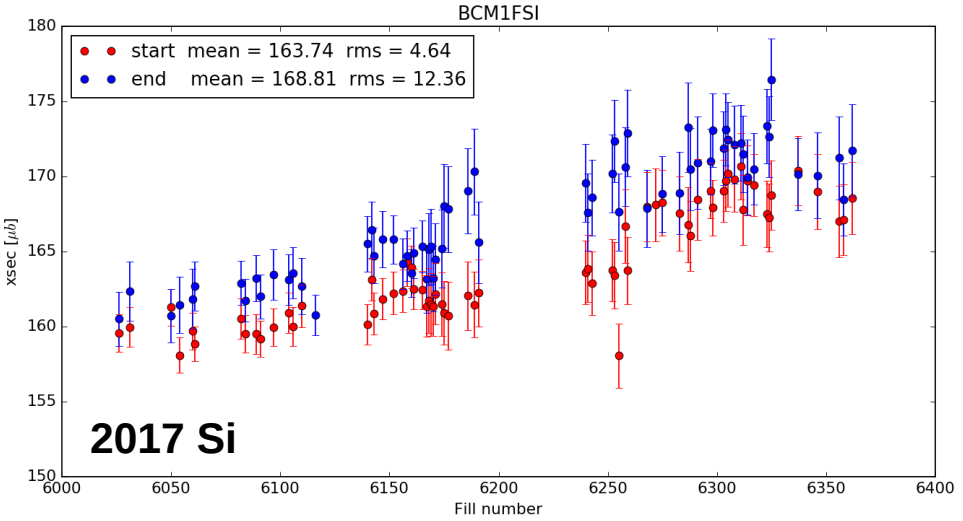
Emittance Scan (SG)

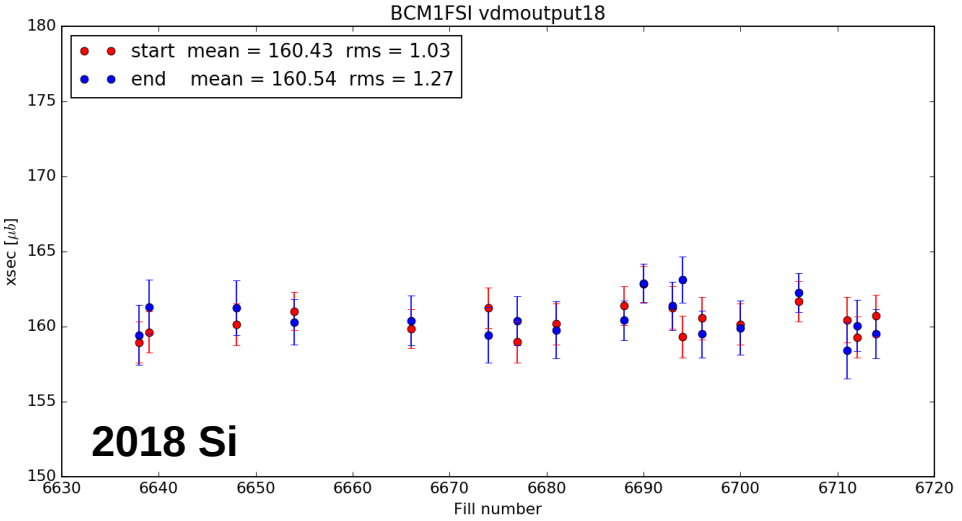
Δt vs ΔSBIL for Si and PCVD on 2017 data

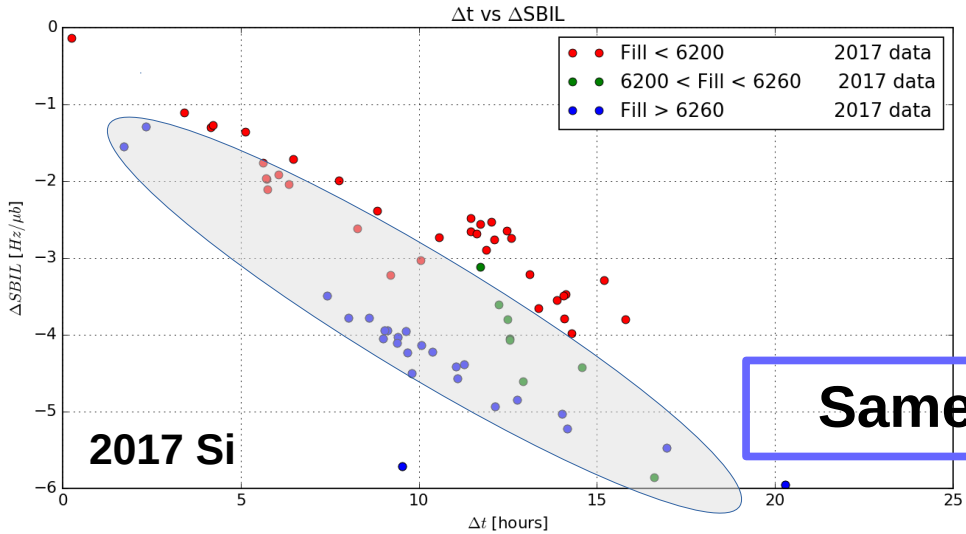


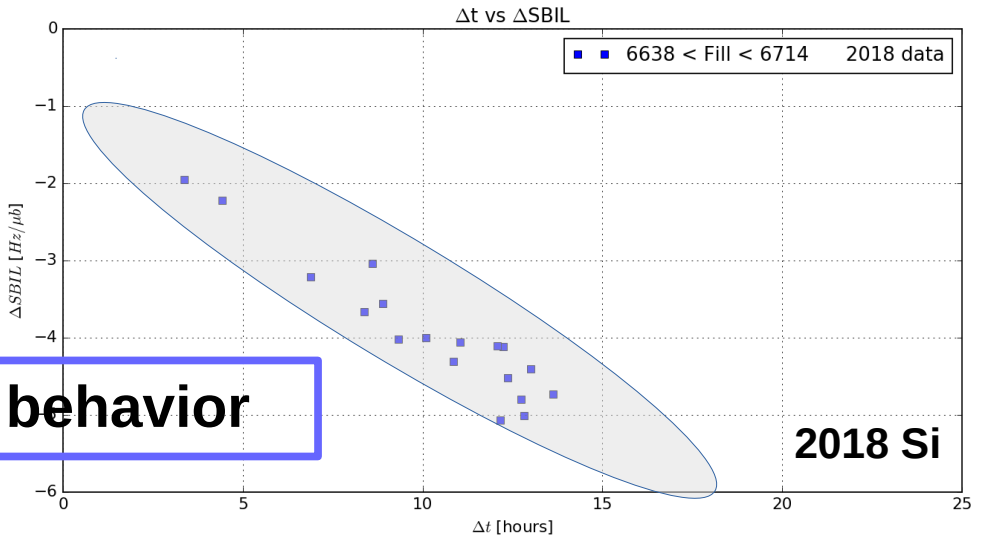
- **NOT a detector issue**
-Should be some particular **beam condition or maybe some data issue ???**

Emittance Scan (SG)





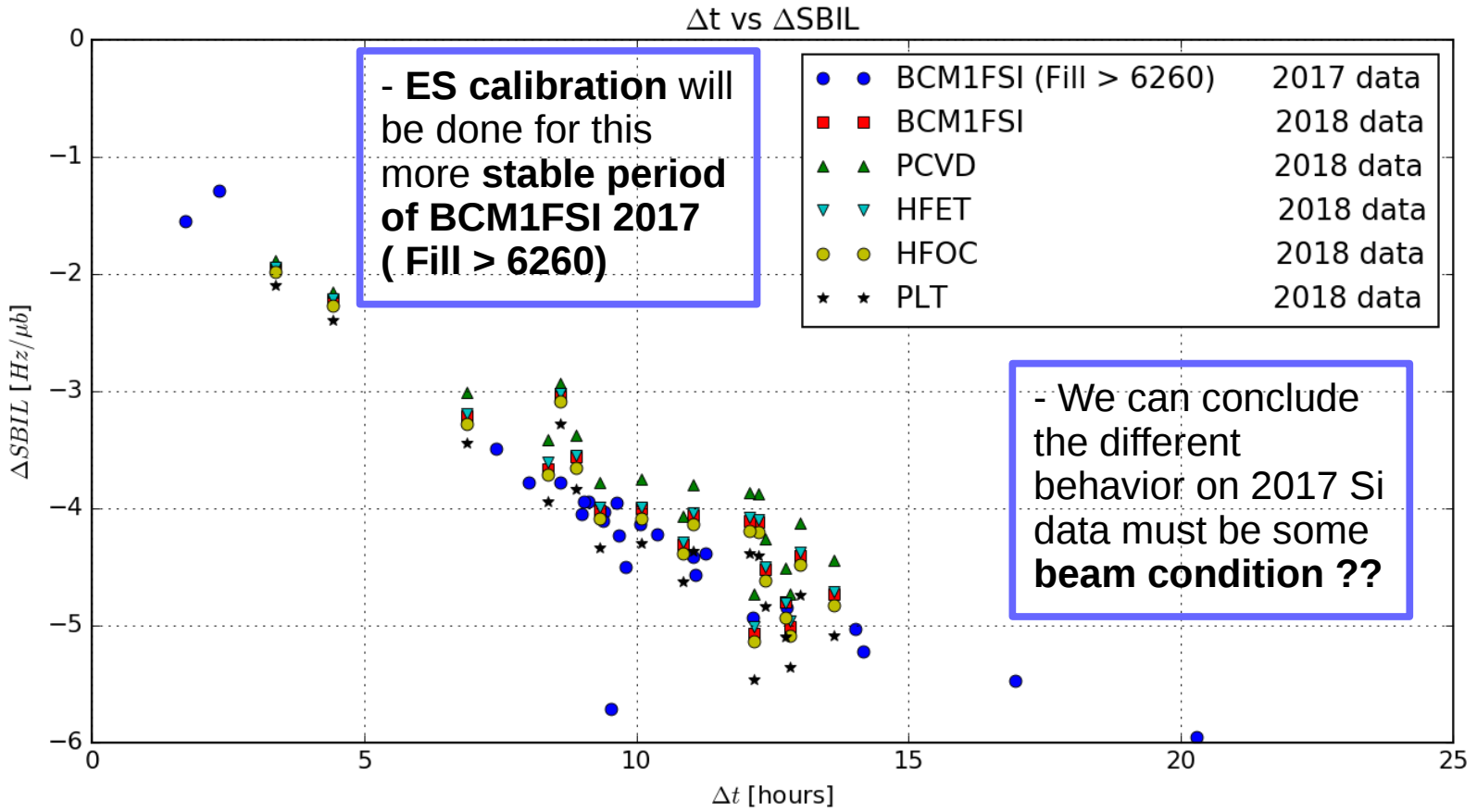




Same behavior

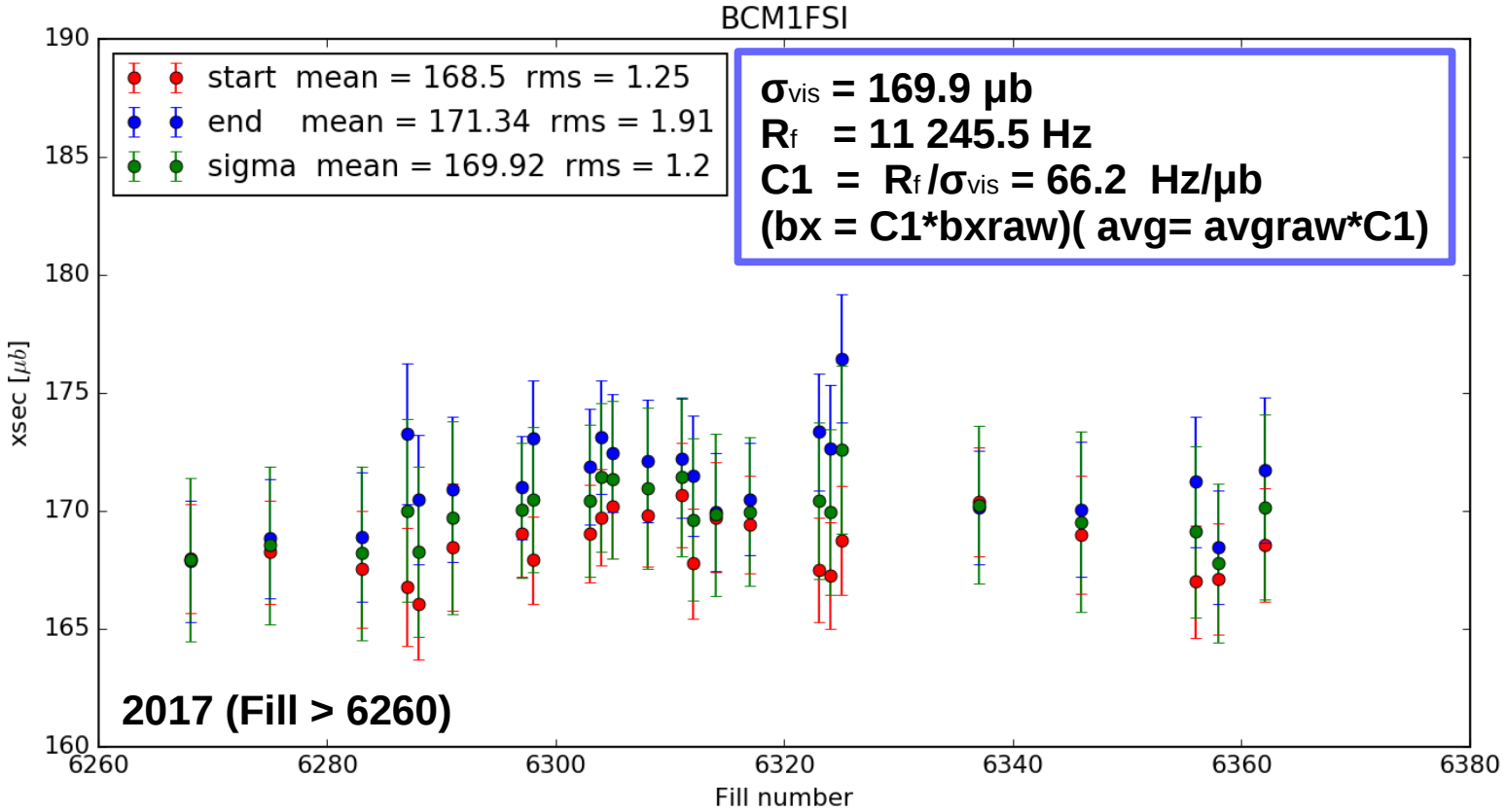
Emittance Scan (SG)

2017 and 2018 data have the same behavior



Emittance Scan (SG)

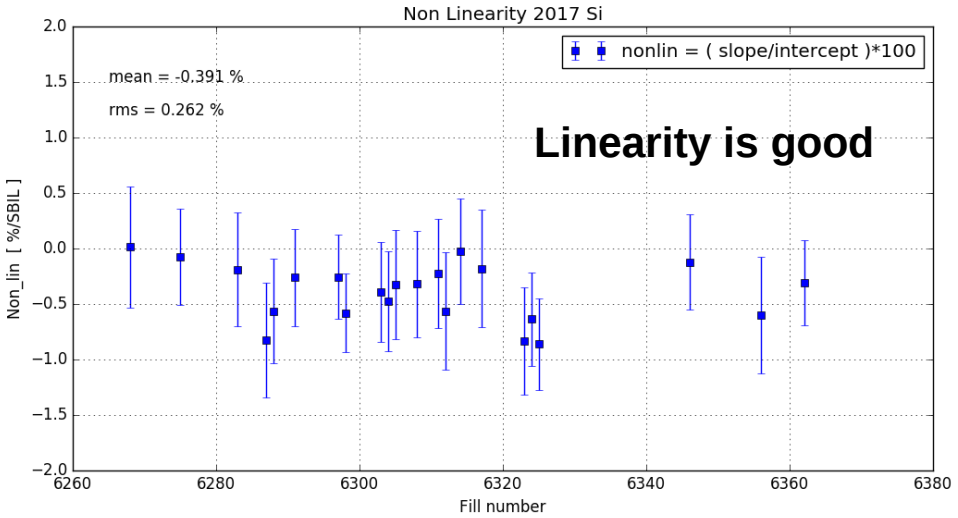
Calibration from ES



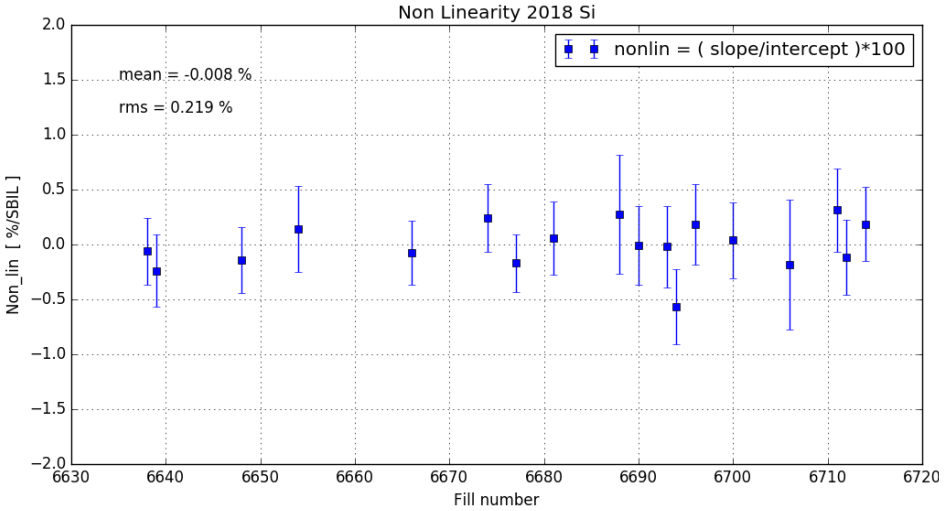
Emittance Scan (SG)

Linearity from ES

2017 Si data (Fill > 6260)

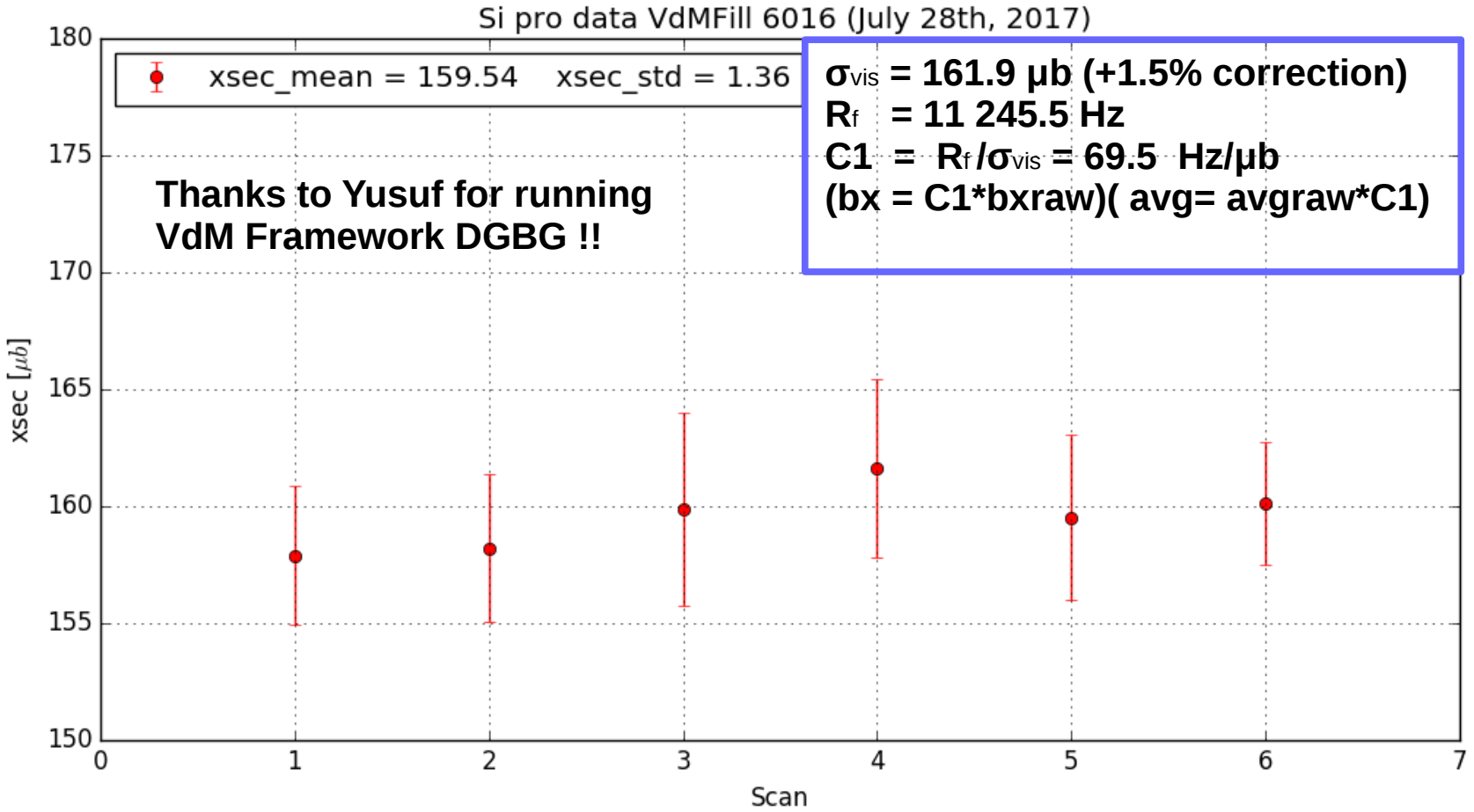


2018 Si data



VdM Scan (DGBG)

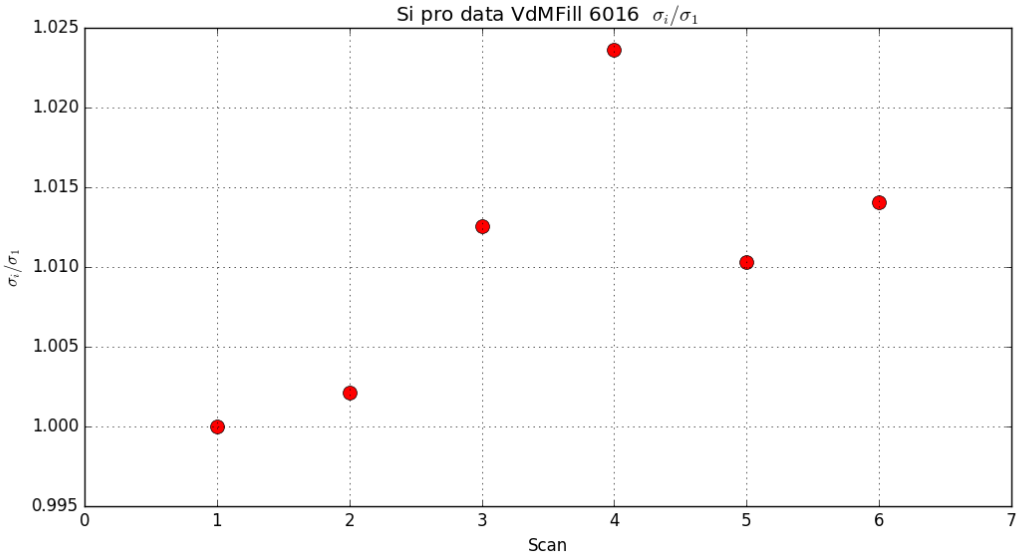
Calibration from VdM

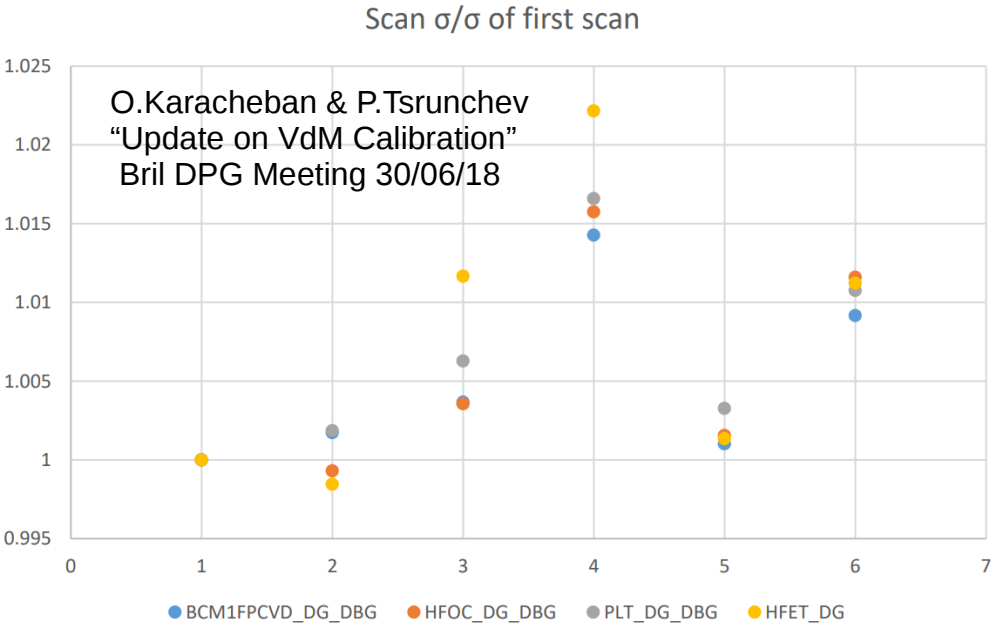


σ_{vis} = 161.9 μb (+1.5% correction)
R_f = 11 245.5 Hz
C1 = R_f/σ_{vis} = 69.5 Hz/μb
(bx = C1*bxraw)(avg= avgraw*C1)

VdM Scan (DGBG)

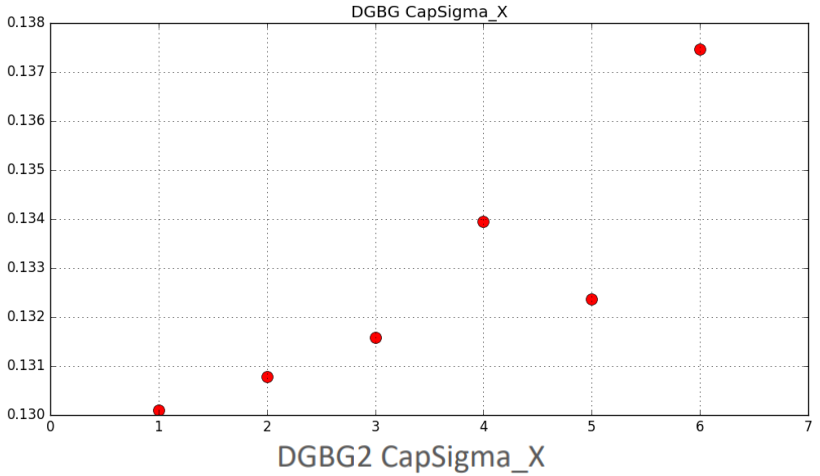
Sigma visible comparison with last VdM

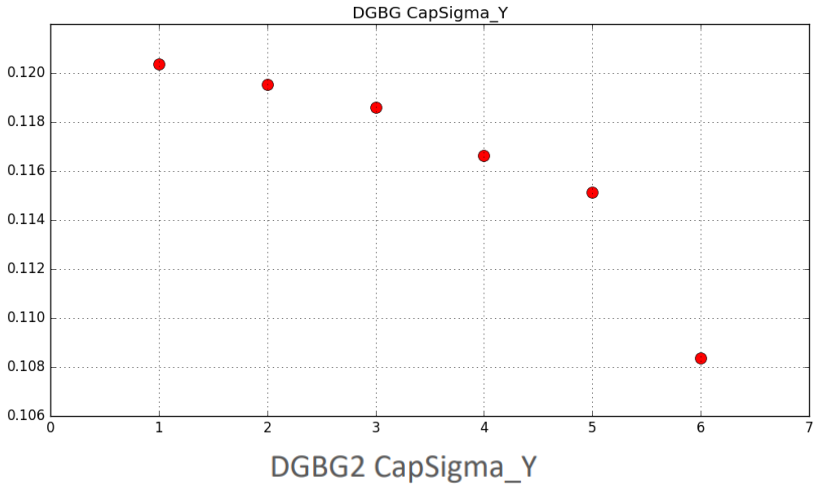


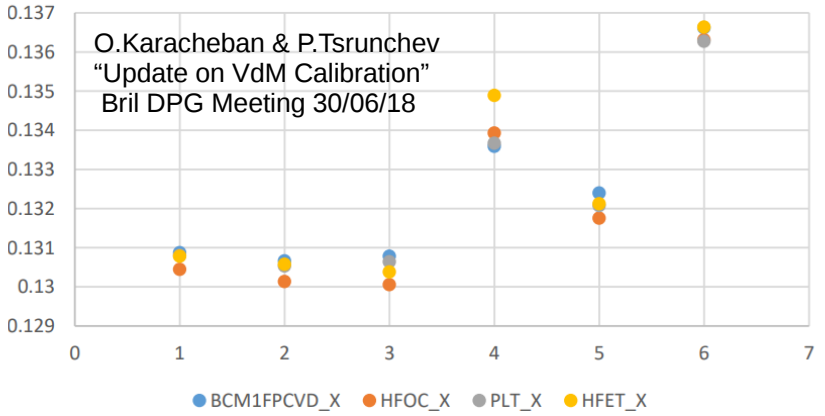


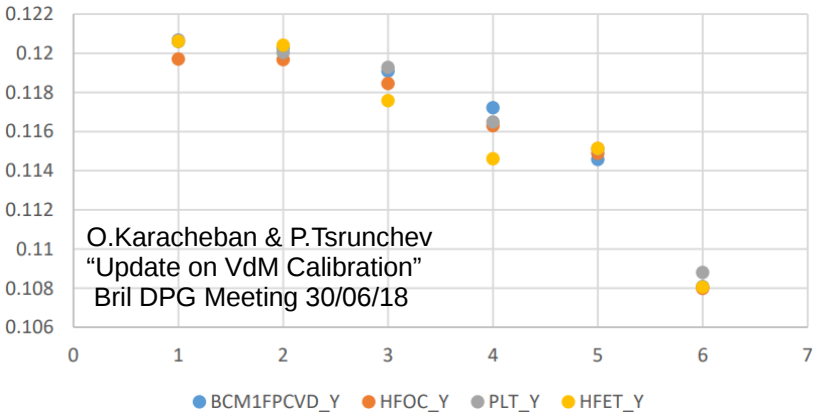
VdM Scan (DGBG)

CapSigma comparison







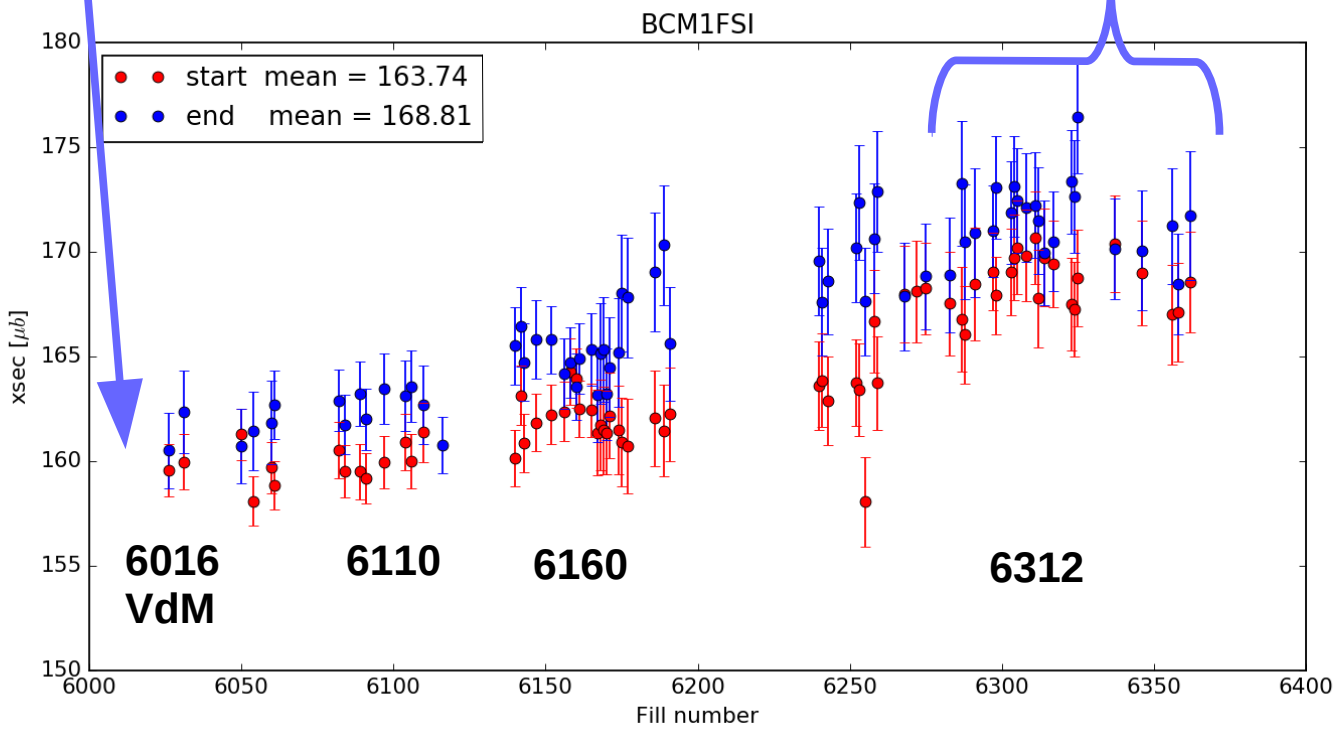


VdM Scan (DGBG)

Comparison between VdM and ES calibration

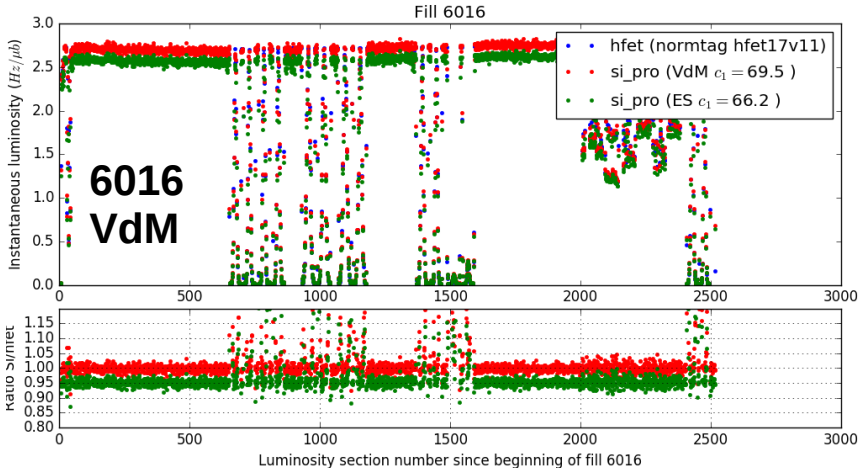
VdM calibration (Fill 6016)
σ_{vis} = 161.9 μb (+1.5% correction)
C1 = R_f/σ_{vis} = 69.5 Hz/μb

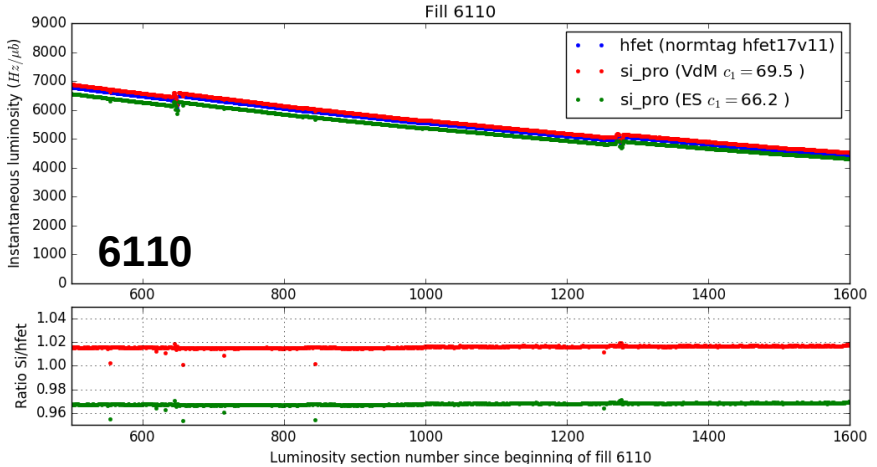
ES calibration (Fill 6260-6362)
σ_{vis} = 169.9 μb
C1 = R_f/σ_{vis} = 66.2 Hz/μb

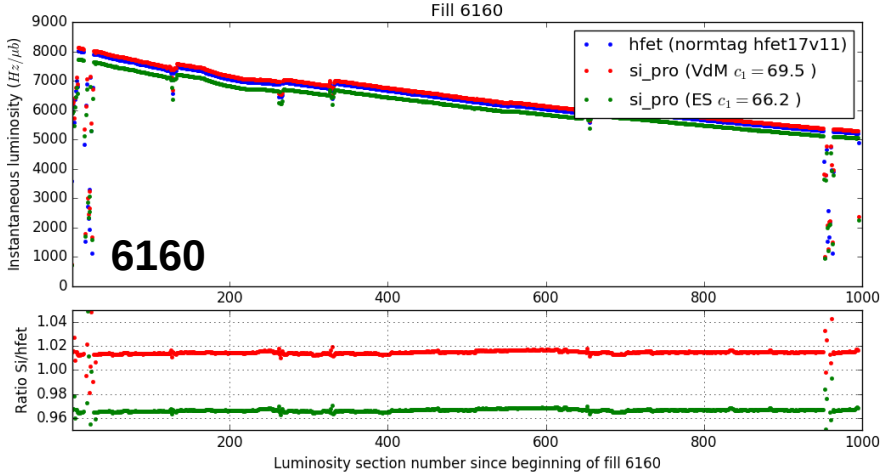


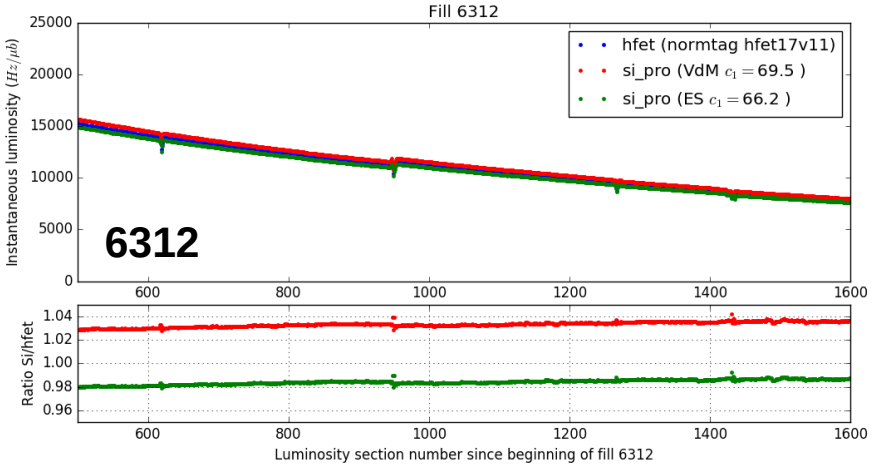
VdM Scan (DGBG)

Comparison between VdM and ES calibration



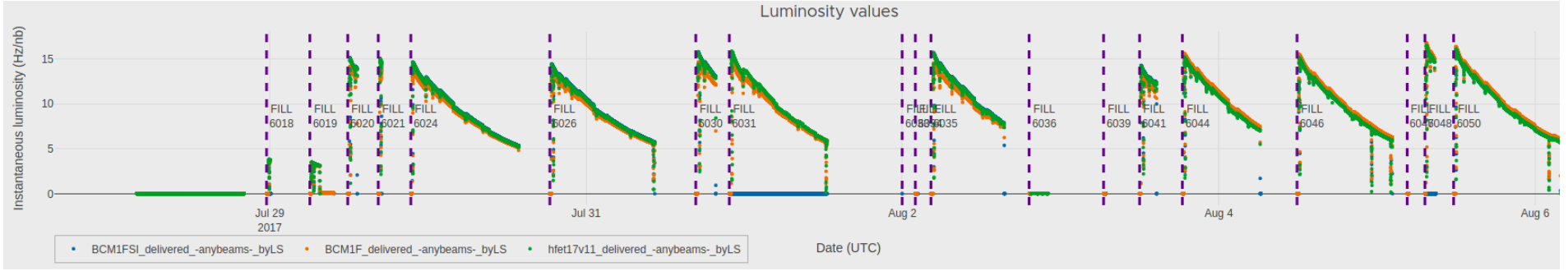


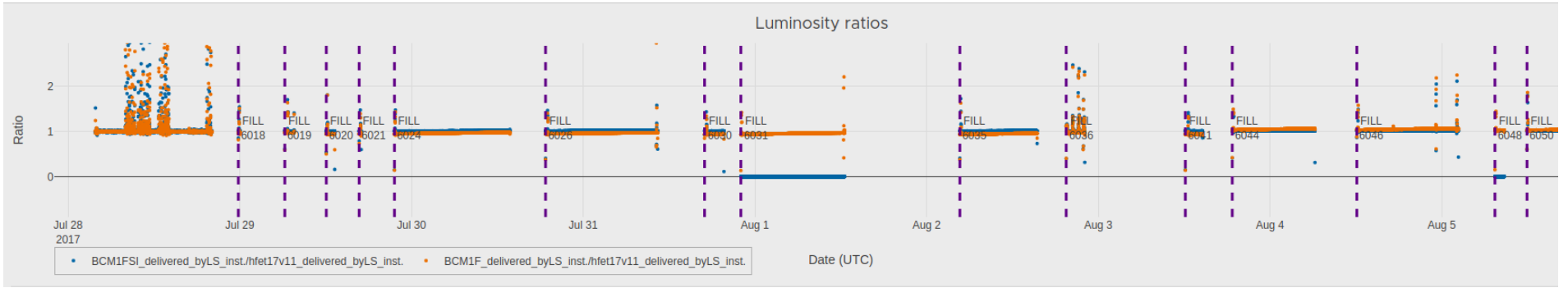




BCM1FSi17 data uploaded

Processed Si data has been uploaded to lumi DB

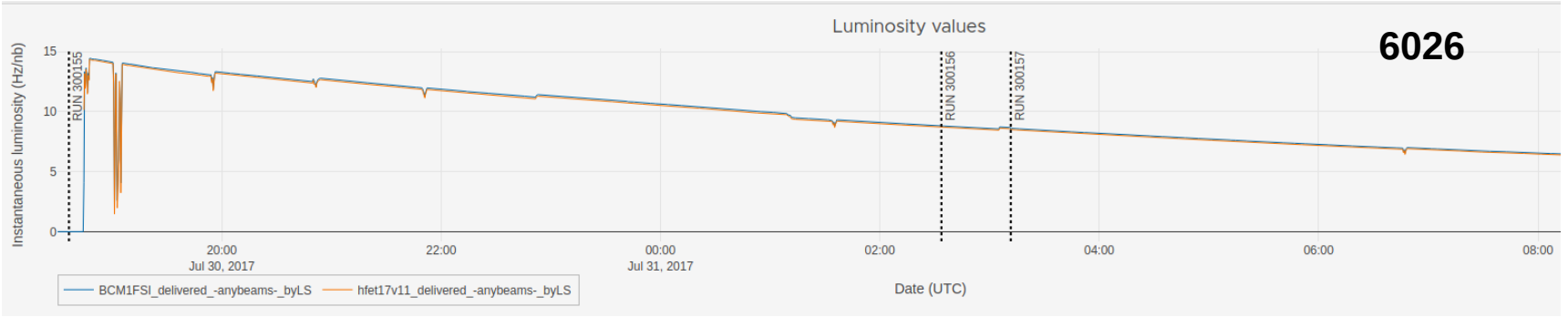


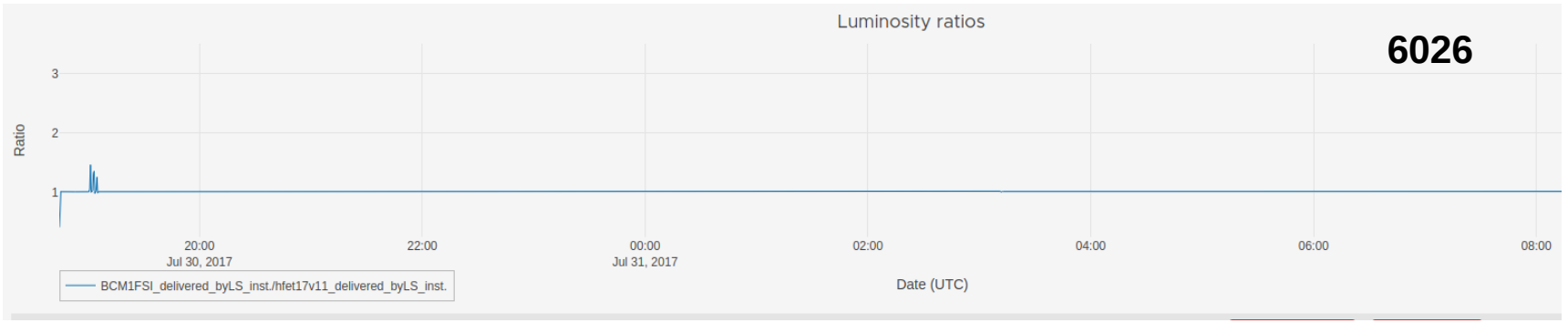


Thanks to Zhen and Jonas !!

BCM1FSi17 data uploaded

Processed Si data has been uploaded to lumi DB

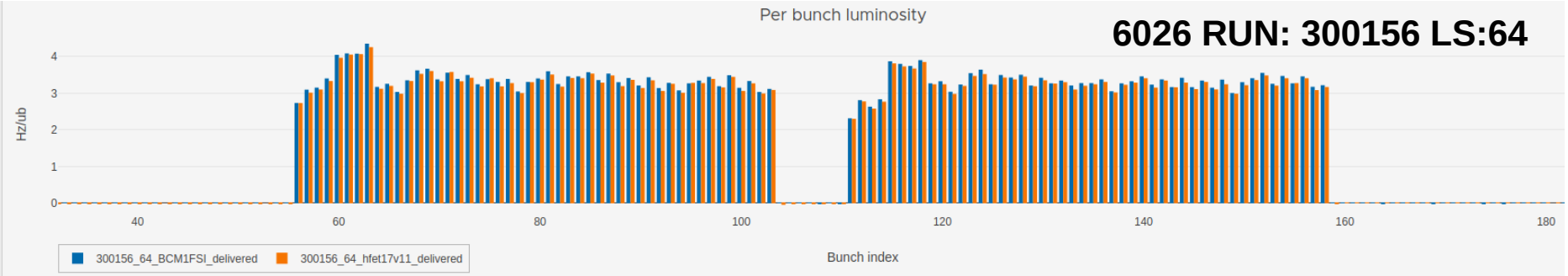


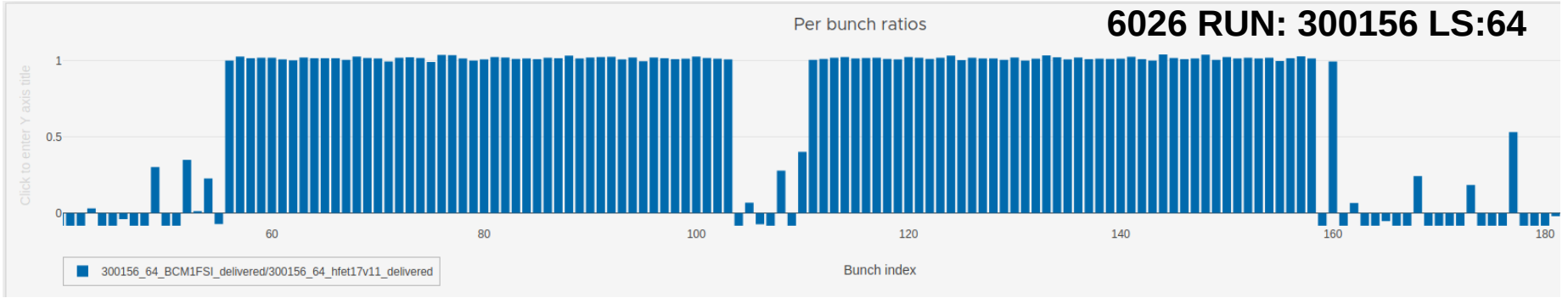


Thanks to Zhen and Jonas !!

BCM1FSi17 data uploaded

Processed Si data has been uploaded to lumi DB

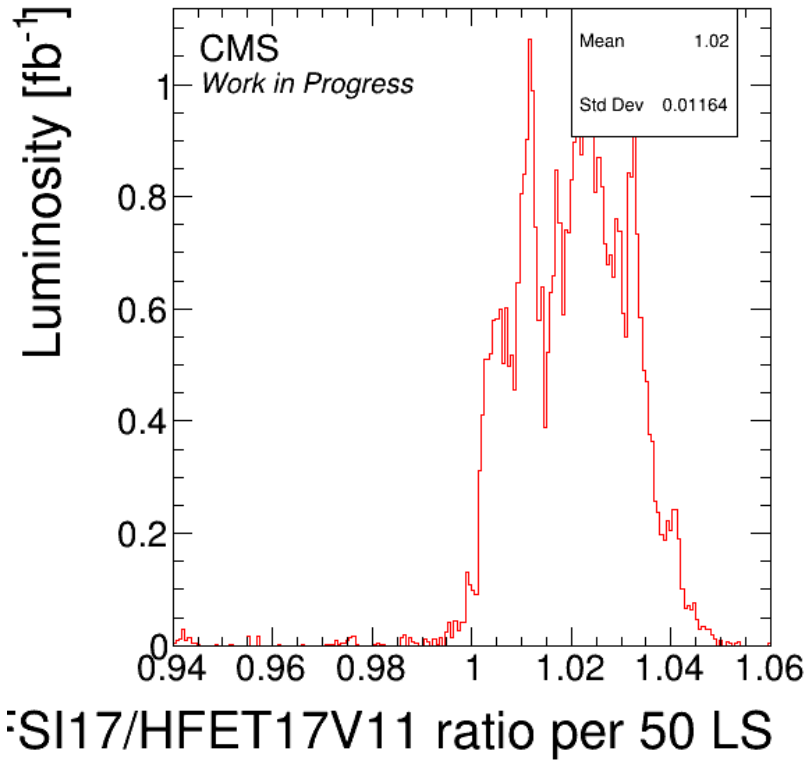


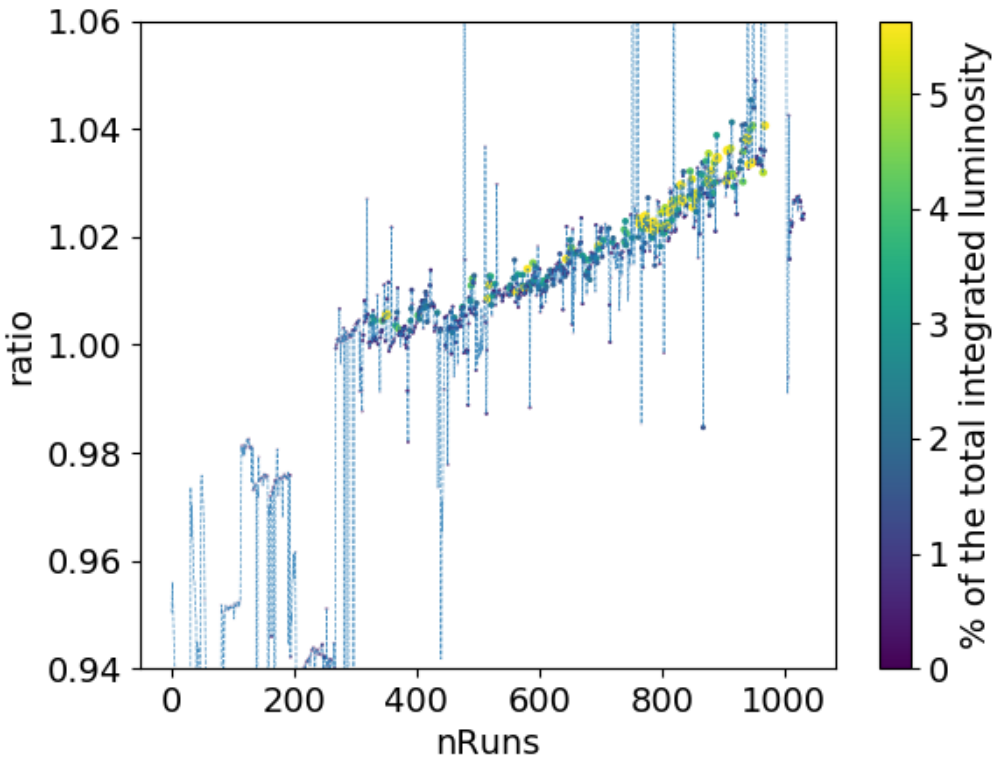


Thanks to Zhen and Jonas !!

BCM1FSi17 LUMI

Integrated lumi ratio plots (bcm1fsi17/hfet17v11)



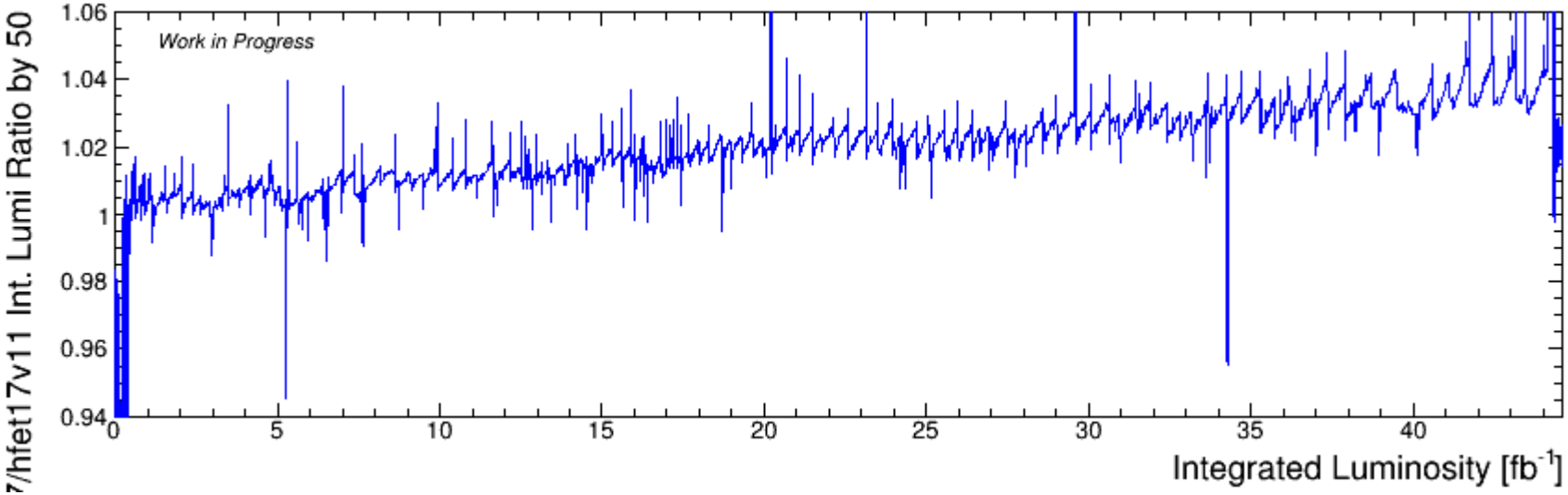


BCM1FSi17 LUMI

Integrated lumi ratio plot (bcm1fsi17/hfet17v11)

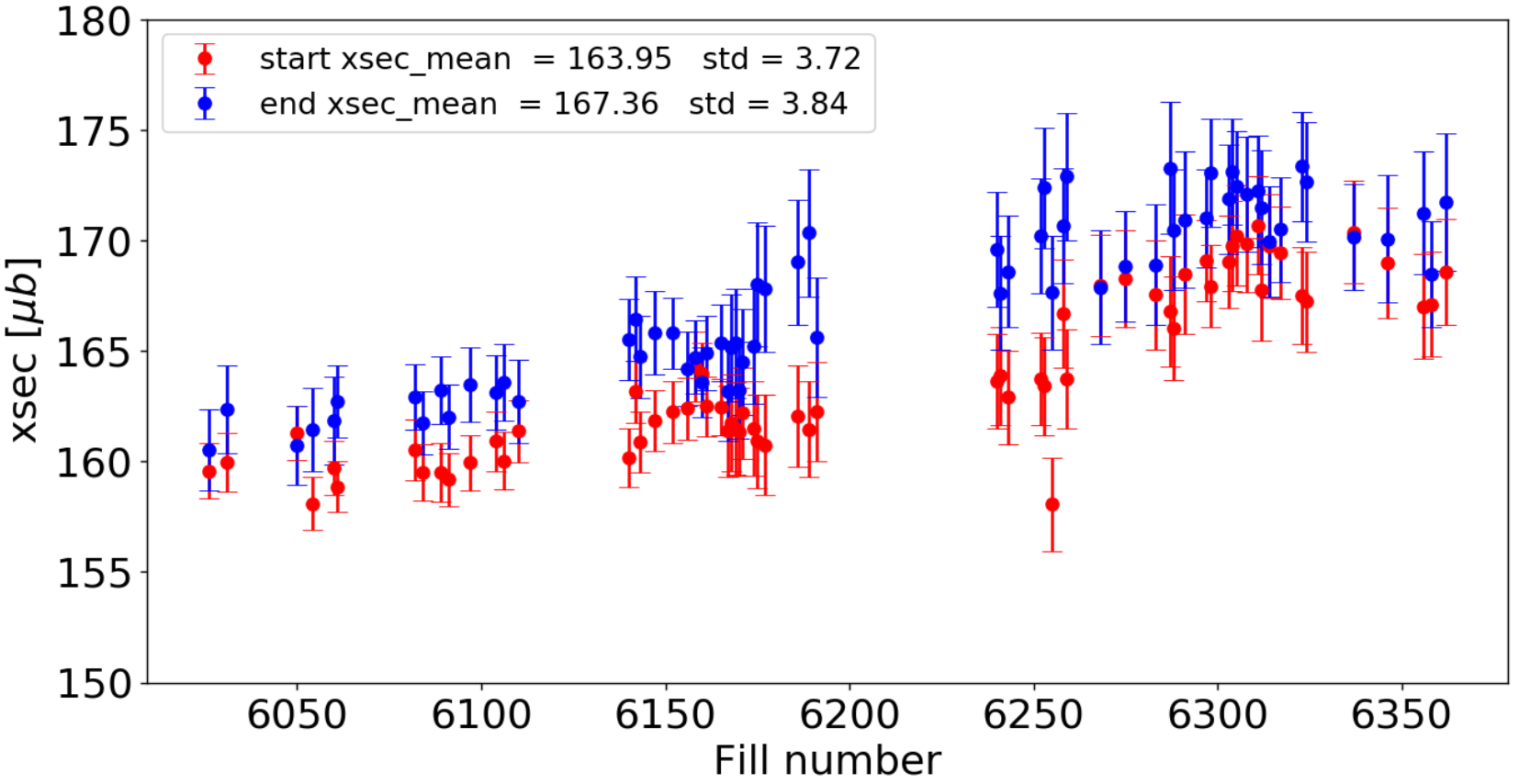
The data was uploaded using the calibration from VdM scan

σ_{vis} = 161.9 μb (+1.5% correction)
R_f = 11 245.5 Hz
C1 = R_f / σ_{vis} = 69.5 Hz/μb
(bx = C1*bxraw)(avg= avgraw*C1)



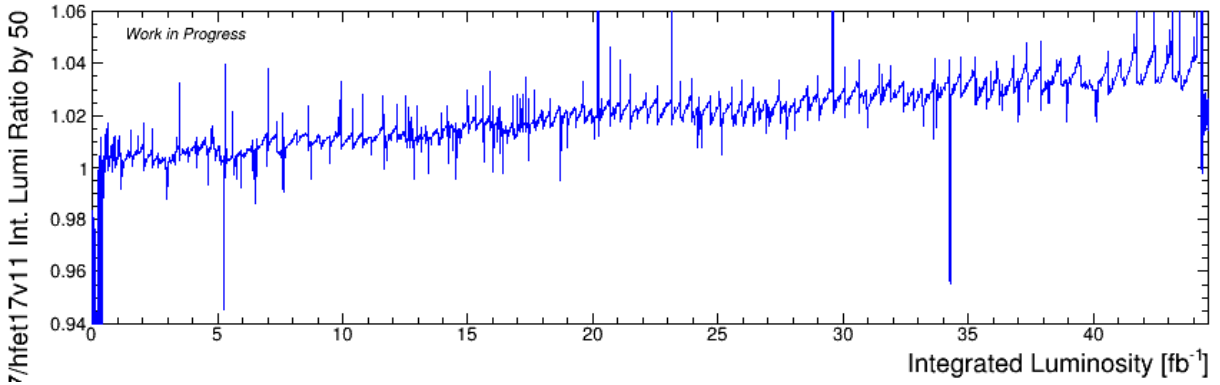
BCM1FSi17 LUMI

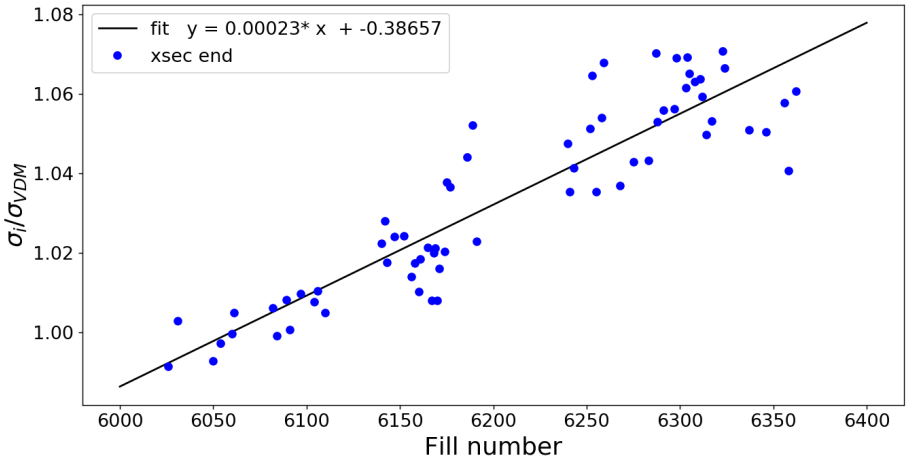
Emmitance Scan (early and late scan)

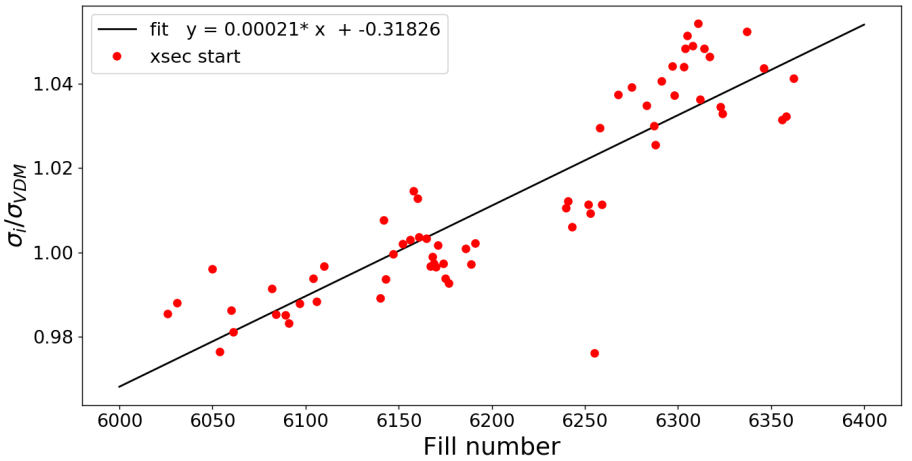


BCM1FSi17 LUMI

Integrated lumi ratio vs Emittance Scan

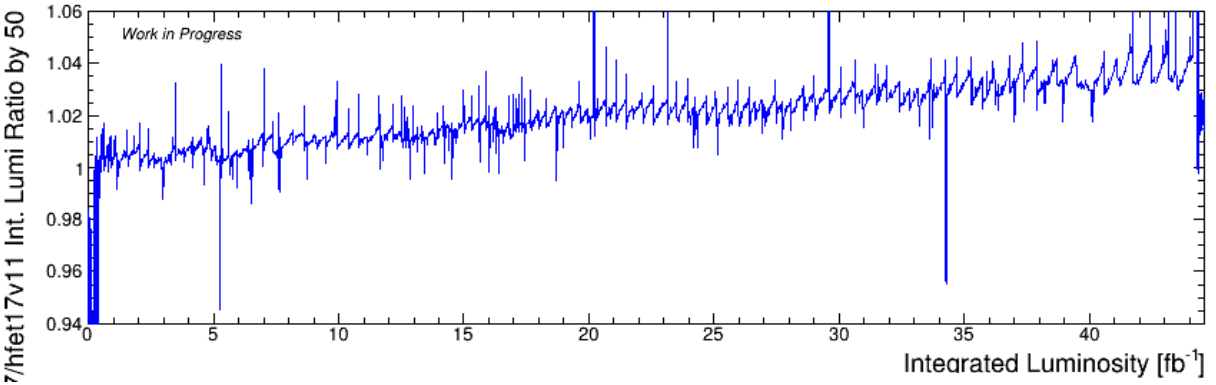


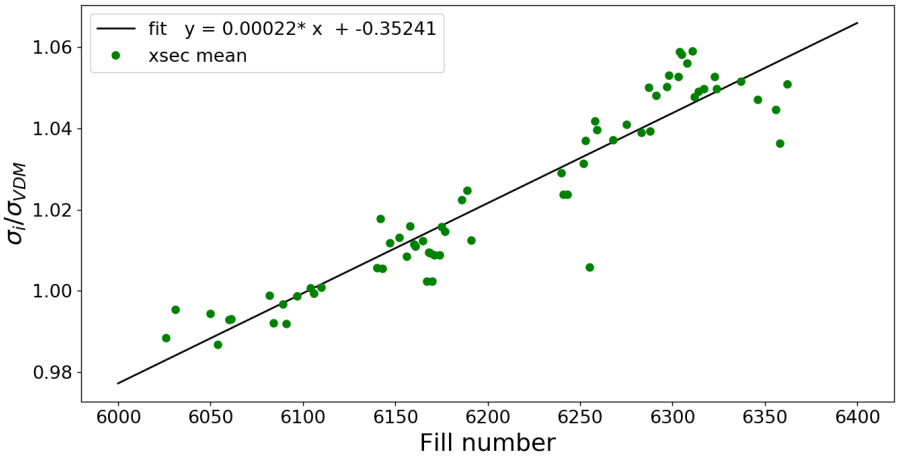




BCM1FSi17 LUMI

Integrated lumi ratio vs Emittance Scan





Summary and next step

- **Calibration**

➢ BCM1FSI 2017 data have been improved

➢ Reprocessed data has been uploaded to lumi DB

➢ ES results are consistent with lumi behavior

➢ The luminometer shows good linearity and stability

➔ Use the VdM scan and ES (late scan) results to make a normtag


DESY.


BRIL
Beam Radiation Instrumentation and Luminosity


CMS

THANK YOU !