AUG Monday Morning Meeting 30/11/2015

Permanent IMSE 2015 - November 2015

±Bφ Calibration shots
Sawteeth shots

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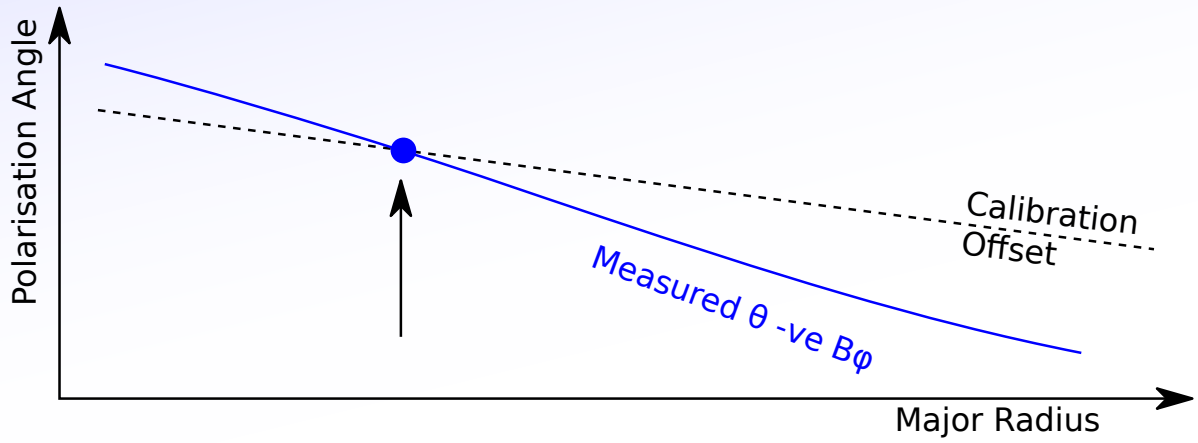
IMSE Reverse Bφ Calibration

Pitch of the magnetic axis is 0 by definition, but we need to know where axis is to use this:



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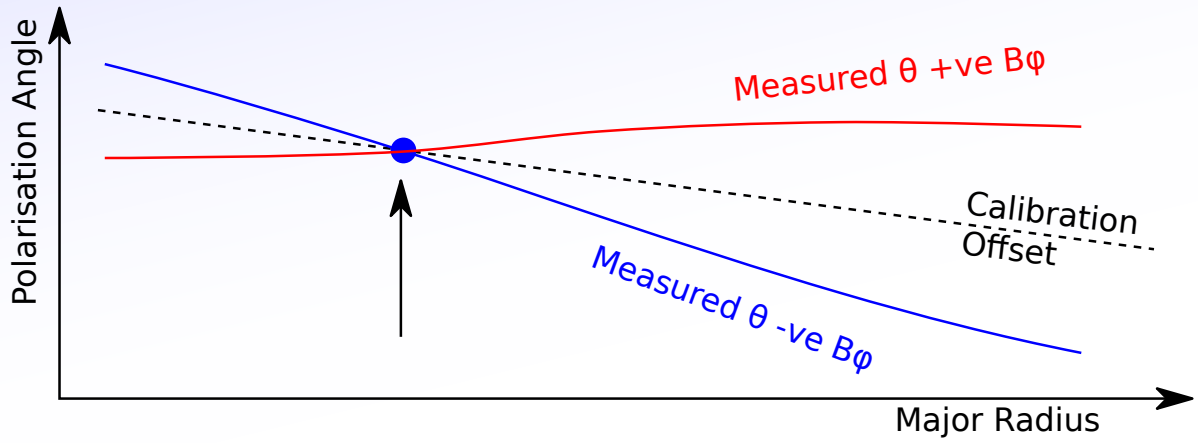

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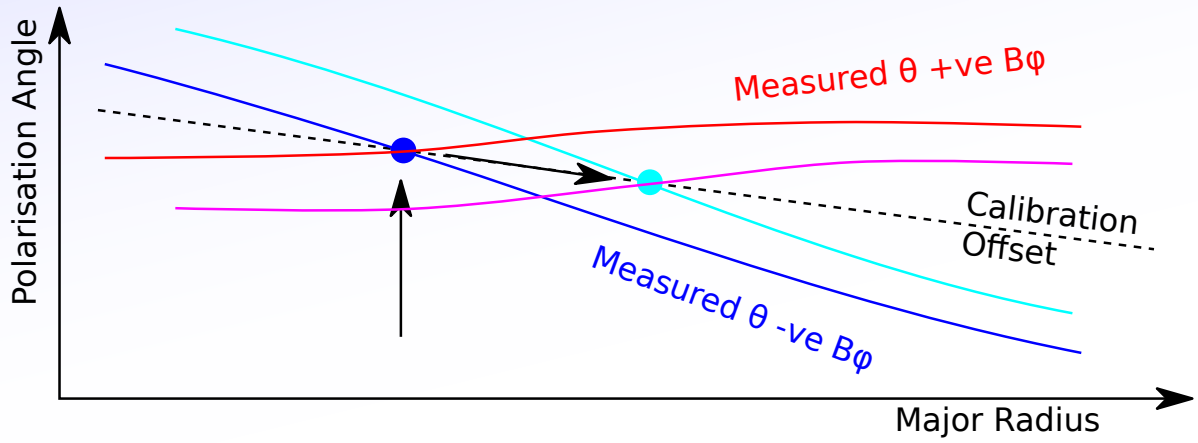

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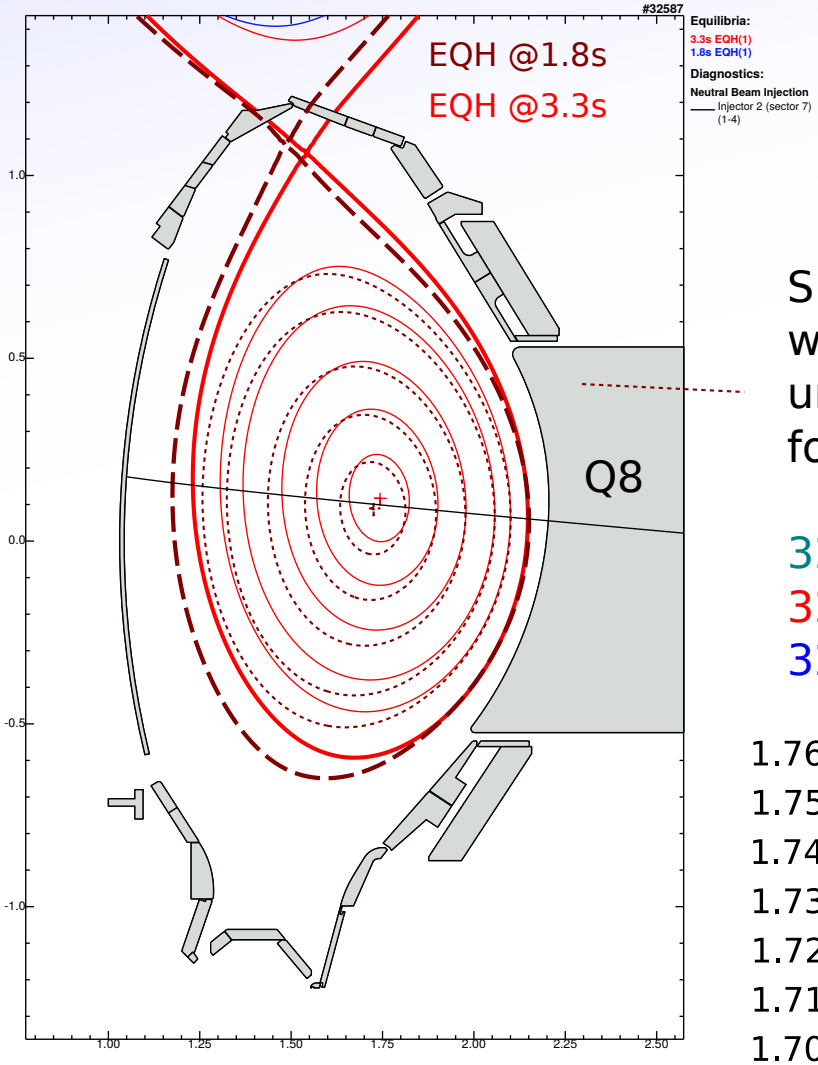
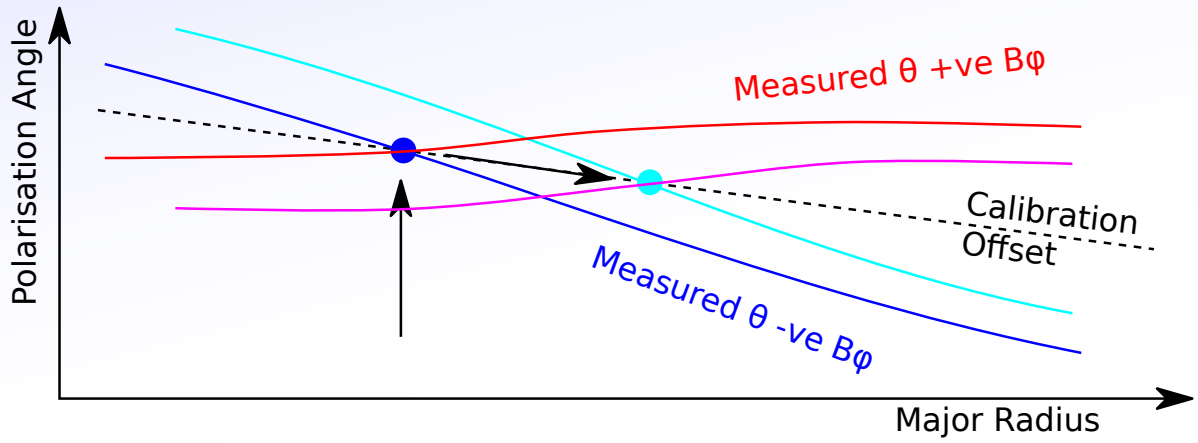
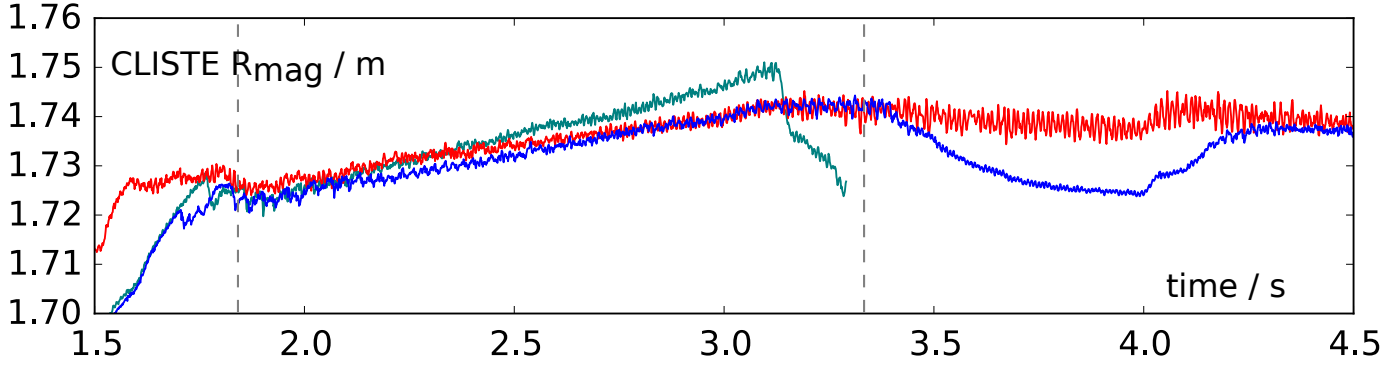




Slowly scan magnetic axis position as far as possible in R with ±Bφ. Try to keep pulses the same (difficult with unfavorable drift in +ve Bφ) and density as low as possible for good S/N.

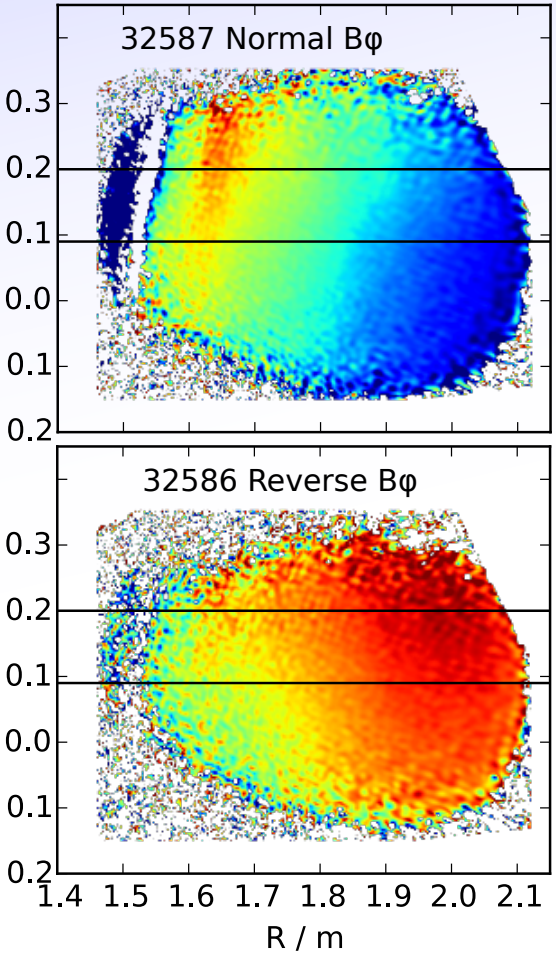
32585: Normal Bφ. Rmag scan different, disrupts early.
32586: Reverse Bφ. Good shot. (+Q5 data + Q3 for MSE)
32587: Normal Bφ. Good shot. (+Q5 data + Q3 for MSE)

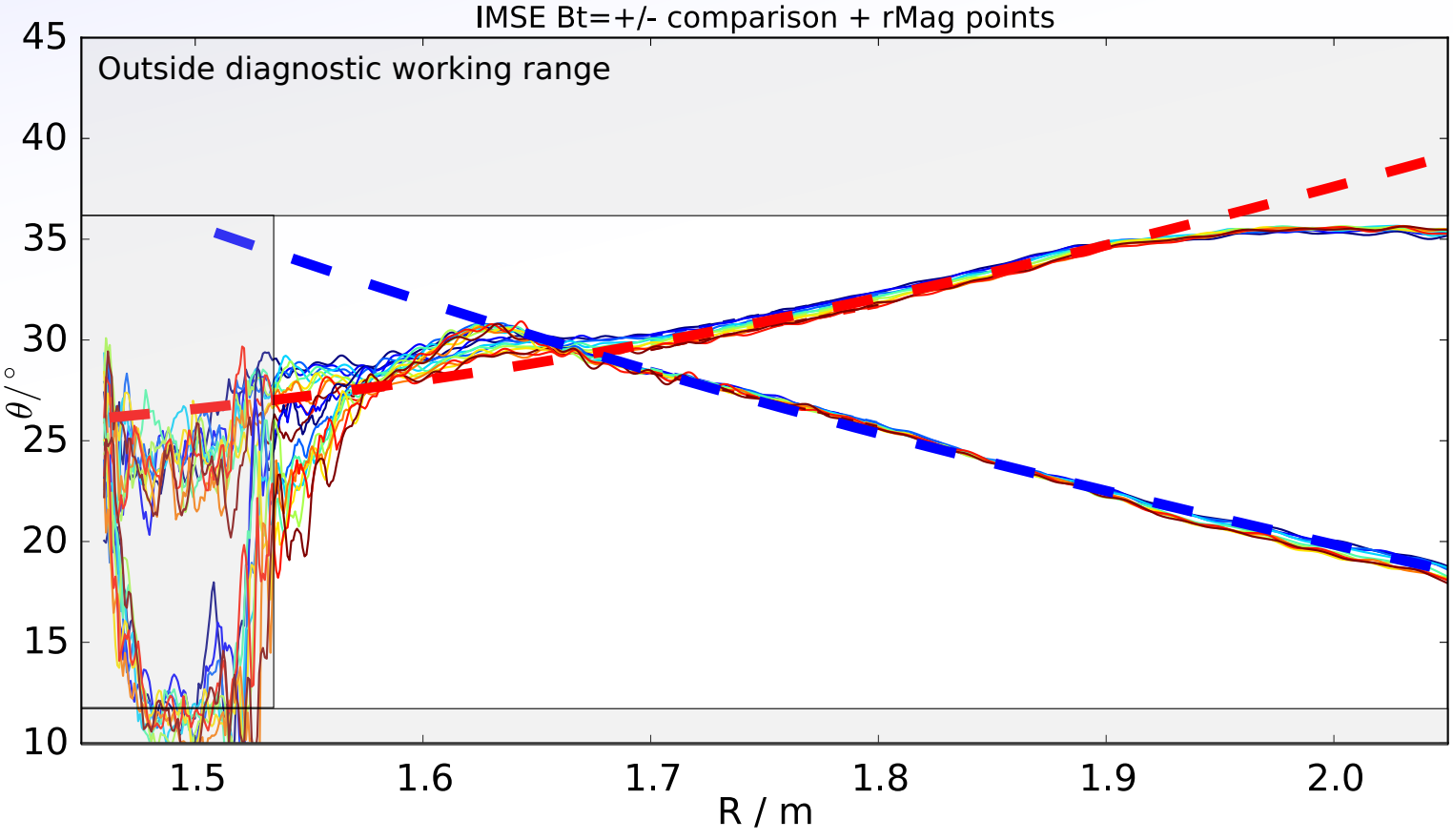


IMSE Reverse Bφ Calibration

Good IMSE data despite relatively high electron density (H-1: 6 - 10 x10^{19}):

Polarisation θ

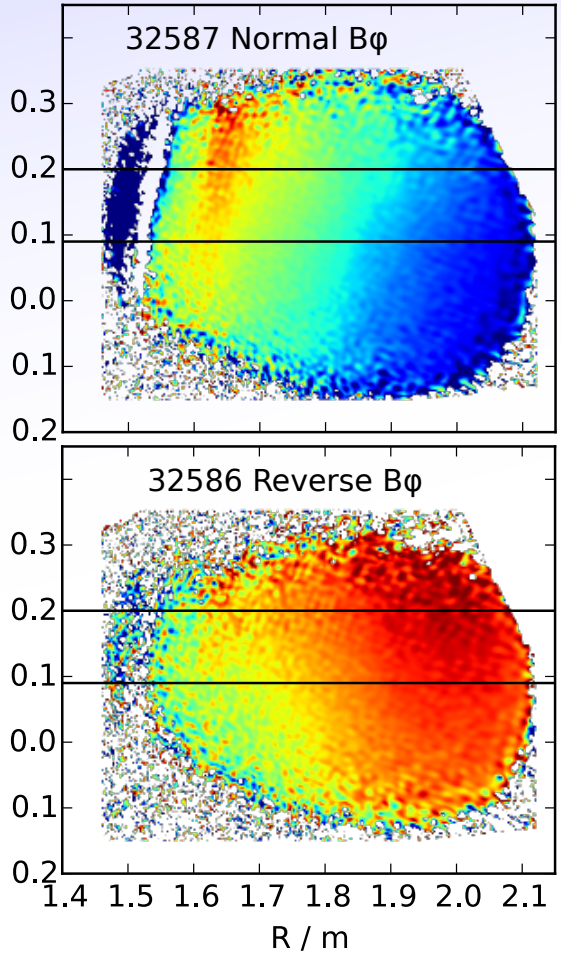


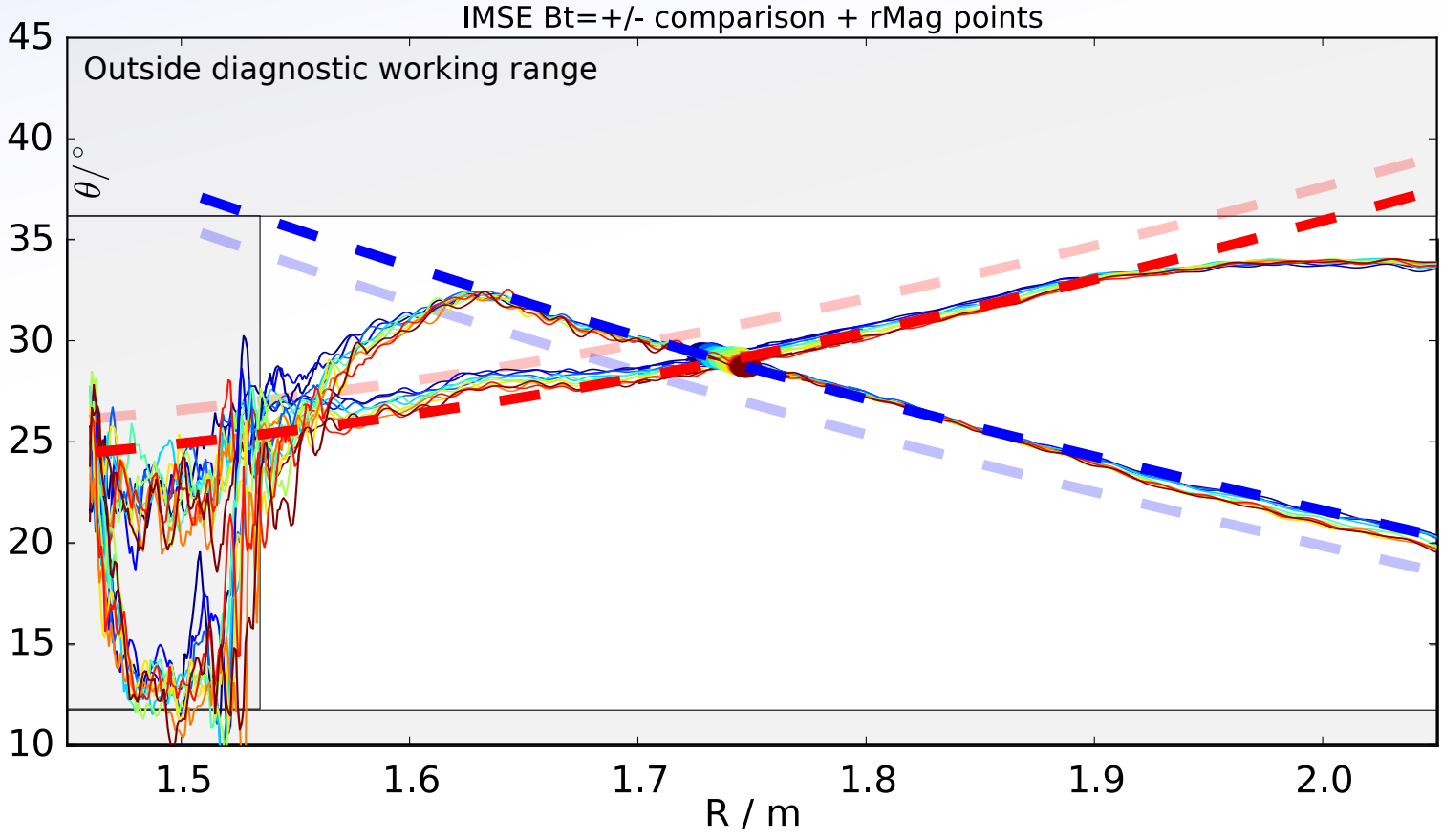


IMSE Reverse Bφ Calibration

Good IMSE data despite relatively high electron density (H-1: 6 - 10 x10^{19}):

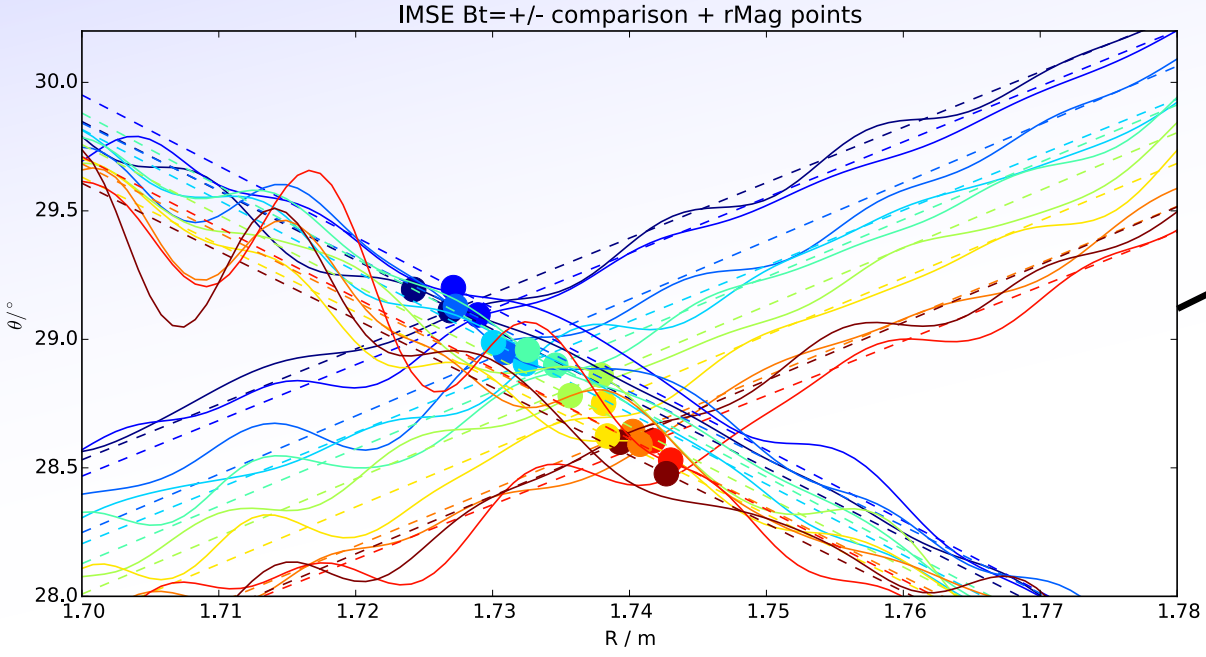
Need to take account of inverted Faraday rotation due to TF:

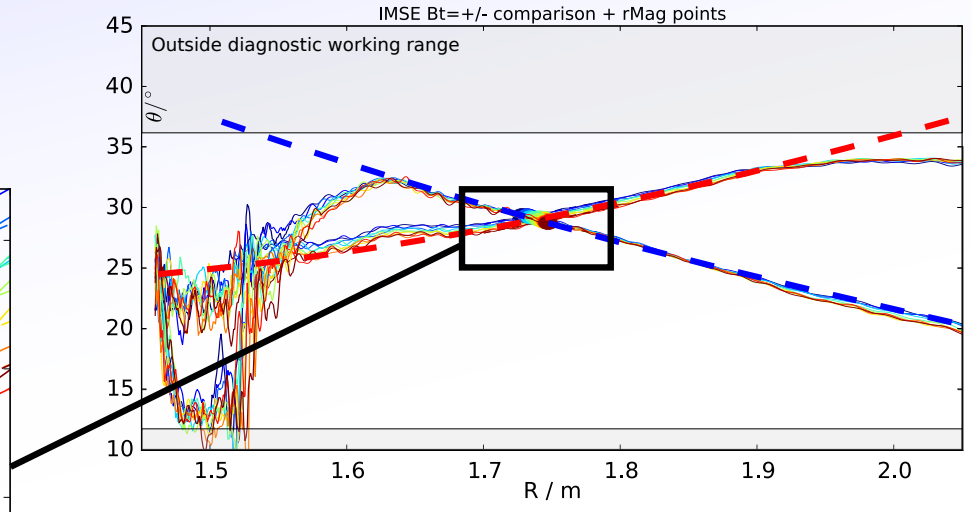




IMSE Reverse Bφ Calibration

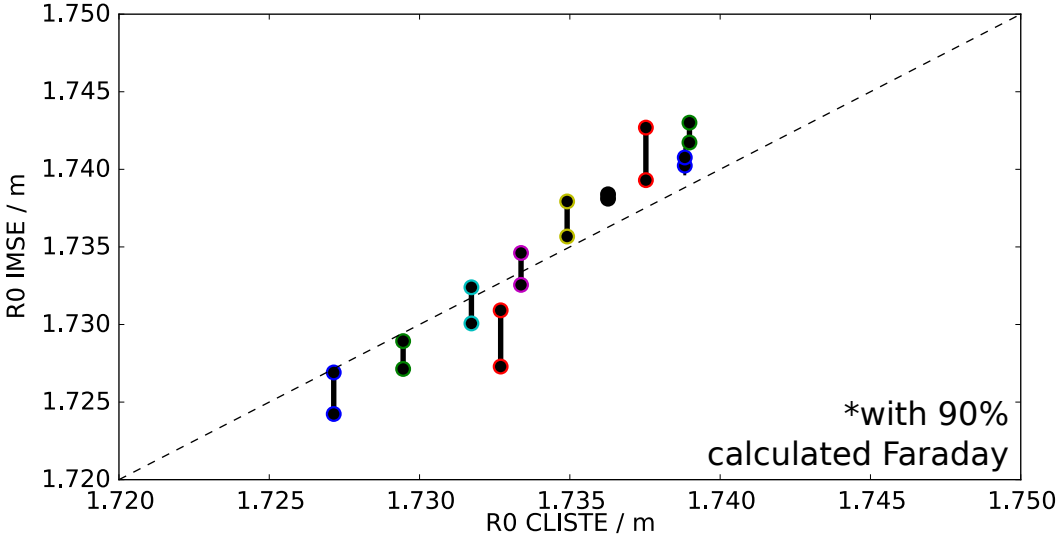
Only had scan $1.71 < R_{mag} < 1.75$:





Agreement with CLISTE R_{mag} is surprisingly good, although it would be good to confirm R_{mag} with another diagnostic.

Not sure why the polarisation angle in the normal Bφ shot decreases though - Calculated PF Faraday is not enough to explain it - need to check lamps.



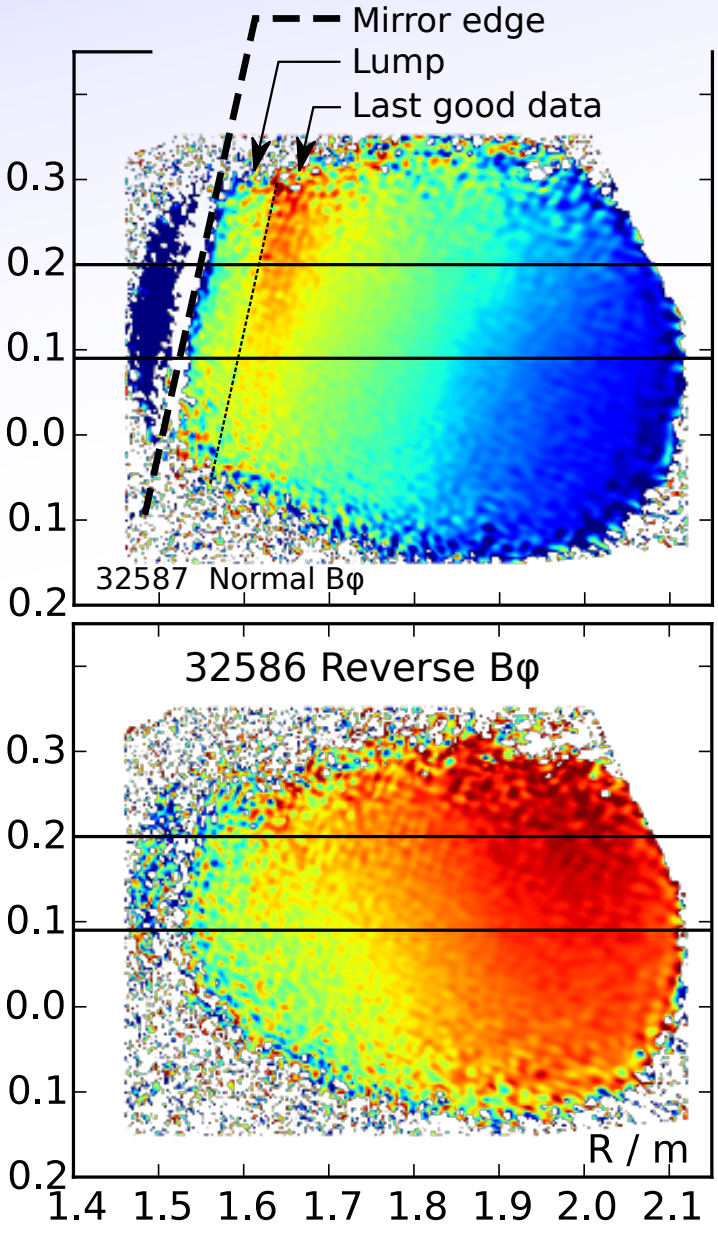
This has been the most sucessful calibration exercise so far - we definitely want to further develop the shot.

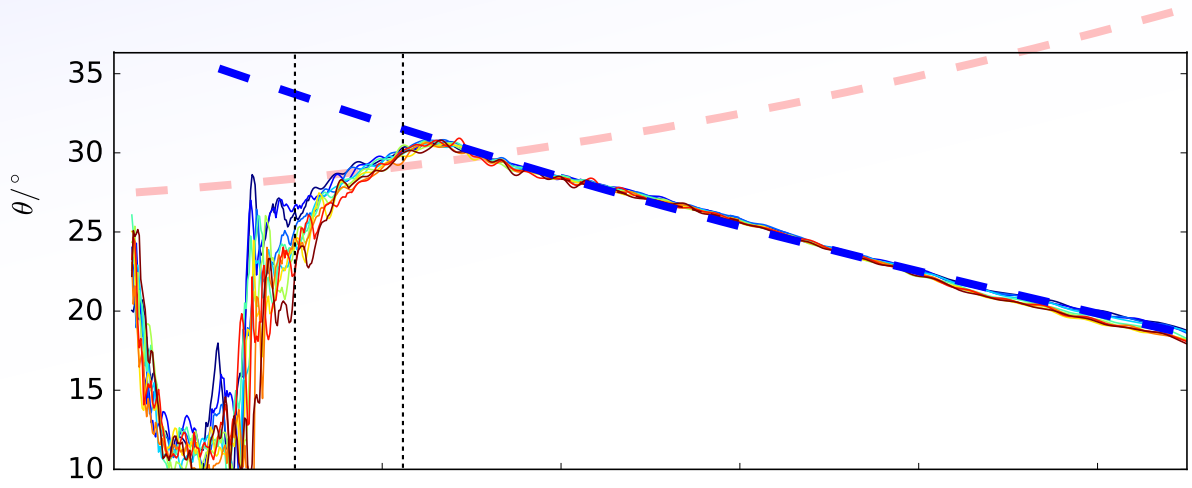
- Bigger scan of Rmag.
- Better control of density.
- Q5 & Q7

We should also check the MSE data (no R_{mag} scan).

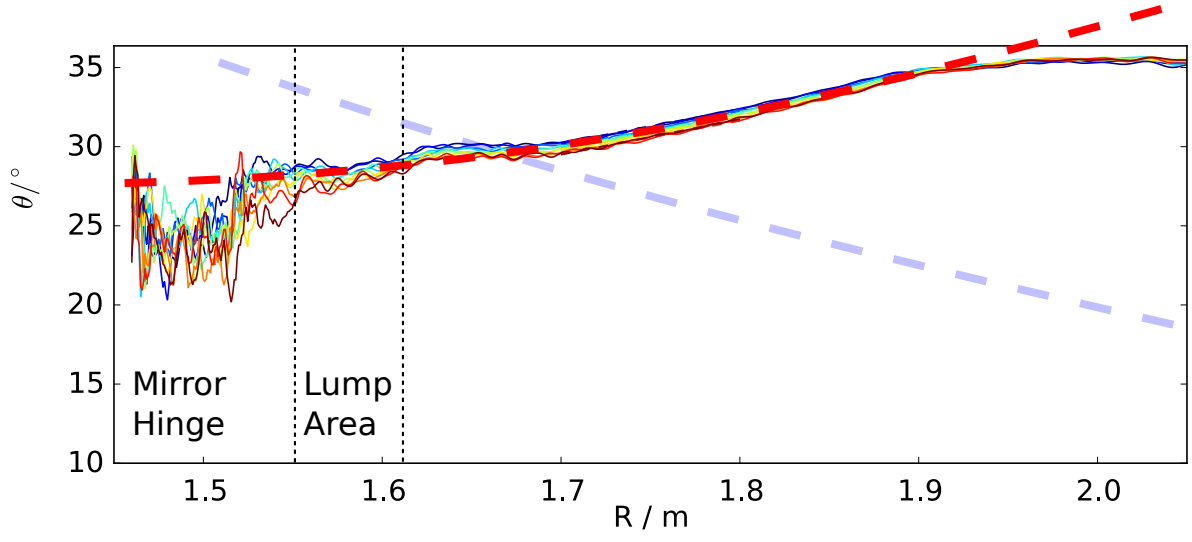
IMSE - Core/Edge contamination

Returning to the raw data, we've always had problems with data in 1.55 < R < 1.6: (variations with >2nd order in R). This was much less of an effect in reverse Bφ.

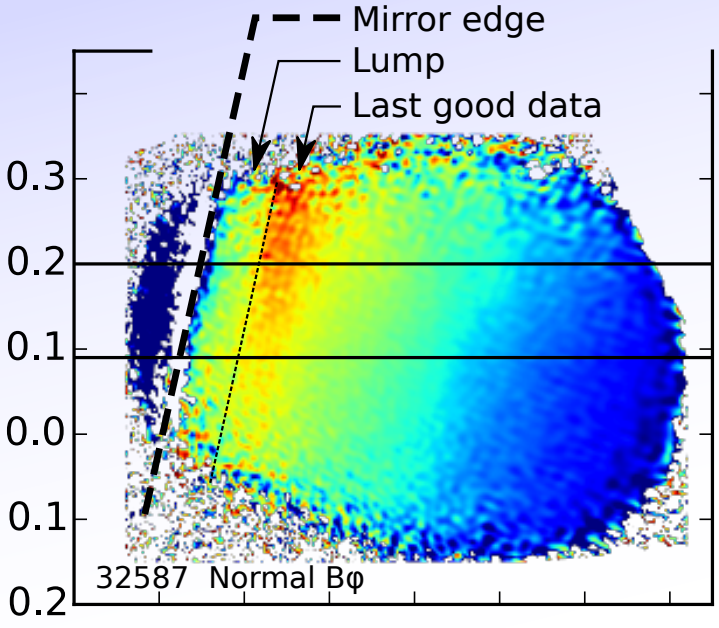


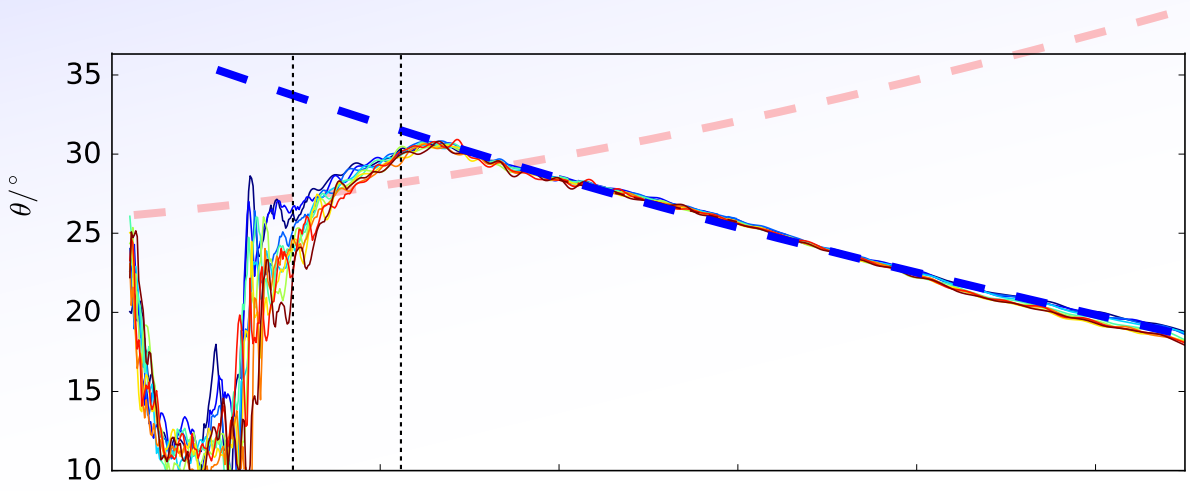


Reflection from the mirror hinge and the lump seem to be some edge light (which is much brighter) reflected onto the core image.

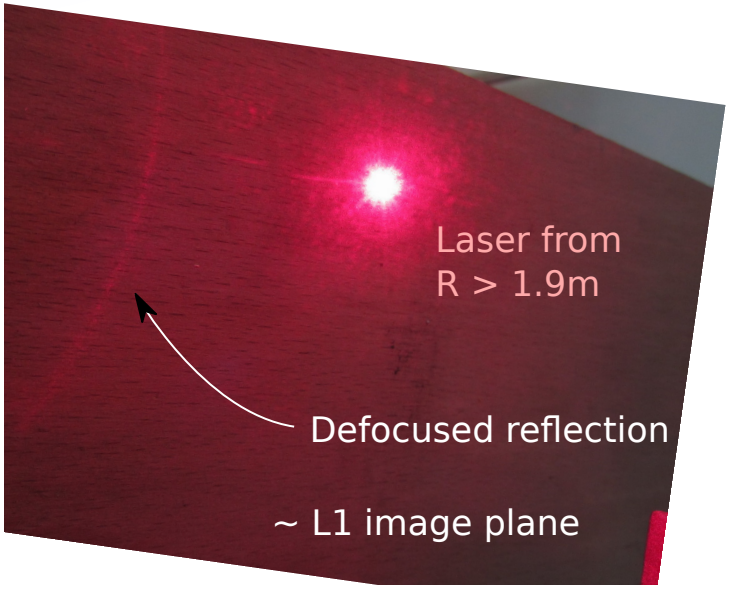


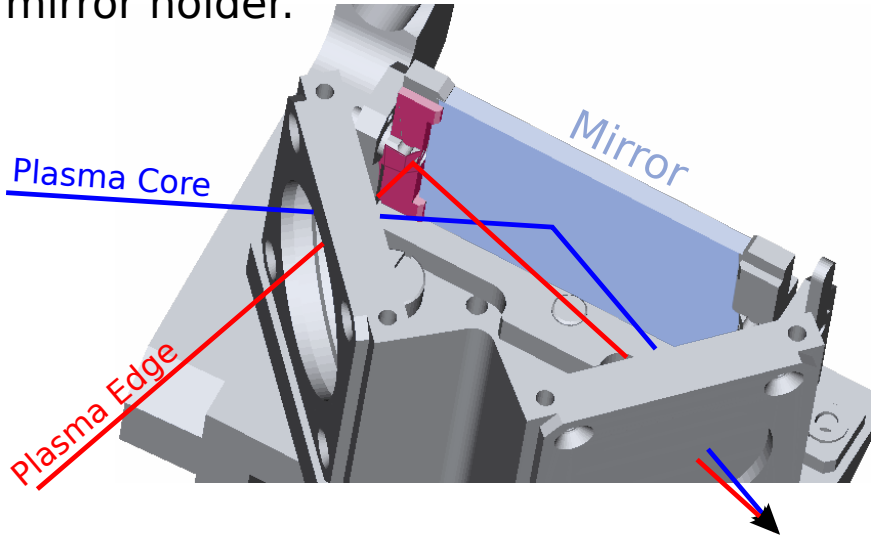
IMSE - Core/Edge contamination





Building mock-up in lab this week and we can see something that might cause this: defocused reflection from the in-vessel mirror holder.





1) Don't use data at R < 1.62m from 2015.
2) Mechanically fix next opening for future campaigns.
3) For 2016, see if it's possible to spectrally filter out edge light from core image area.

Oliver Ford
IPP Greifswald

PermIMSE - Sawteeth

Attempted to measure the sawteeth shots on Tuesday with the IMSE since this had worked well with the prototype system, except that it couldn't see to the core.

Use reduced ROI (for Q8 only), dropping frame period to 7ms (normally 13ms).

32566: Good - Irregular sawteeth but clear data.
32568: Q8 tripped.
32569: 3 Sawteeth only.
32570: Camera failed, and no Sawteeth with Q8.
32571: No sawteeth.
32573: No sawteeth (intentionally)
32574: No Q8

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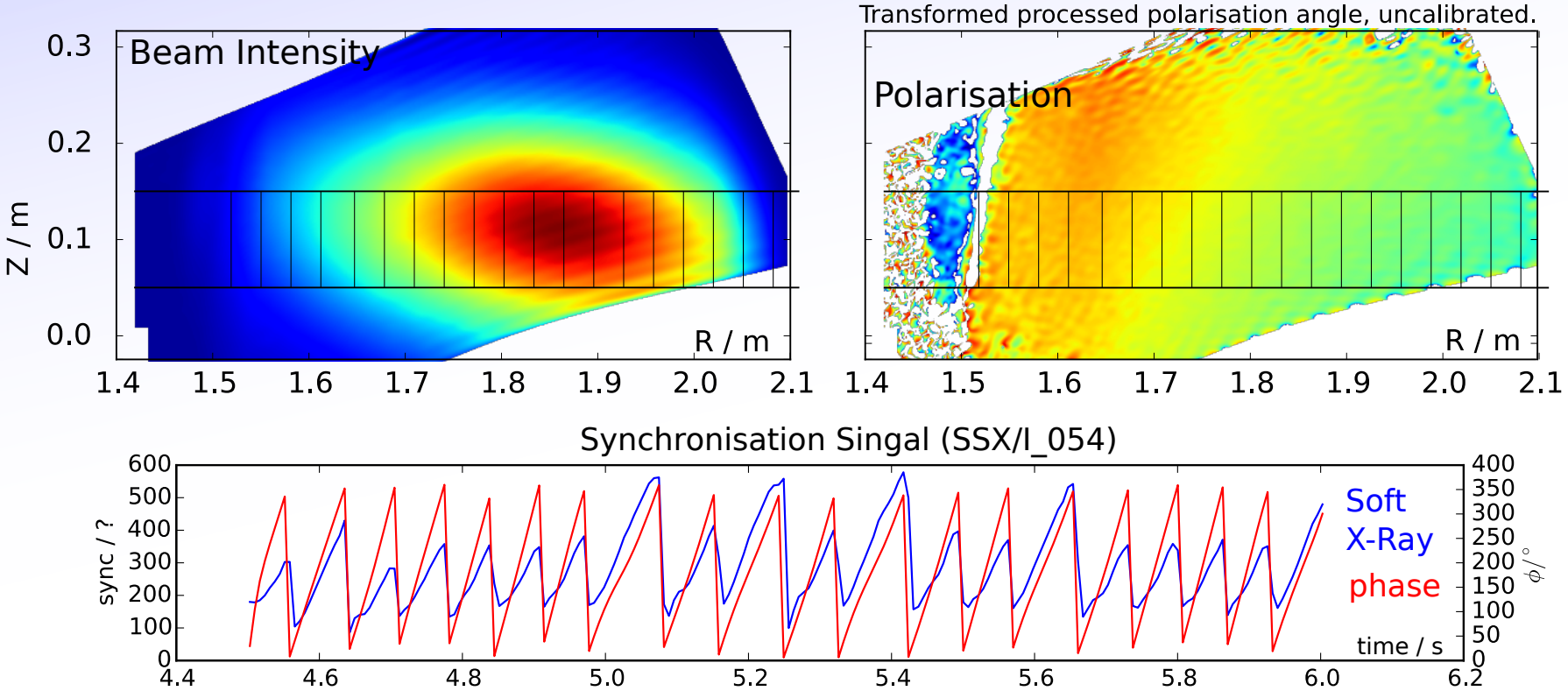
IPP Greifswald

PermIMSE - Sawteeth



To first approximation in the core, the plasma current goes as dθ/dR.

- Collect image dθ/dR in bins of R and sawtooth phase
- Average in bins (over R, Z and t)
- Subtract average for each R bin to show the dynamics over sawtooth phase.

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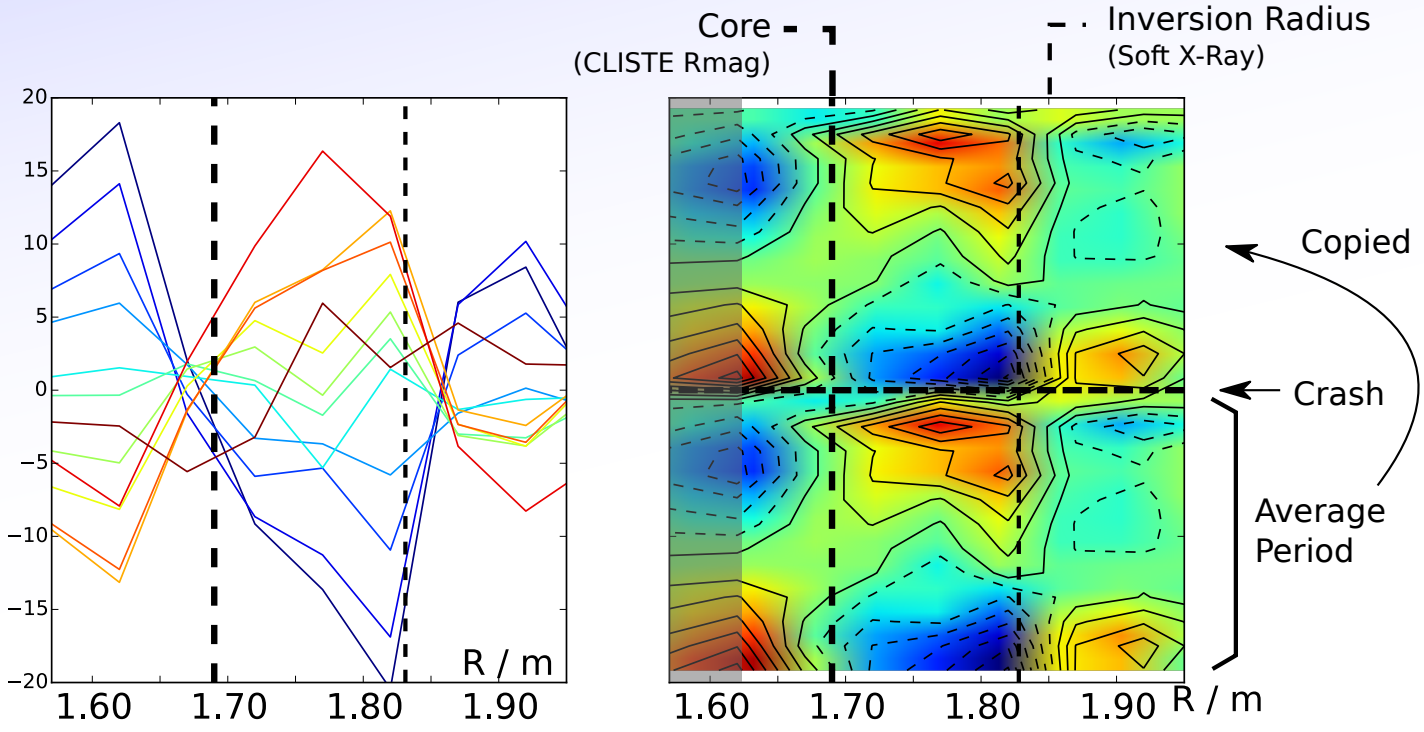
PermIMSE - Sawteeth

Gradient of intensity (~ dn_e/dR) shows us that our spatial calibration matches the approximate core position and inversion radius from ECE.



Gradient of polarisation ($d\theta/dR \sim j\varphi$) gives current dynamics.

Clearly see the build-up and explusion of current from the centre outwards.