Introduction

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Rutherford Appleton Laboratory

Reminder – Publication plan

		02-Aug-18	v7
Title	**Contact**	**Target date**	
		Final	**Preliminary**
Direct measurement of emittance using the MICE scintillating-fibre tracker	V. Blackmore	Jun18 CM51	
The MICE liquid-hydrogen absorber	C. Whyte/J. Boehm	Jun-18	Apr18 w/s
The MICE Analysis and User Software framework	D. Rajaram	Jun18 CM51	May18 w/s
Phase-space density/emittance evolution; rapid communication	C. Rogers	Jun18 CM51	Apr18 w/s
Measurement of multiple Coulomb scattering of muons in lithium hydride	J. Nugent	Jun18 CM51?	
Performance of the MICE diagnostic systems	S. Wylbur/P. Franchini		Jun-18
Beam-based alignment	C. Hunt		Jun-18
Muon Ionization Cooling Experiment (h/w)	C. Whyte/P. Franchini		Jun-18
Phase-space density/emittance evolution review paper	C. Hunt		
Phase-space density/KDE/6D-emittance evolution	T. Mohayai		Jun-18
Measurement of multiple Coulomb scattering of muons in LH2	J. Nugent		
Field-on measurement of multiple Coulomb scattering	A. Young		

Emittance Measurement Paper

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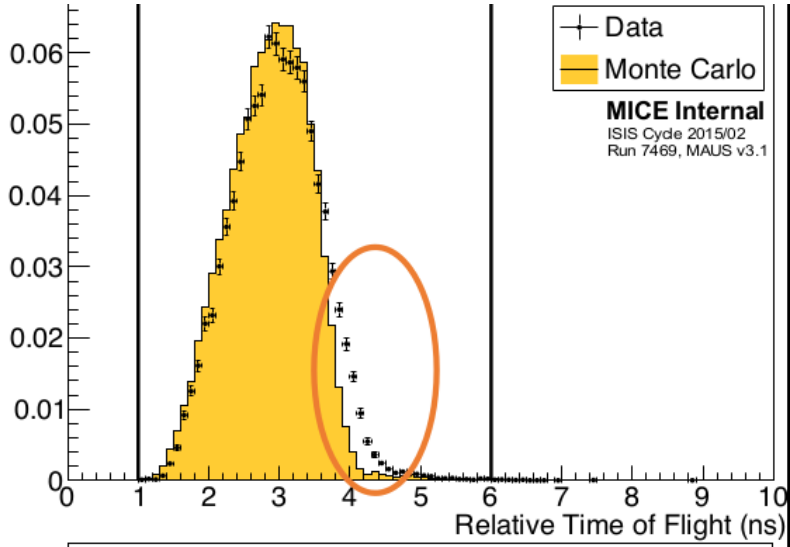
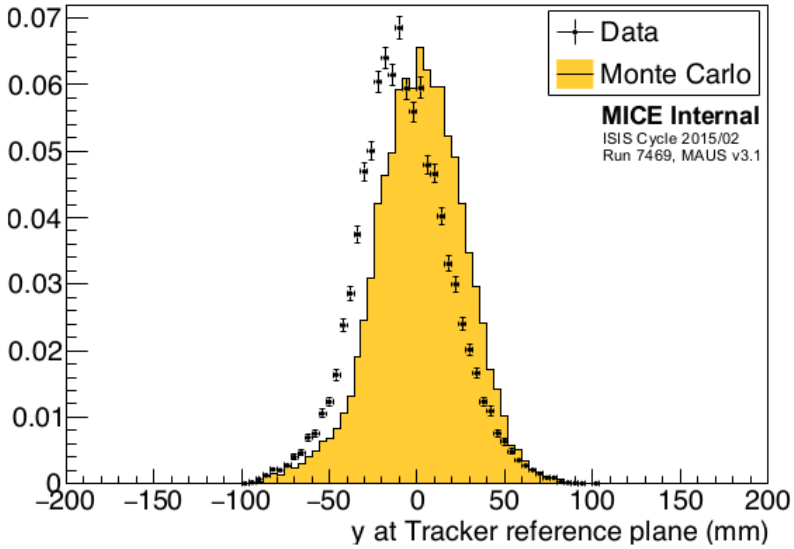
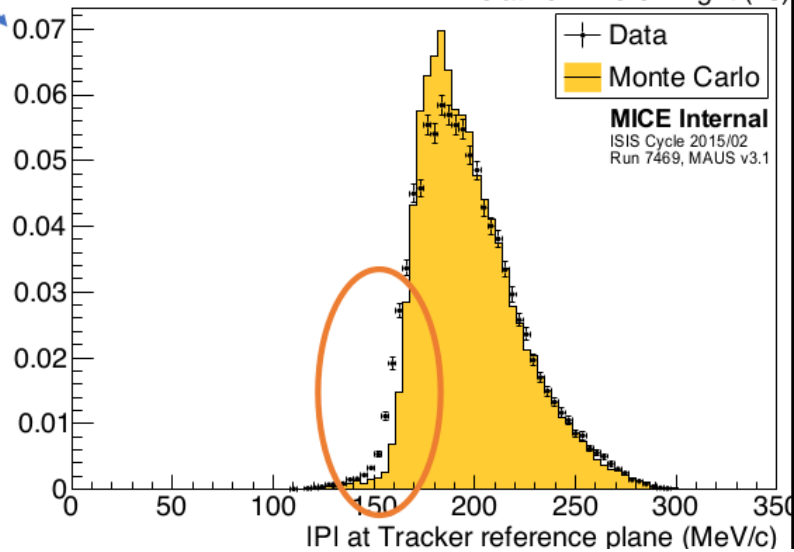
Emittance Measurement Paper (V. Blackmore)

Emittance Measurement: ”Problem” plots

Have a “solution” for these, but it does not help the y-distribution



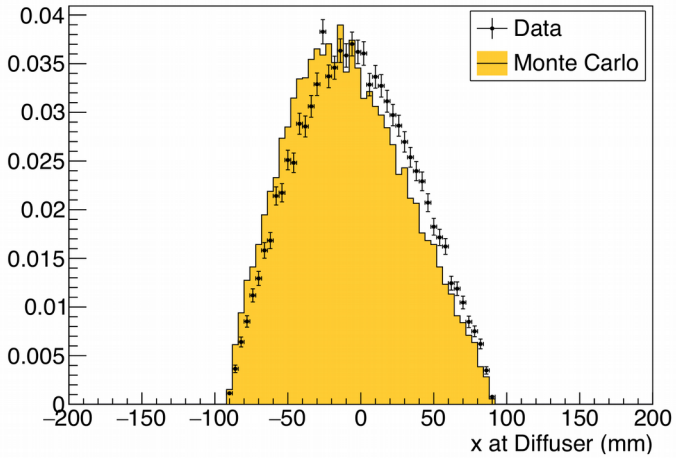


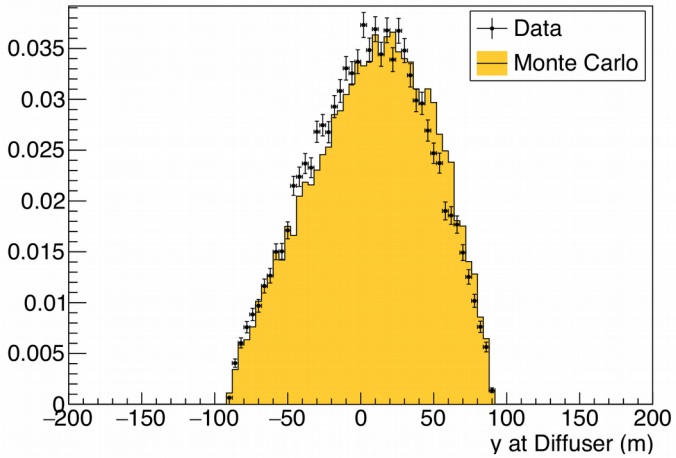


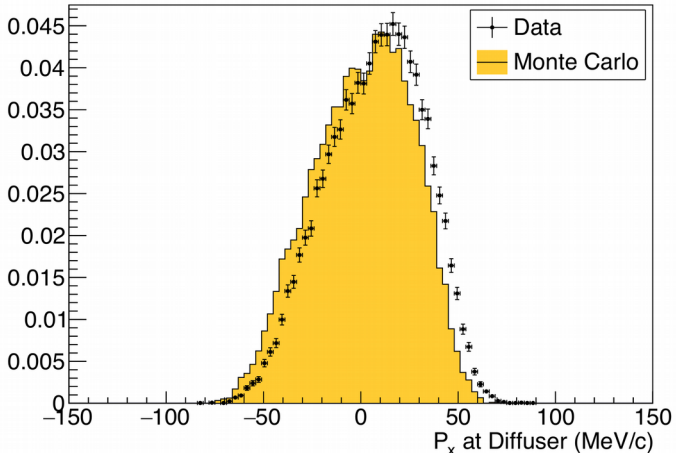
MC vs data at diffuser

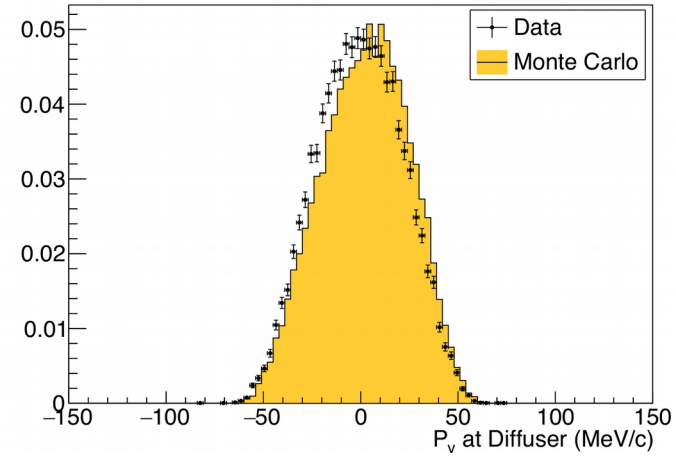
- Dedicated campaign to resolve this issue (and others) for several years
  - Many attempts at tuning dipole fields in MC
  - Measurement campaign on the dipole field in reality
  - Campaign to tune pion production at the target
  - Campaign to measure SSU field in-situ of PRY
  - Campaign to fix significant TOF MC & calibration issues which have existed for a decade
- This is not a new issue and one that analysis team has been battling for a long time

MC vs data at diffuser





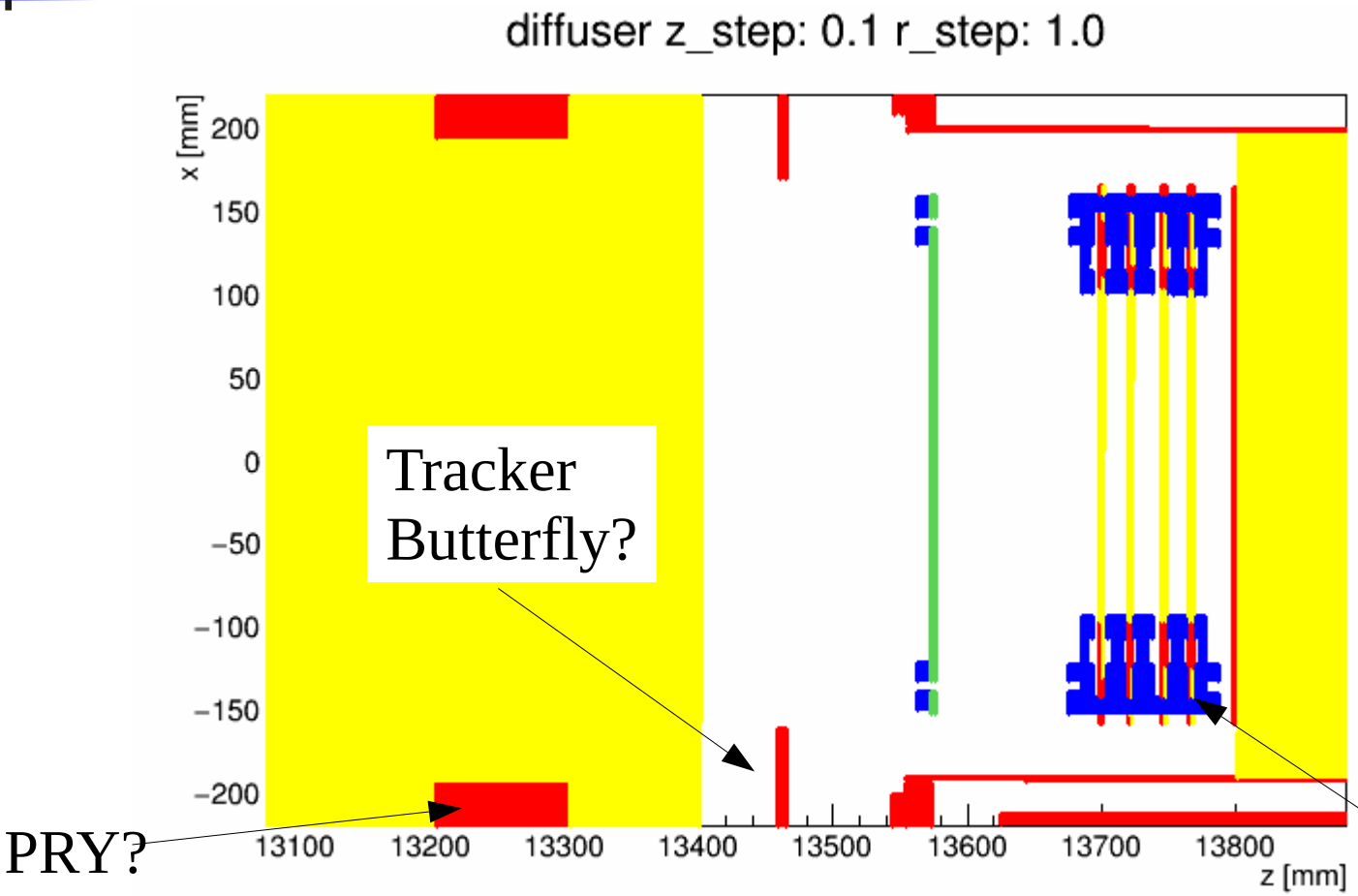




Transverse momentum discrepancy of beam extrapolated to the diffuser

- Could be missing apertures upstream?

Diffuser geometry (P Franchini)



Is geometry up-to-date? Correct? Consistent with other dates?

Emittance Evolution Paper

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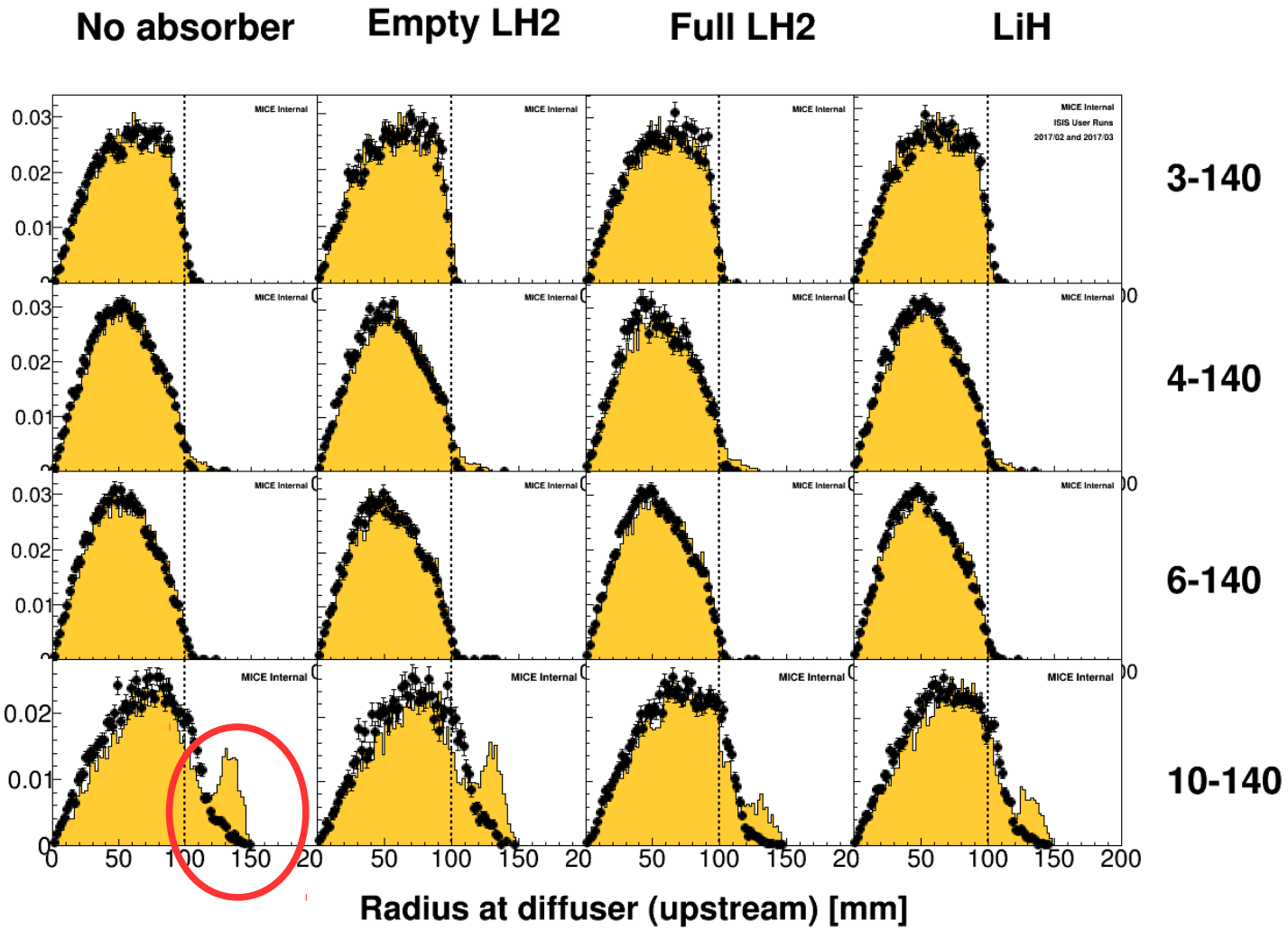
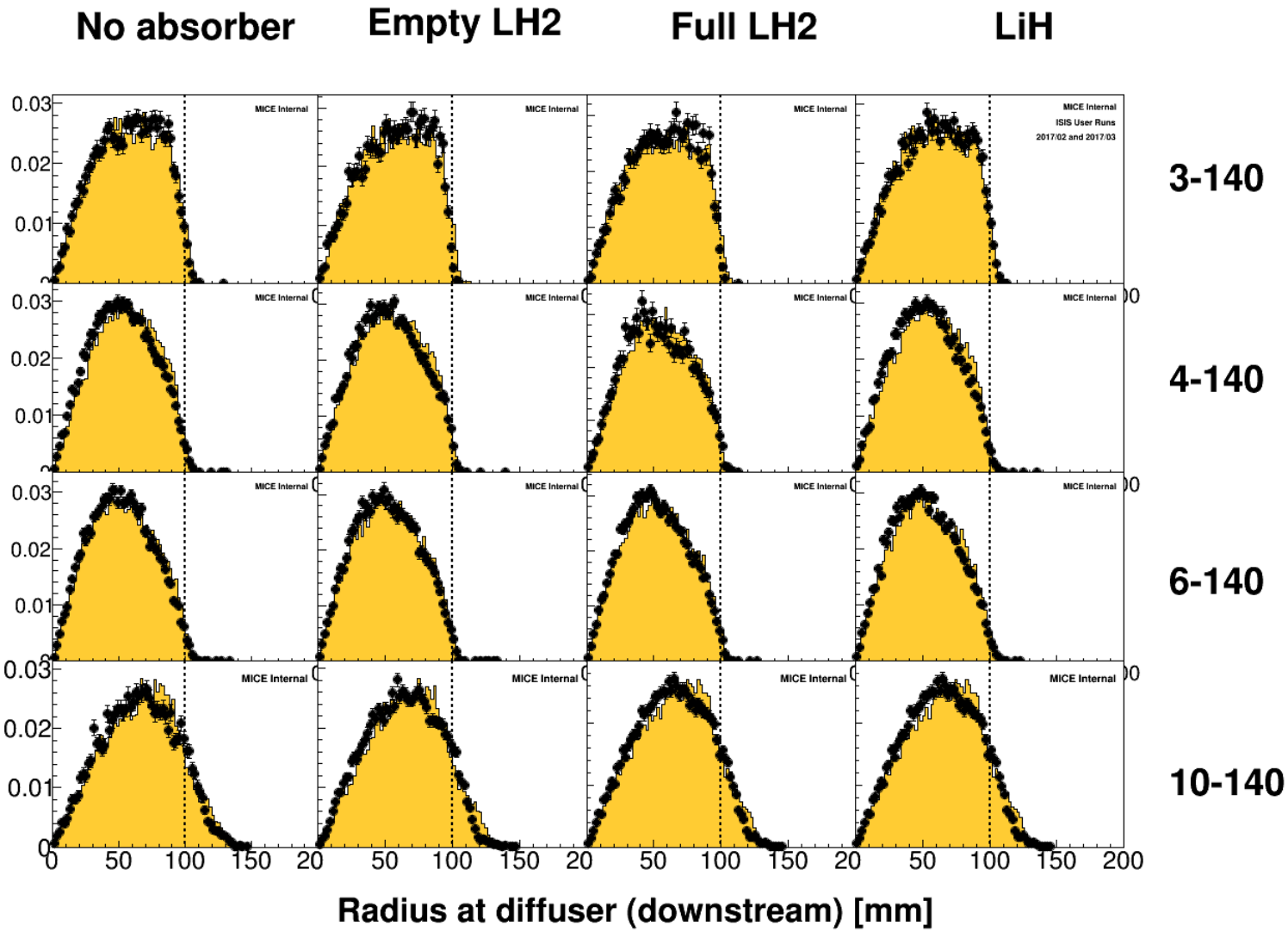
Radius at Diffuser - OLD



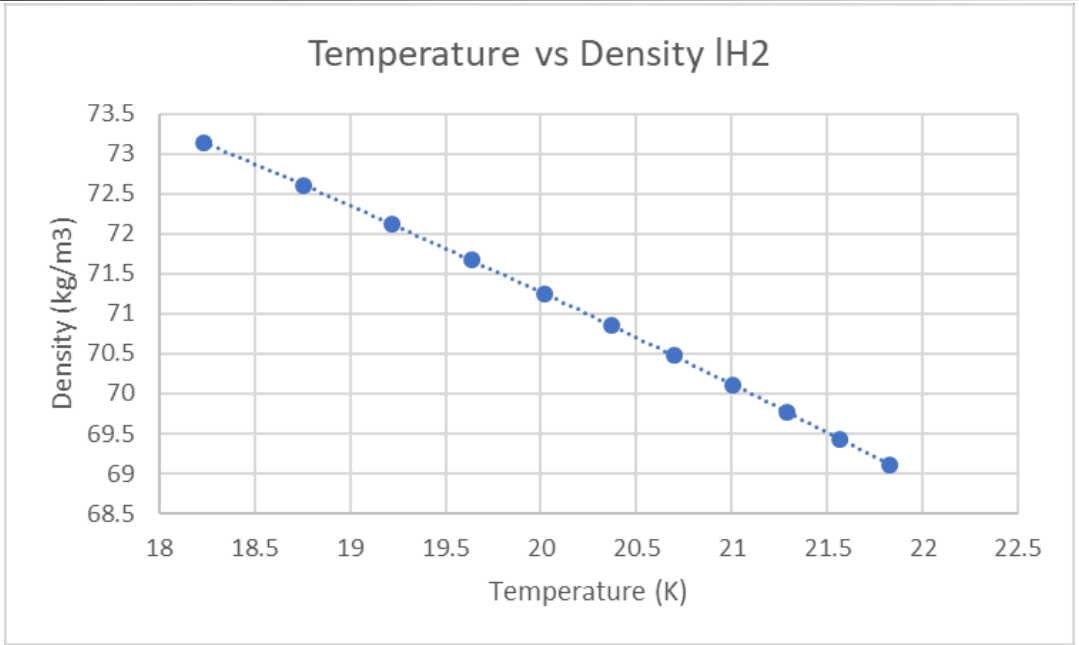
Old diffuser geometry...

Radius at Diffuser - NEW



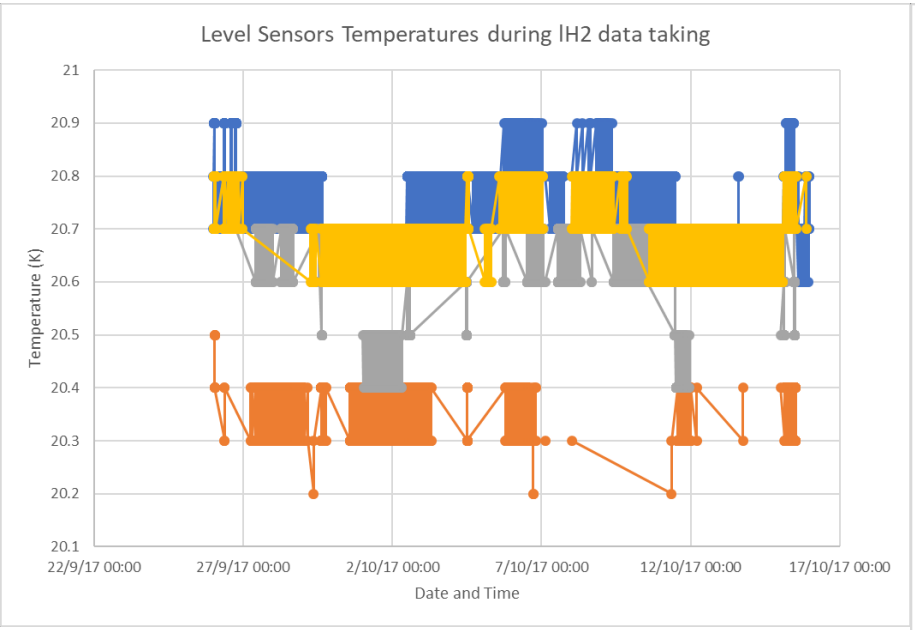
Improved diffuser geometry...

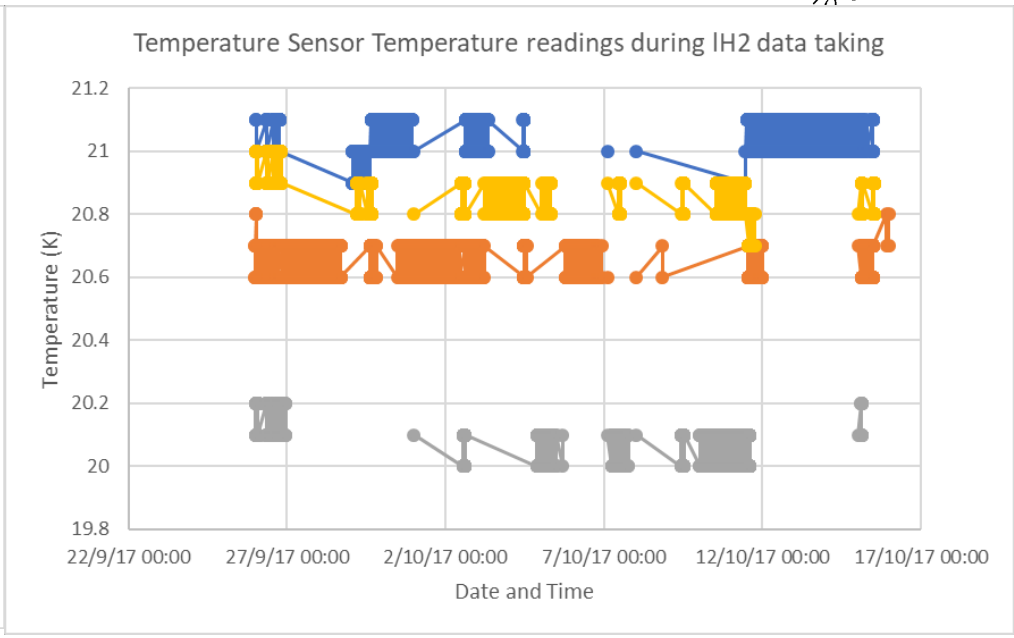
LH2 Studies (C. Brown)



- Determine the factors which can contribute to the systematic uncertainties of energy loss in lH2 absorber and to what extent, including:
  - Change in lH2 density for varying temperatures/pressures
  - Accuracy of temperature/pressure sensors
  - Deflection of absorber windows due to pressure and temperature
  - Smoothness of absorber windows (thickness variance)
  - Ortho/Para Hydrogen

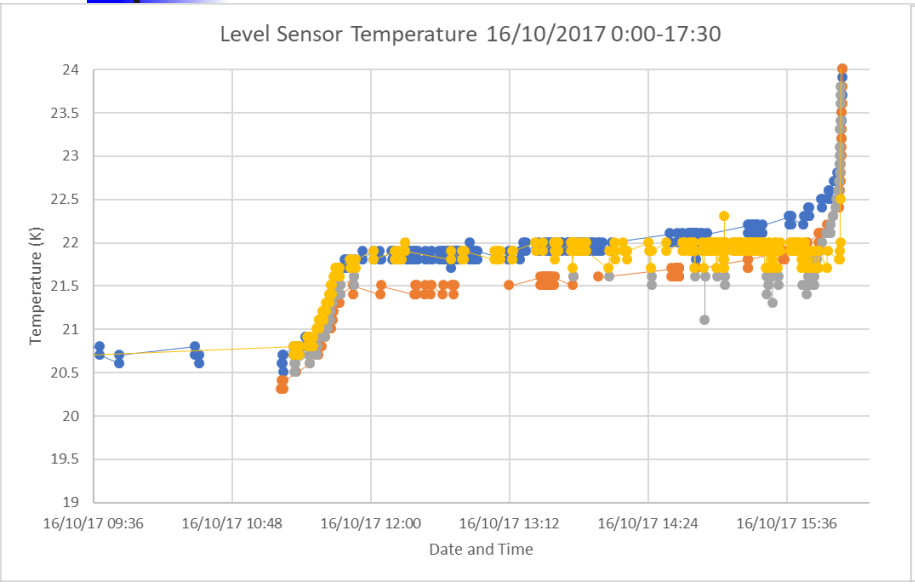
Temperature sensors

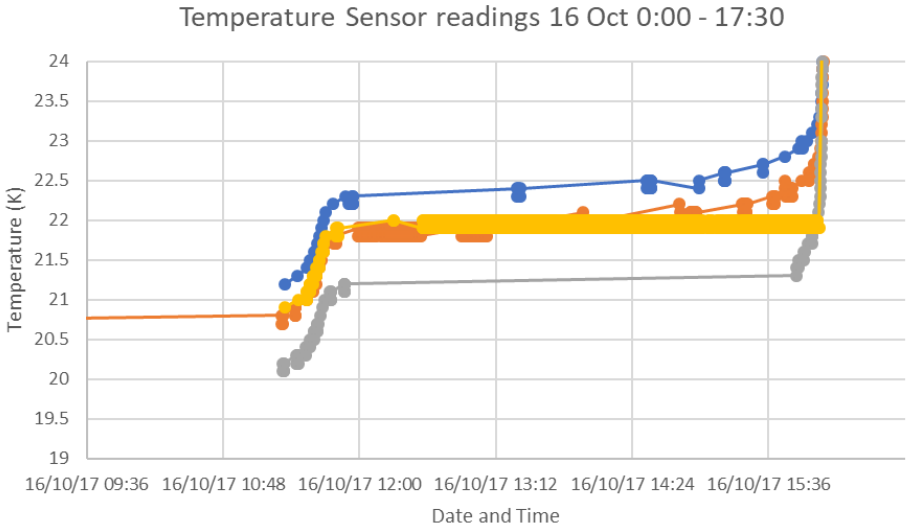




- Temperature and level sensors exhibit systematic offset in measured temperature
  - Some correlation with height
  - But suspect calibration issue
  - ~ 1 K → ~ 1-2 % uncertainty in density

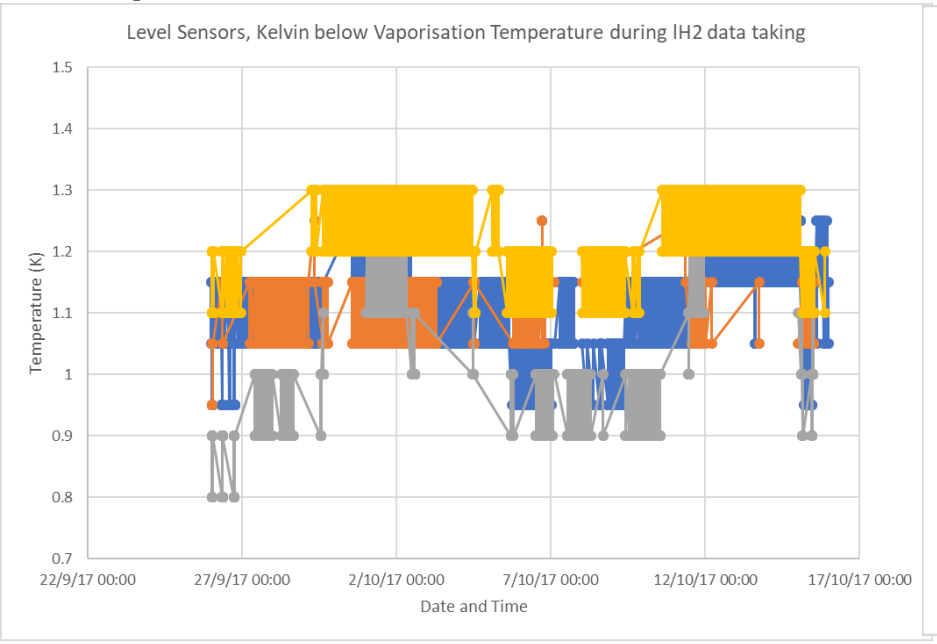
During Boil-Off

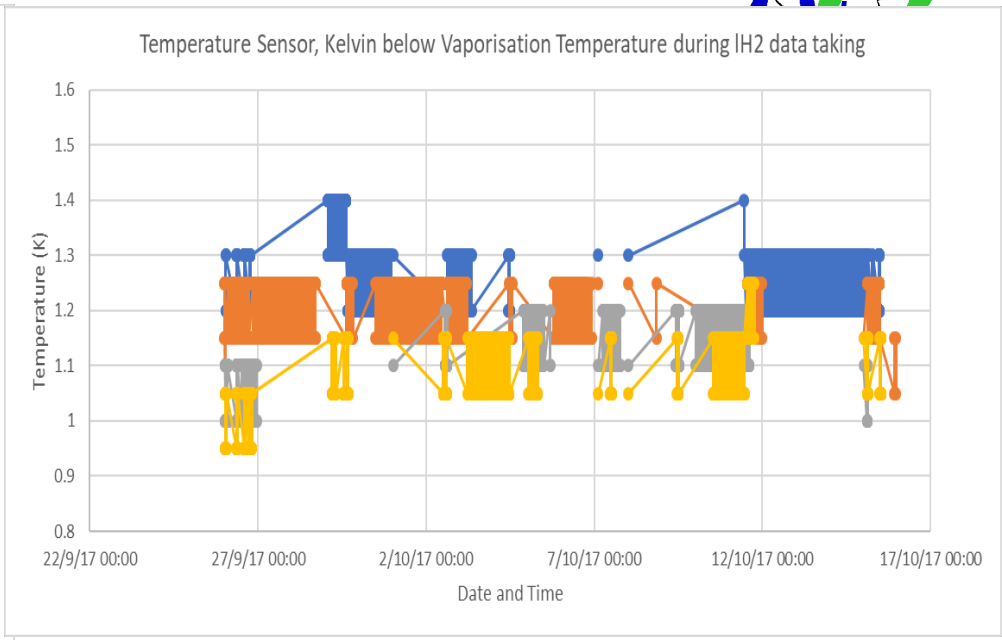




- At boil-off the temperature is well-known
  - Use this to calibrate the temperature probes

During Boil-Off





- At boil-off the temperature is well-known
  - Use this to calibrate the temperature probes
  - Constrain temperature to ~ 0.2 K

Looking Forwards

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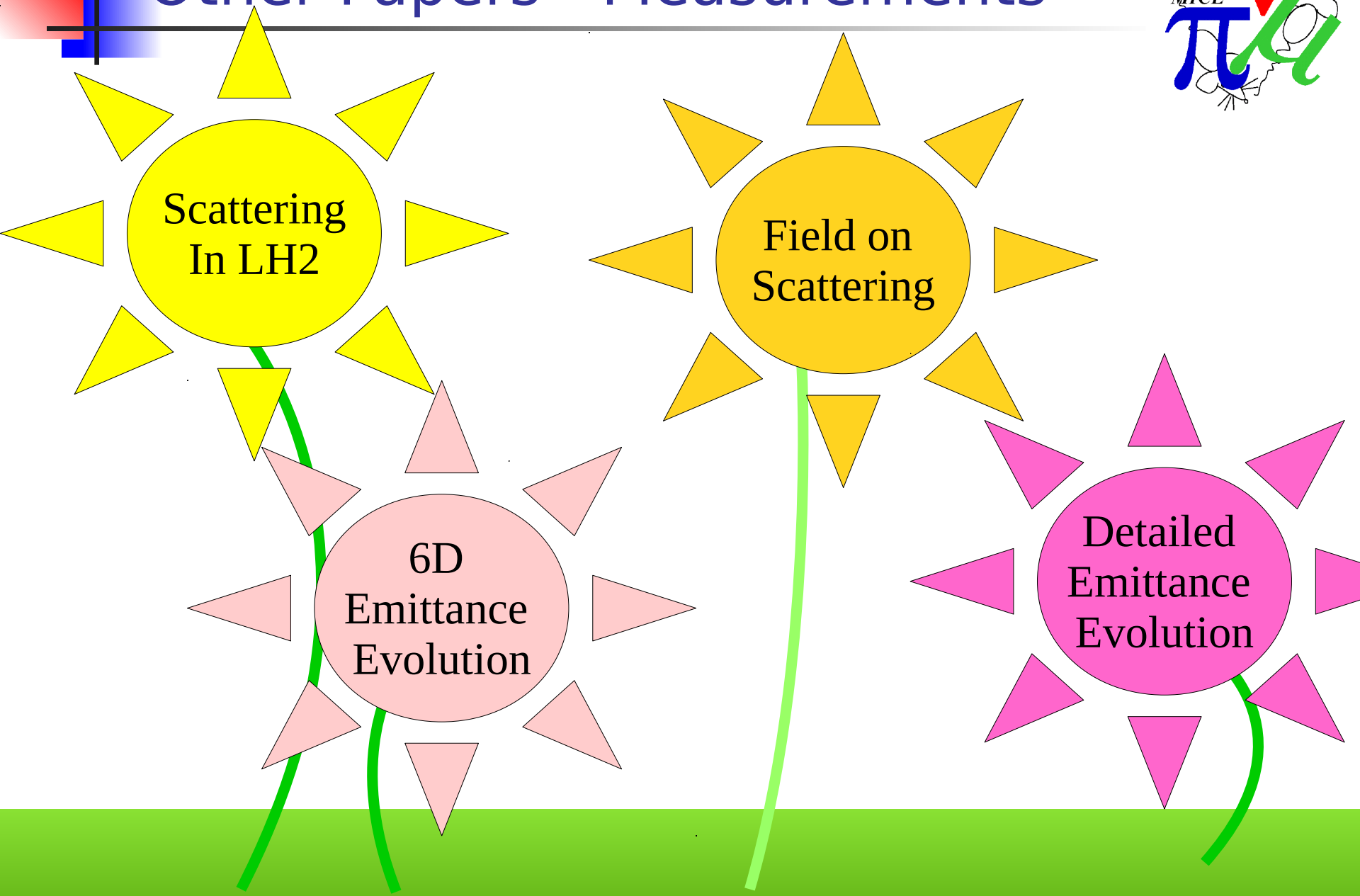
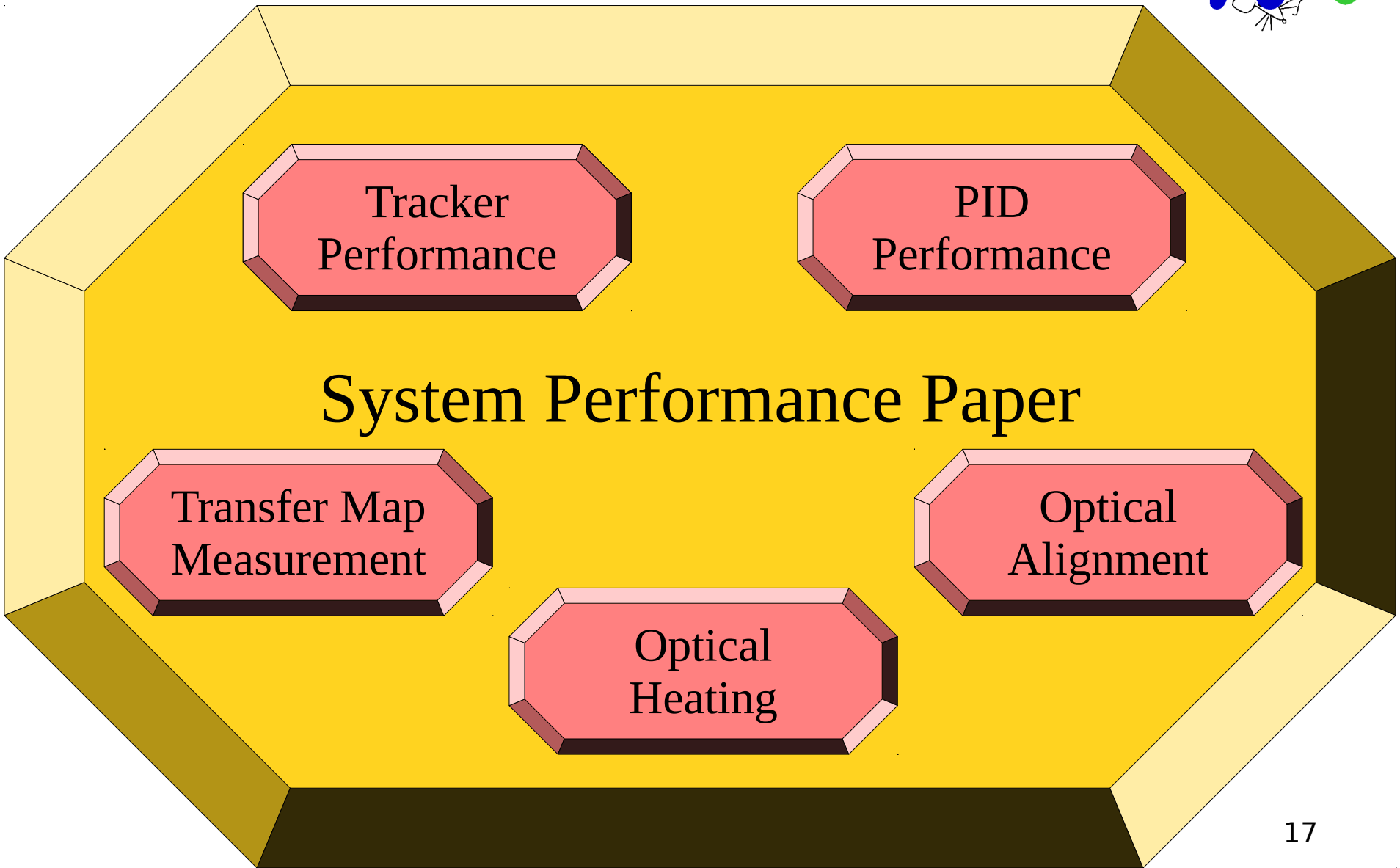
Other Papers - Measurements



Other Papers and Techniques



Comments

- We have a **great data set**
- We have a **great analysis team**
- There are **great opportunities**

Now is the time to make it happen!