

# Moller run checks

*February 4<sup>th</sup> 2025*

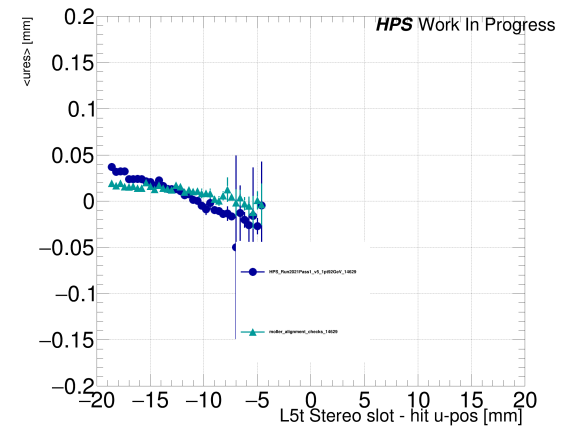
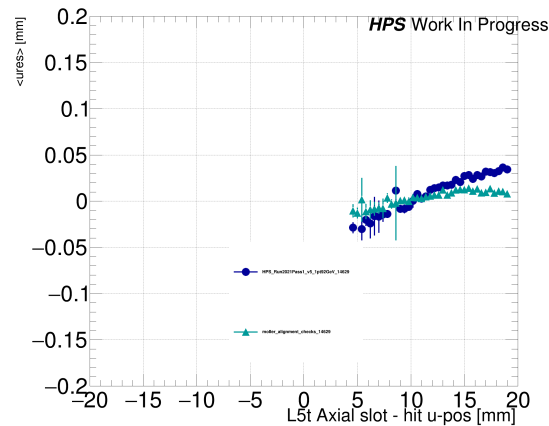
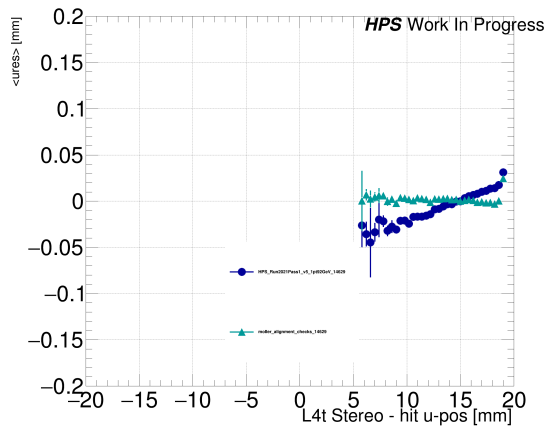
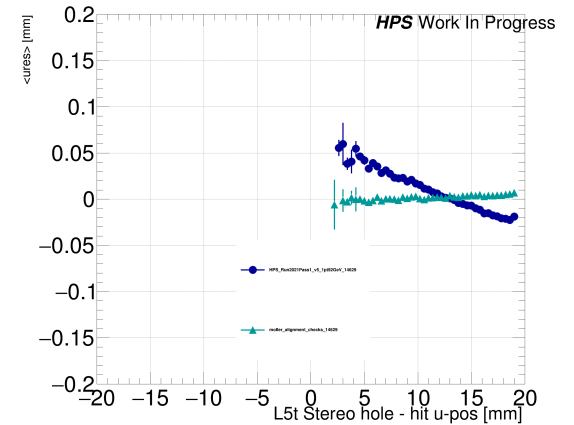
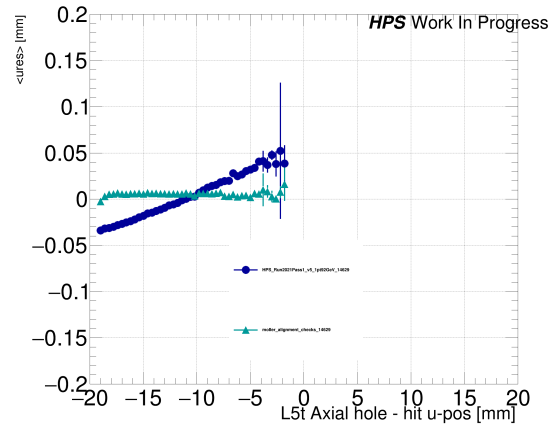
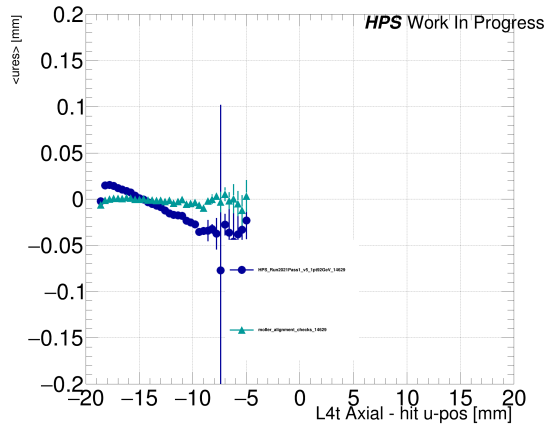
Matthew Gignac

- Lewis has reported some issues with the Moller mass resolution analysis with the 1%
- Alignment for 1% was derived using a momentum constraint on FEEs @3.74 GeV and interpolated across the Moller dataset runs
- In this presentation, I'll show some explicit cross checks of the v6 alignment model for Moller datasets

# Alignment: L4 & L5

## Expected improvements in v6

Blue circles — v5 (old alignment)  
Teal triangles — v6 (new alignment)

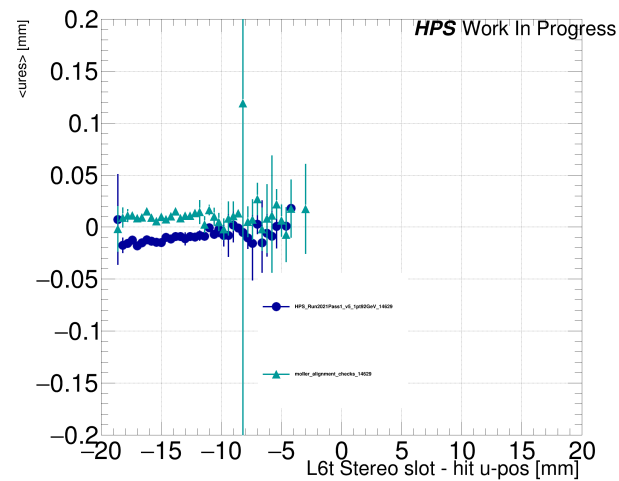
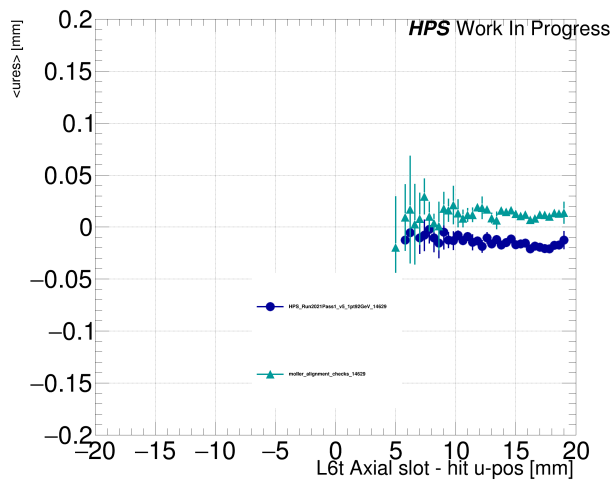
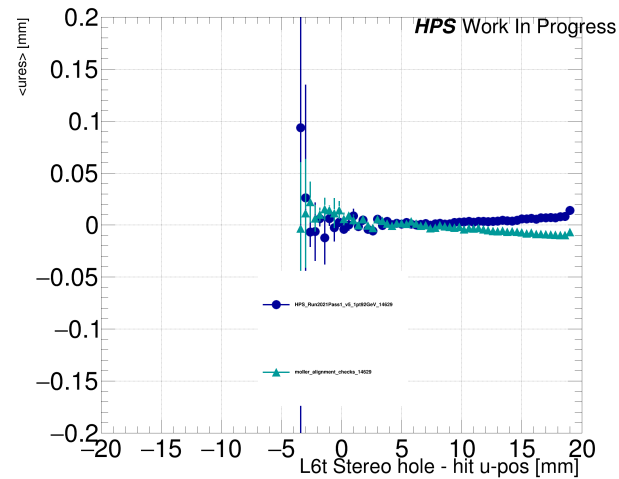
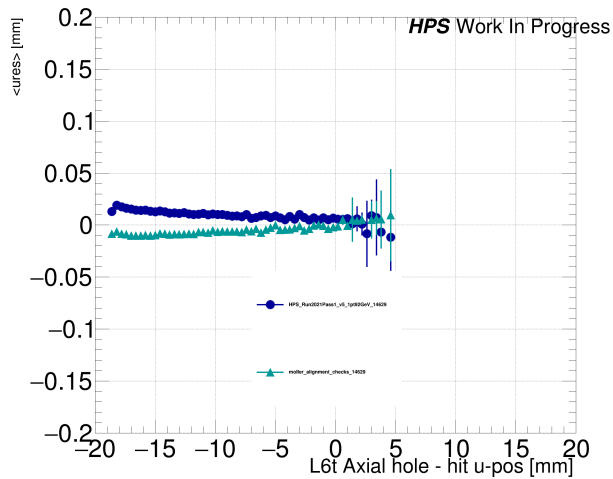


L4

L5

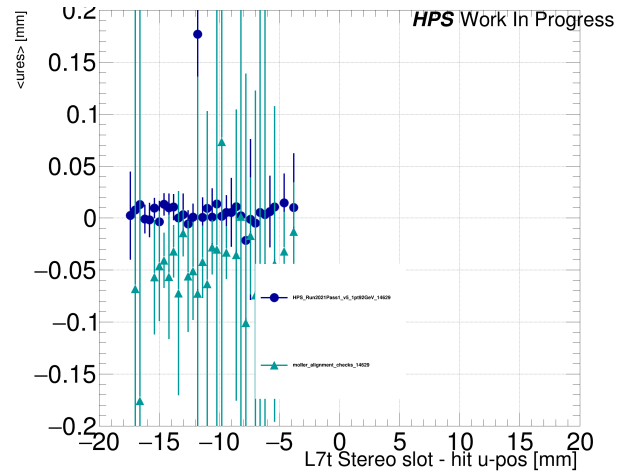
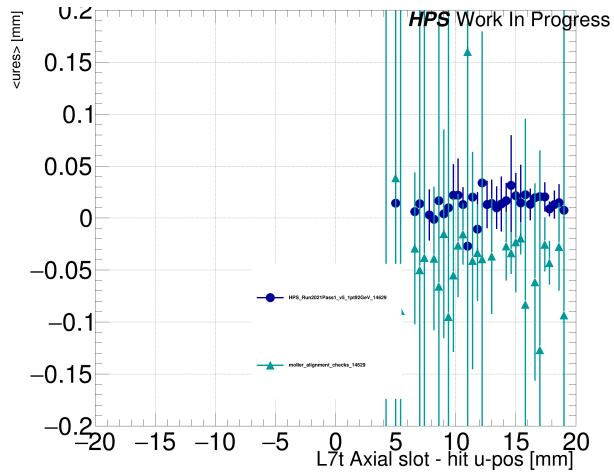
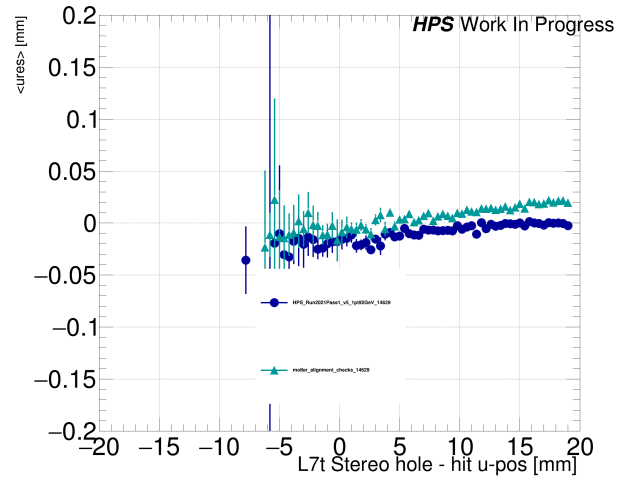
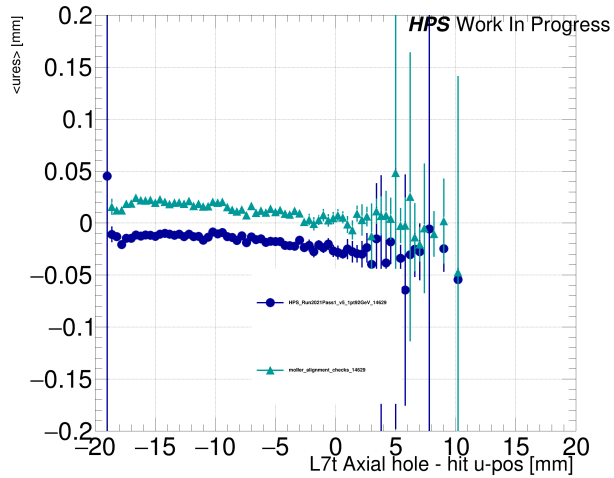
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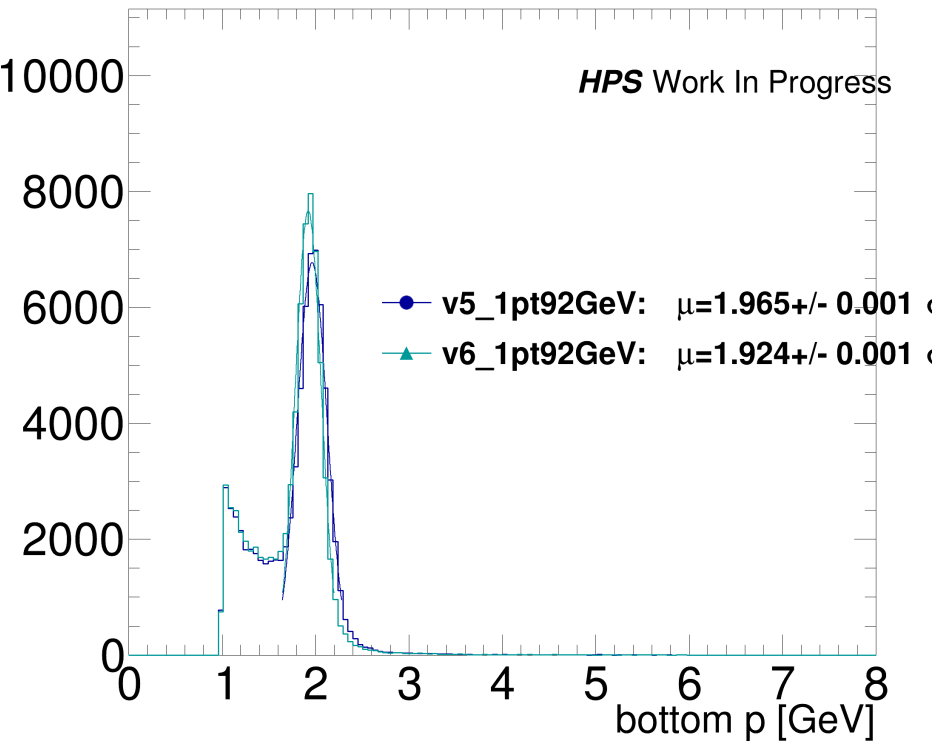
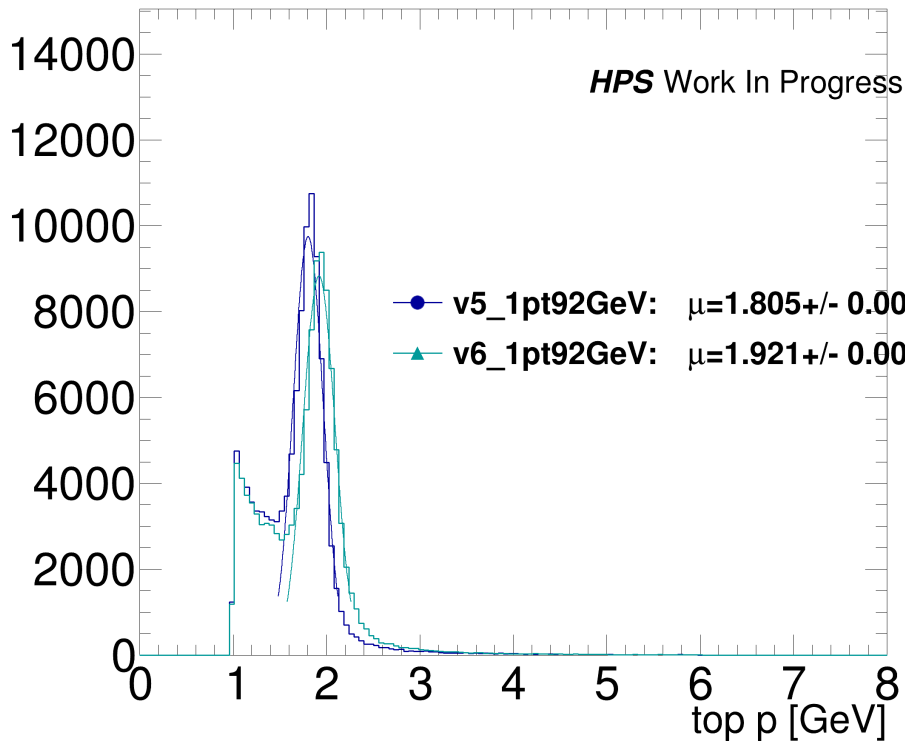
# Alignment: L7

Blue circles — v5 (old alignment)  
Teal triangles — v6 (new alignment)



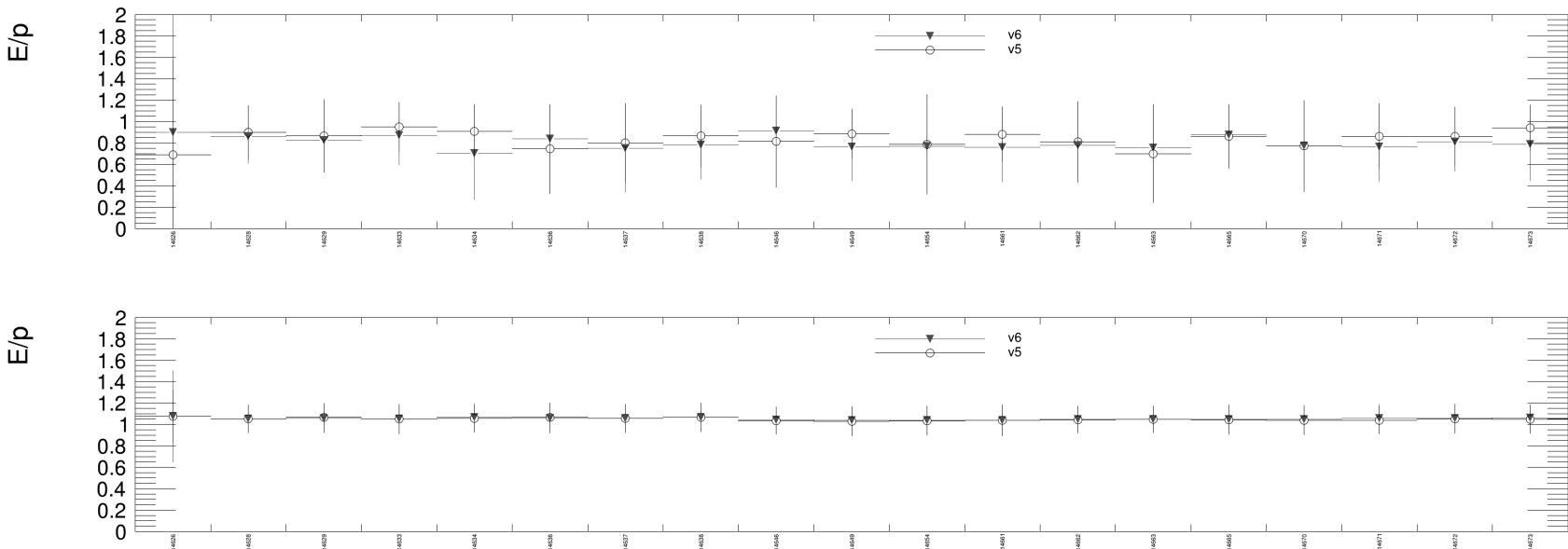
# Fee momentum scale

- Momentum scale in FEEs looks really good in v6 and improved (especially in the top) compared to v5 detector



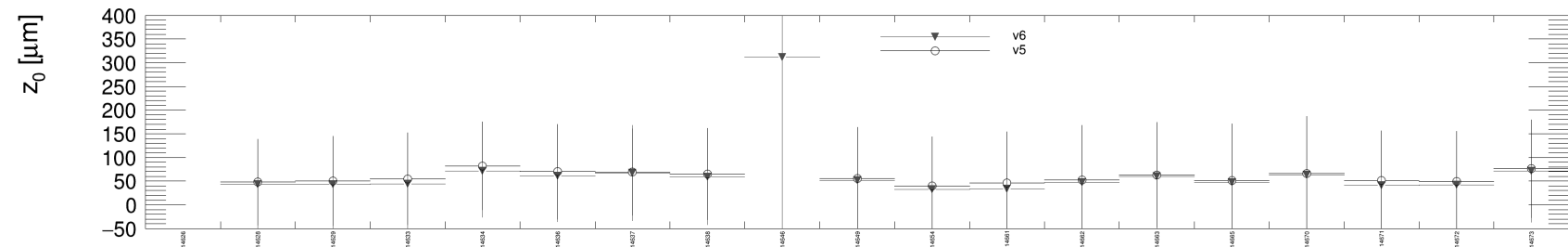
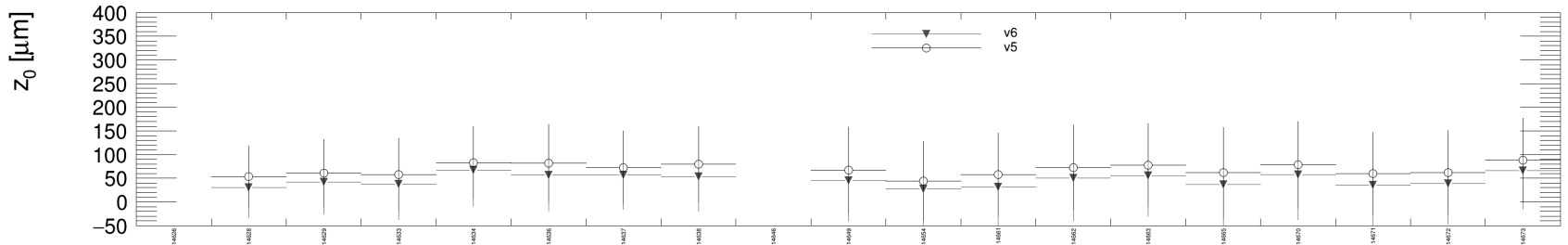
# Data quality @ HPSTR level

- Checking track parameters @ HPSTR level
  - Obviously this isn't a great validation for Moller events, as the selection is for e+e- events. Not aware of any Moller selection in HPSTR, though could be implemented if deemed necessary



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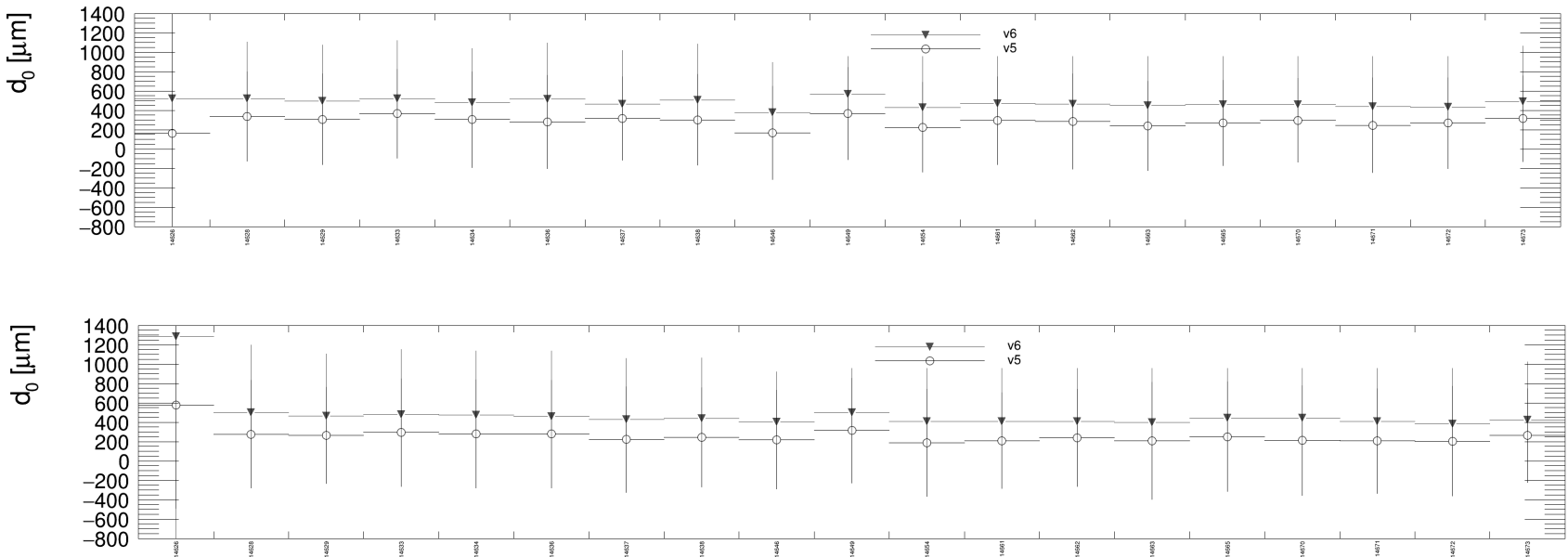
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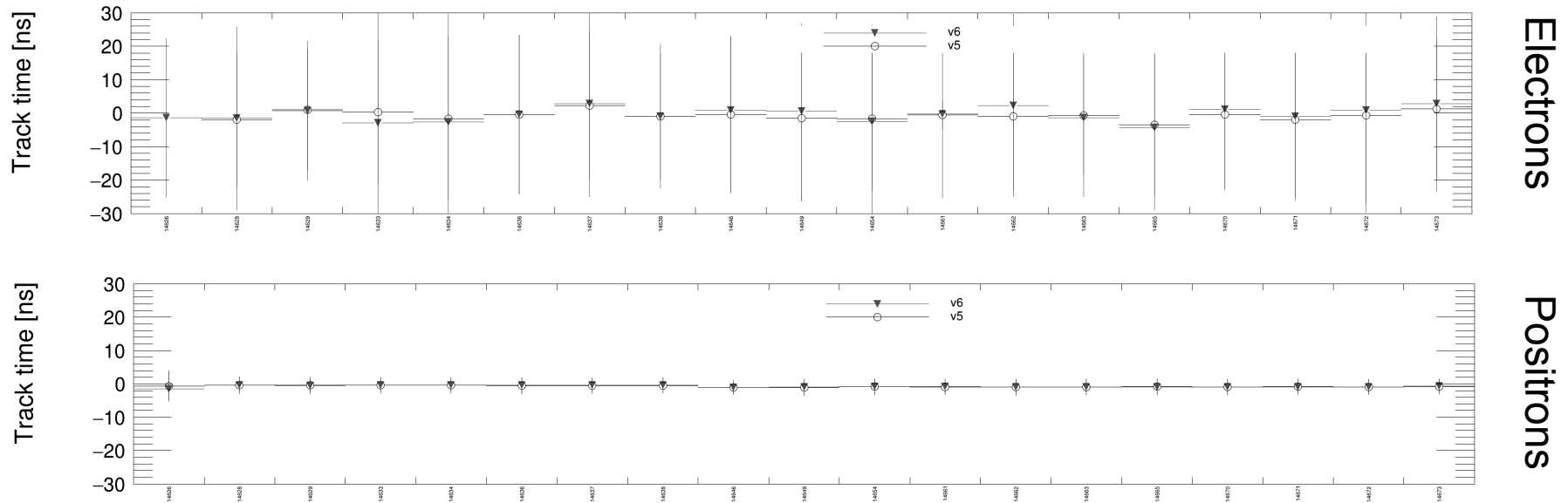
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## Conclusions & next steps

- Cross-checks performed on the v6 alignment model when applied to the Moller runs
  - Residuals look as expected and significant improved with respect to the v5 detector previously used
  - Momentum scale of FEEs in excellent agreement with beam energy
  - Track parameters at HPSTR level look fine, though validation is run on  $e^+e^-$  events and not Mollers
- No explicit check on mass resolution yet, but only expect improvements given improvements to momentum scale

# Questions

