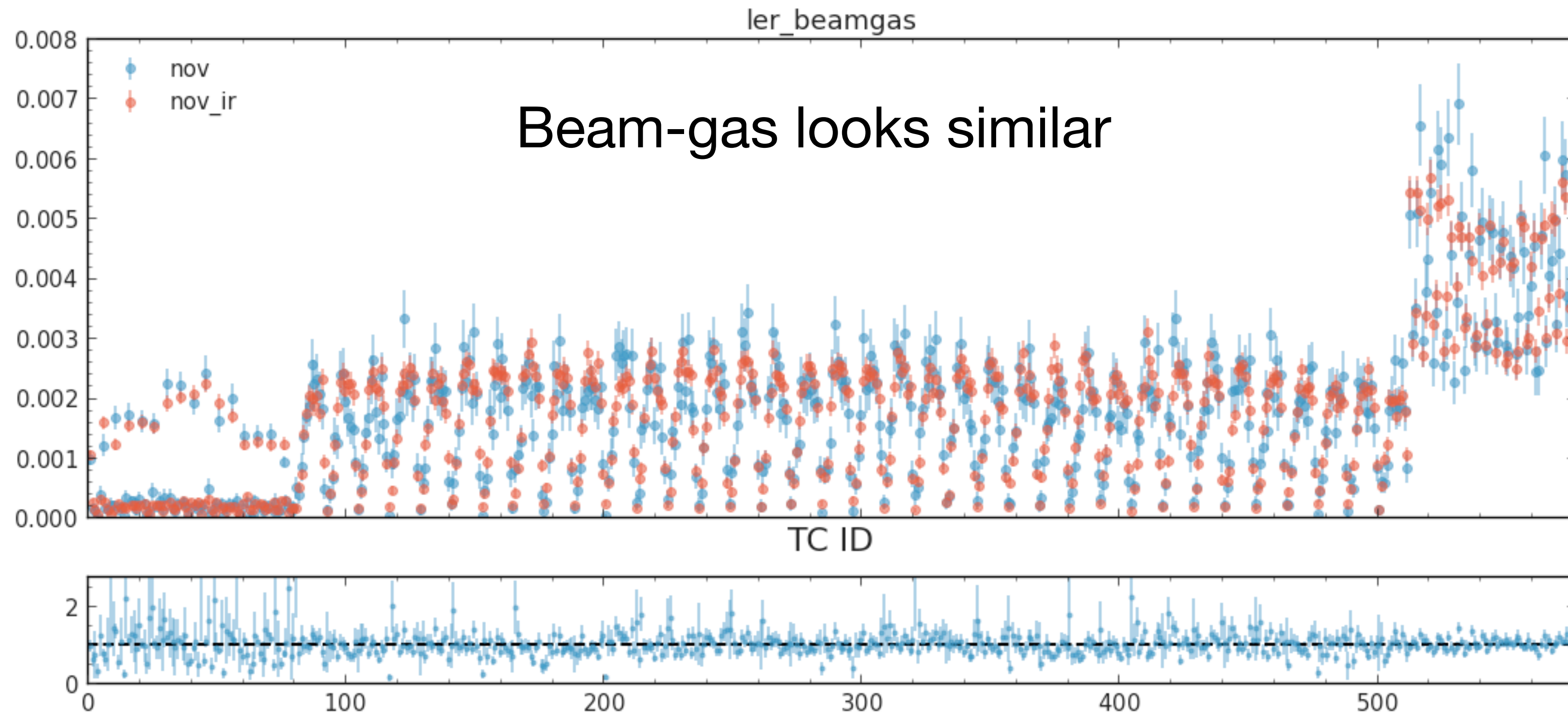


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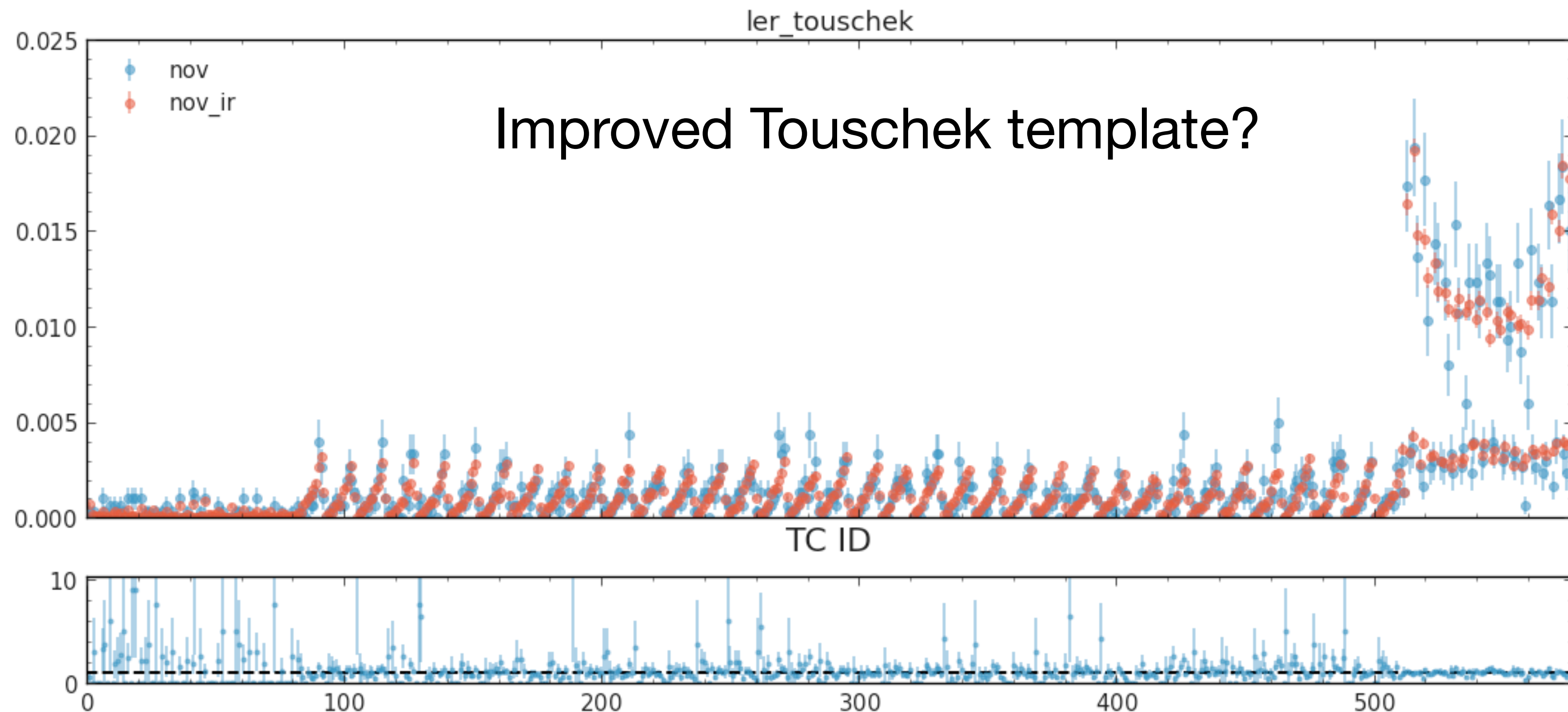
- ECL templates based on loss rate at IR (+/- 4 m) in the November MC
  - 10 times faster compared to FBL(Far beam line, +/- 29 m)



# April 10, 2025

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- ECL templates based on loss rate at IR (+/- 4 m) in the November MC
  - 10 times faster compared to FBL(Far beam line, +/- 29 m)



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- ECL fit from online monitor: also a least square fit as what I tried last week

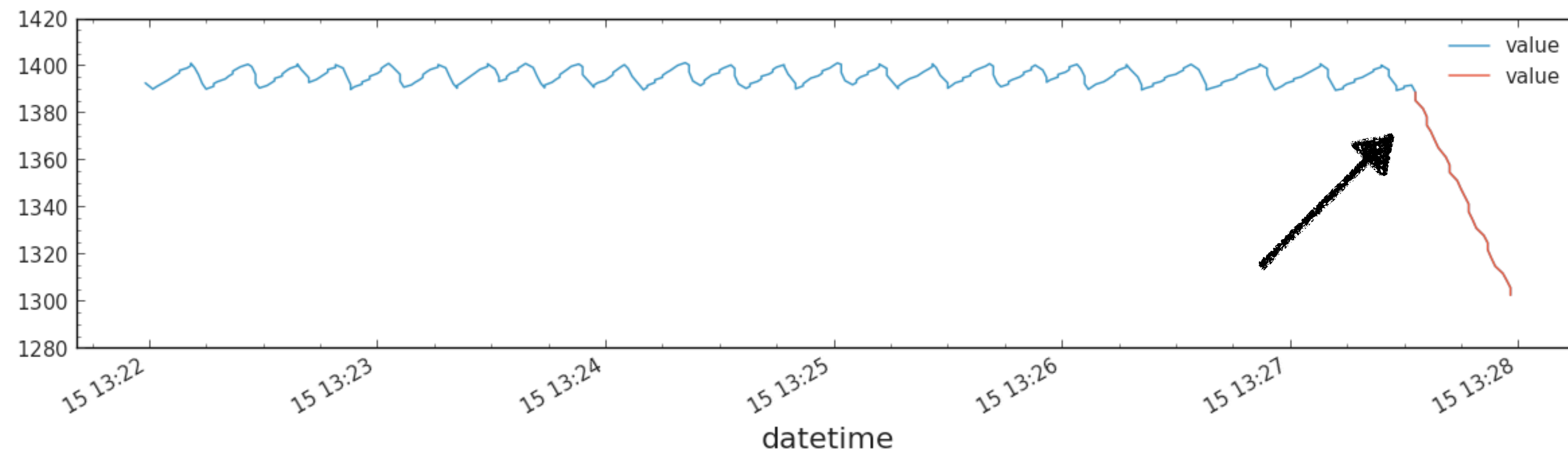
```
337         Double_t expVal = _array_exp[detID];
338         //         Double_t expErr = _arrayErr_exp[detID];
339
340         if(simVal <= 0 || expVal <= 0){continue;}
341
342         //         Double_t stdDev = TMath::Sqrt(TMath::Power(expErr,2) + TMath::Power(simErr,2));
343         //         Double_t stdDev = expErr;
344         //         Double_t stdDev = 1;
345         //         nn++;
346         //         if(stdDev > 0){chisq += TMath::Power((expVal - simVal)/stdDev,2);}
347         if(simVal > 0){chisq += TMath::Power(expVal - simVal,2)/simVal;}
348     }
349
350     f = chisq;
351
352     return;
353 }
```

<https://gitlab.desy.de/belle2/detector/bkg/RealTimeBGmonitorEPICS/-/blob/5073a66c9d1cb4bb79b84b8aa074b36efc93c578/src/ana.cc#L347>

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- ECL fit using different templates
  - Choose the trigger rates during decay and at high current

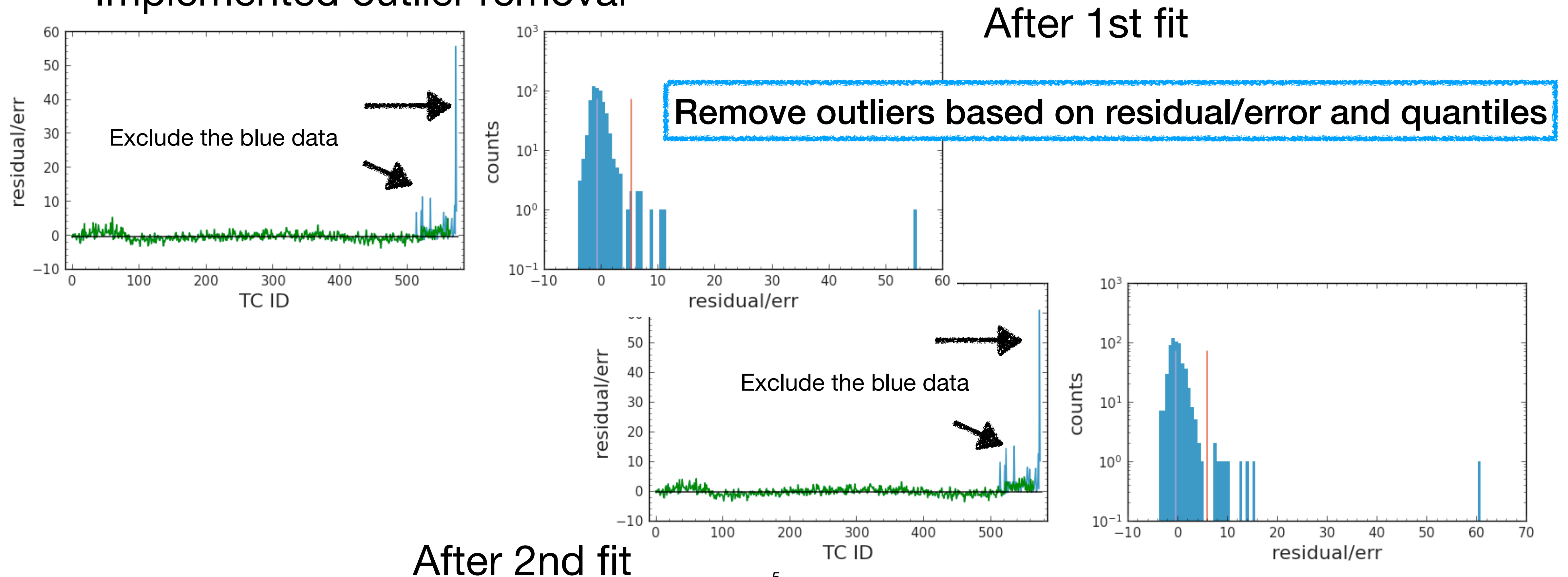




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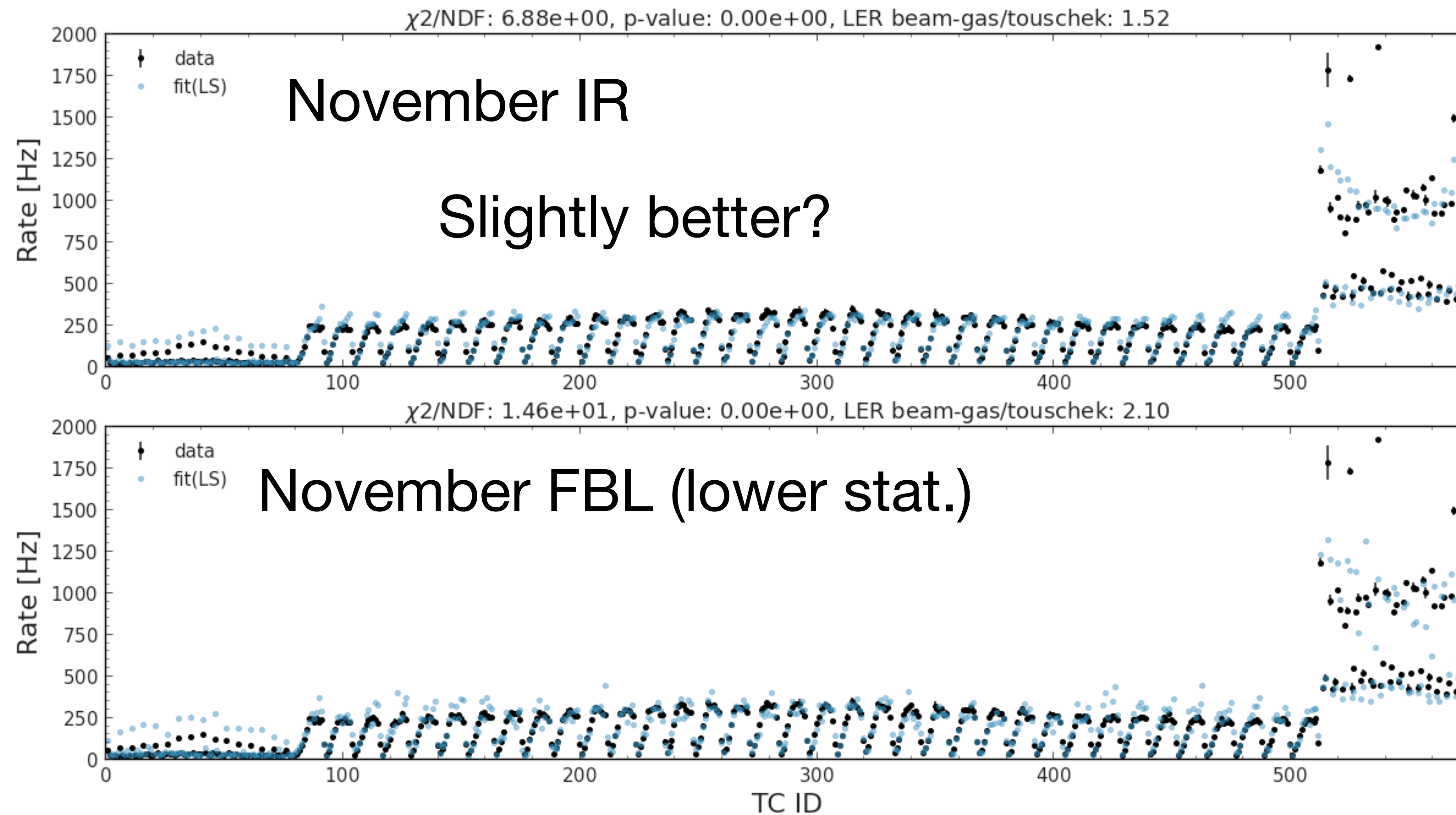
- ECL fit using different templates
  - Implemented outlier removal



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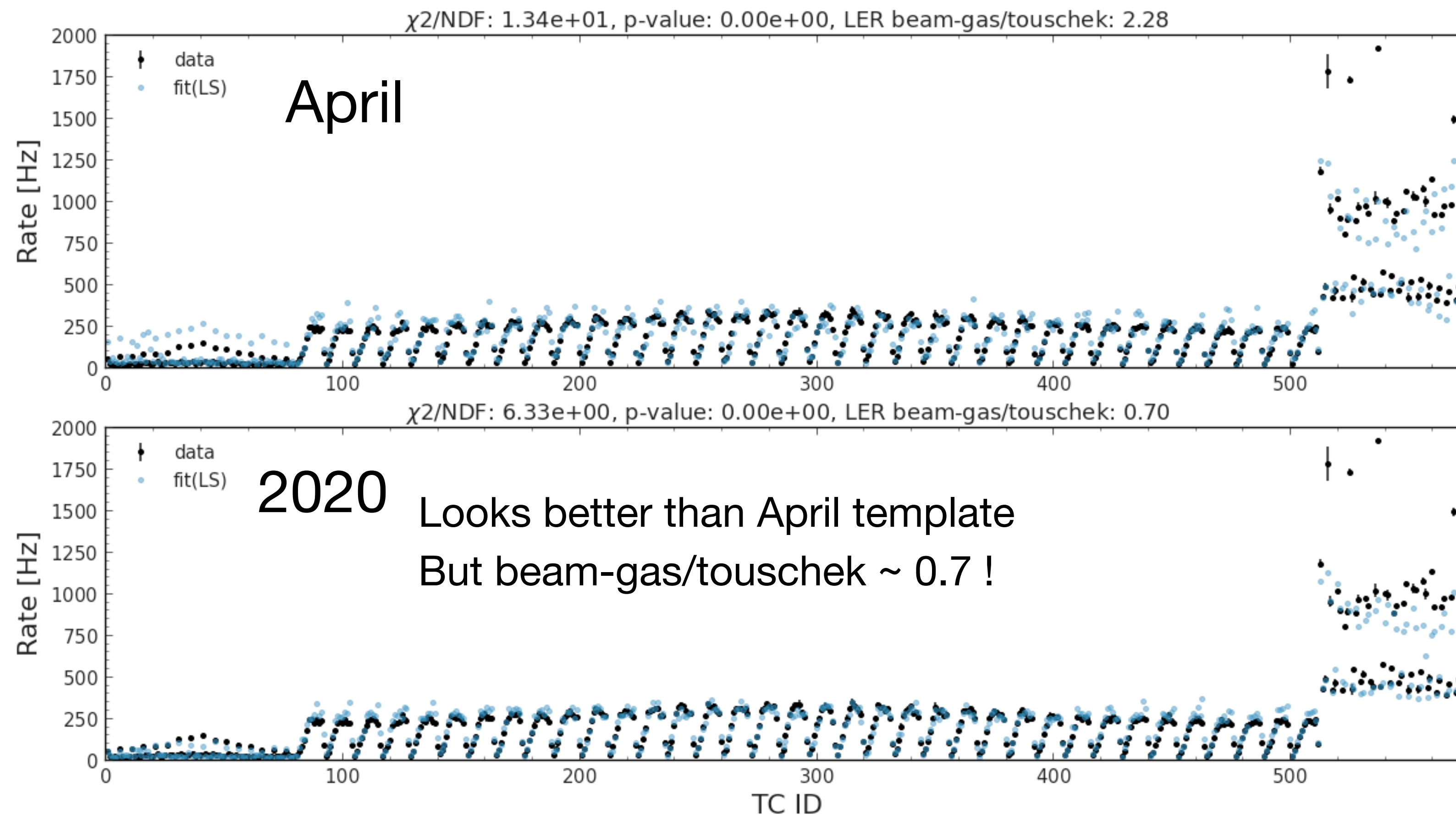
## ■ ECL fit using different templates : Results



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## ■ ECL fit using different templates : Results

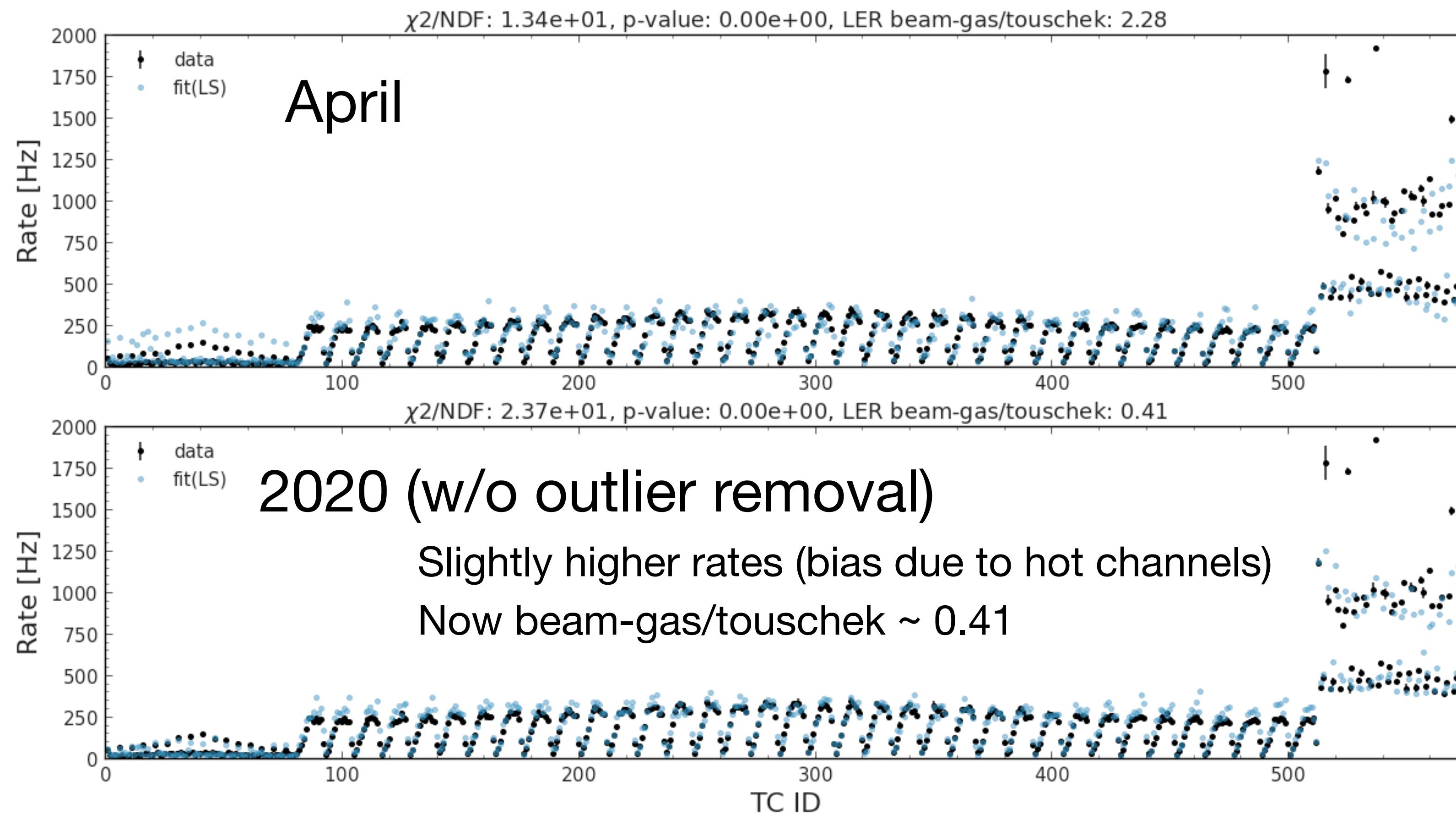




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## ■ ECL fit using different templates : Results





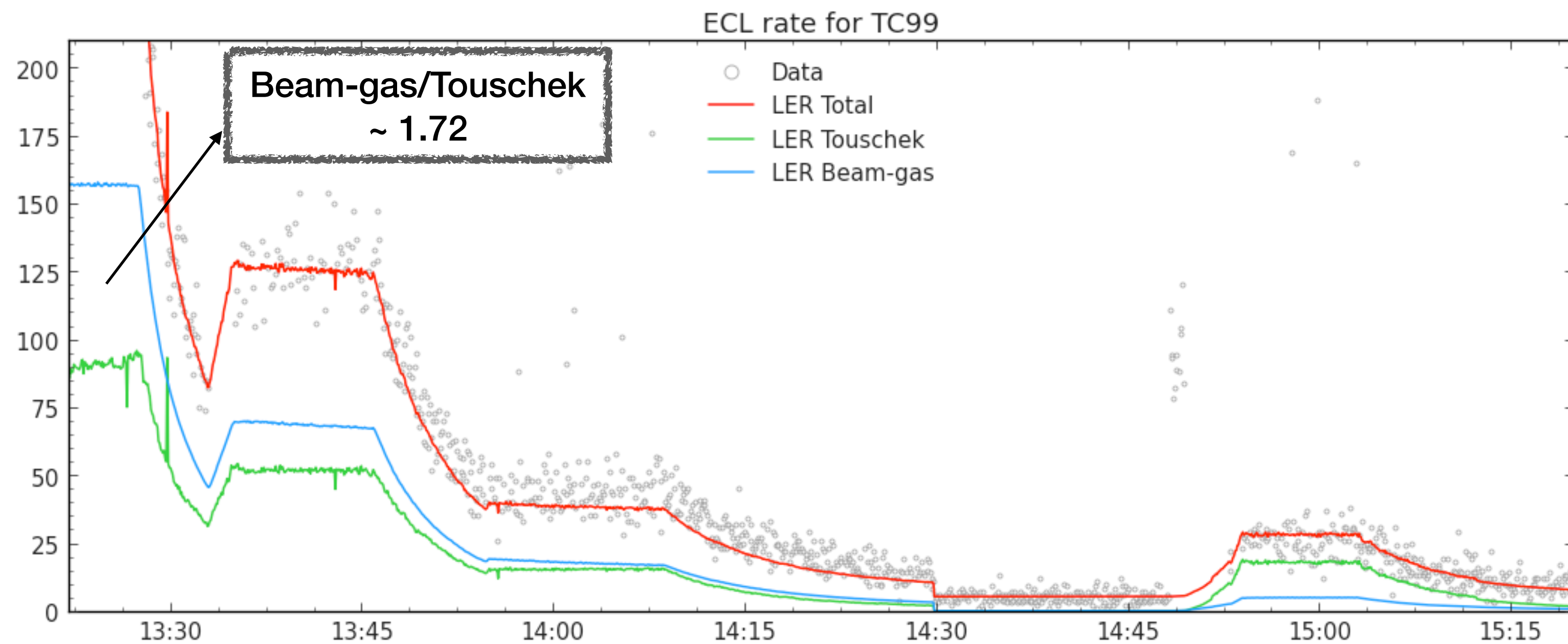
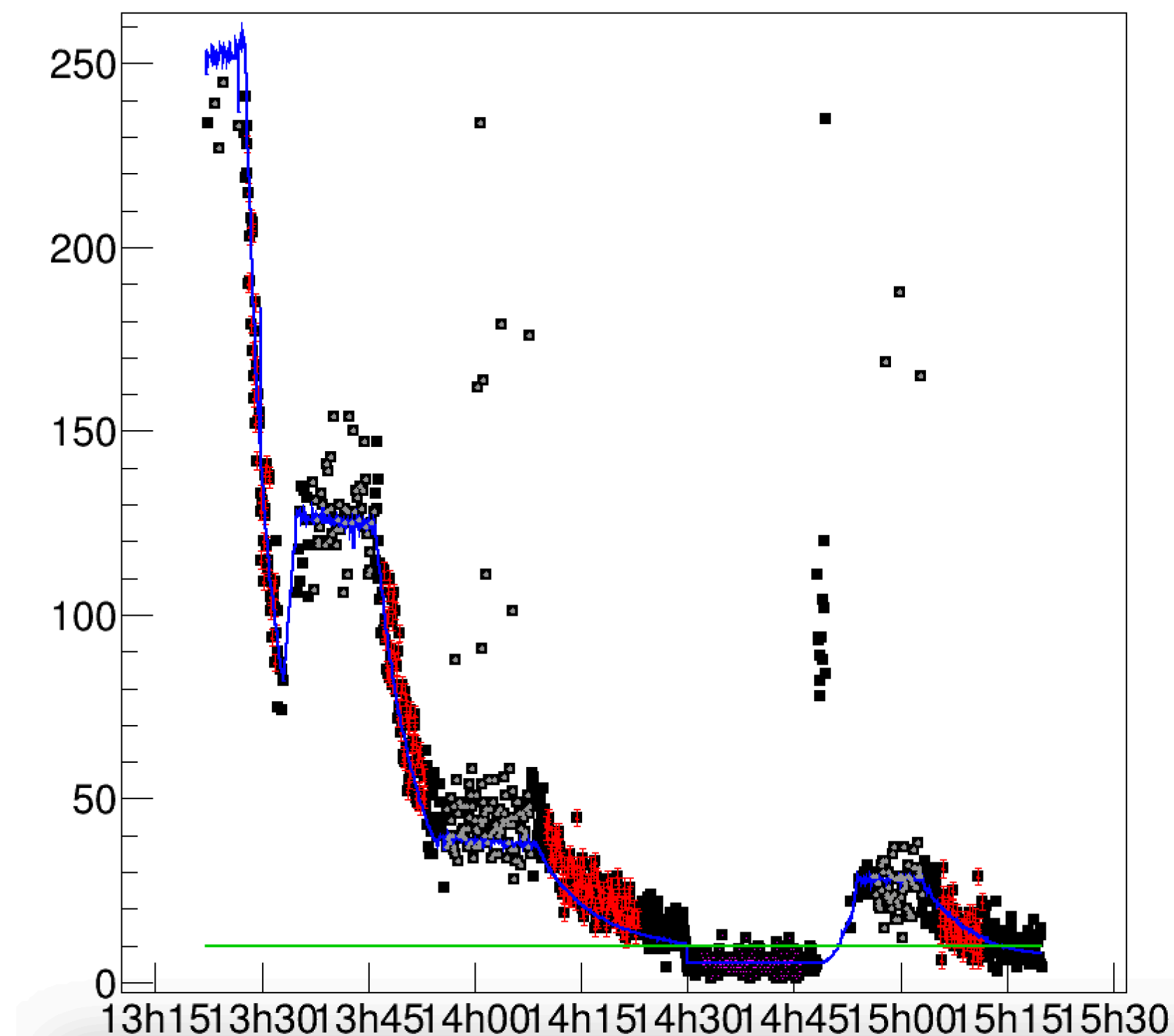
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### ■ November study

- Heuristic fit: Overestimated pedestals
  - Fixing pedestals to the measured ones -> slightly worse chi2,

tcid\_99



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## ■ Conclusion

- Tried different target function for minimization in template fit
  - ▶ least-square, NLL and least square considering templates uncertainties
  - ▶ Similar results
- Different combinations of templates and minimization function can lead to different beam-gas to Touschek fraction
- TODO: Consider nuisance parameter in template fitting?
  - ▶ Maybe IR template is not good enough.
  - ▶ We can also try to increase statistics