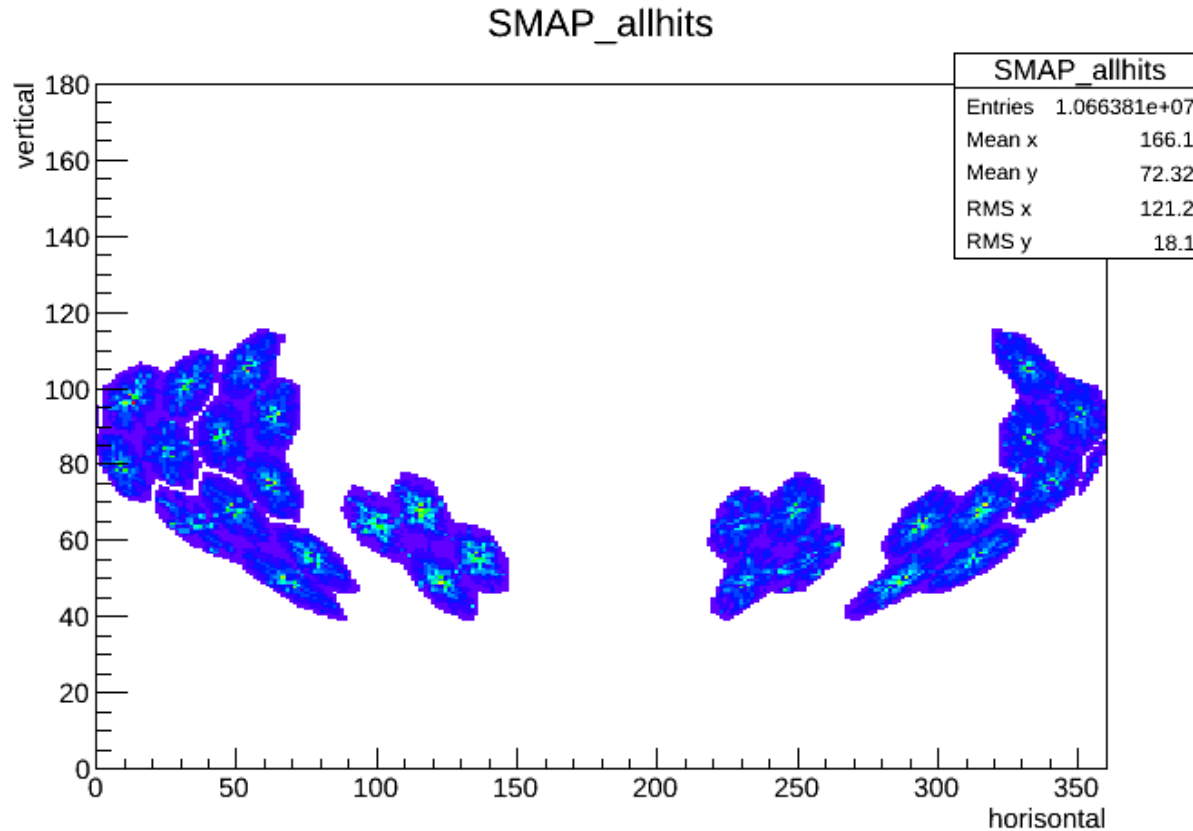


## News from the GRETINA TRACKING group

- **New in tracking:**
- We can track Geant4 (G4) simulated data
- Using both the (1) **original AGATA code simulations** (with GRETINA geometry) and the (2) **US adapted version** of the Geant4 code.
- We can show that they give the same results
- We can show the GT and AGATA tracking is about the same



Lets start with some experimental  $^{60}\text{Co}$  data from MSU

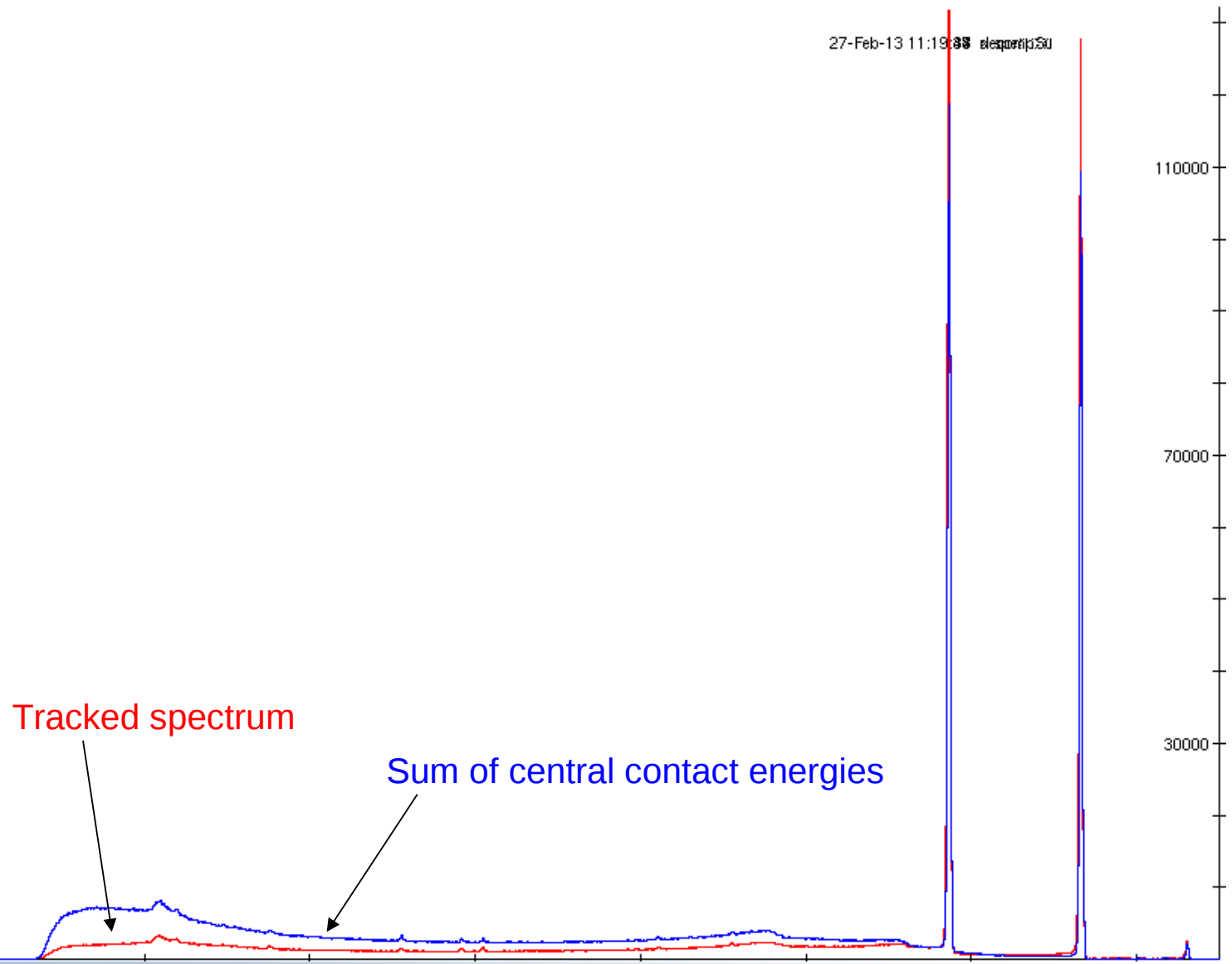


Not as close packed as we would like; but..

Not background subtracted

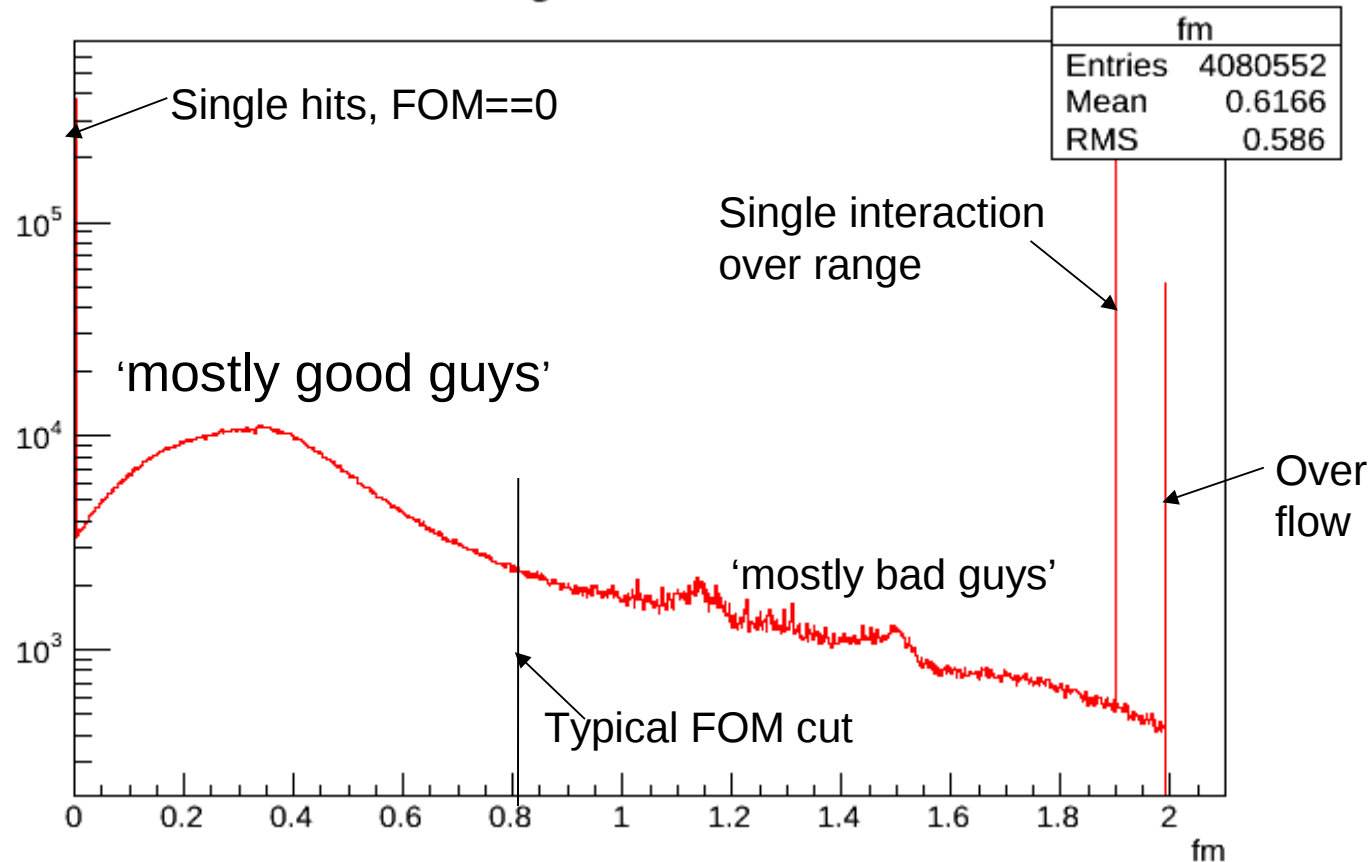


# Typical tracked spectrum, FOM < 0.8



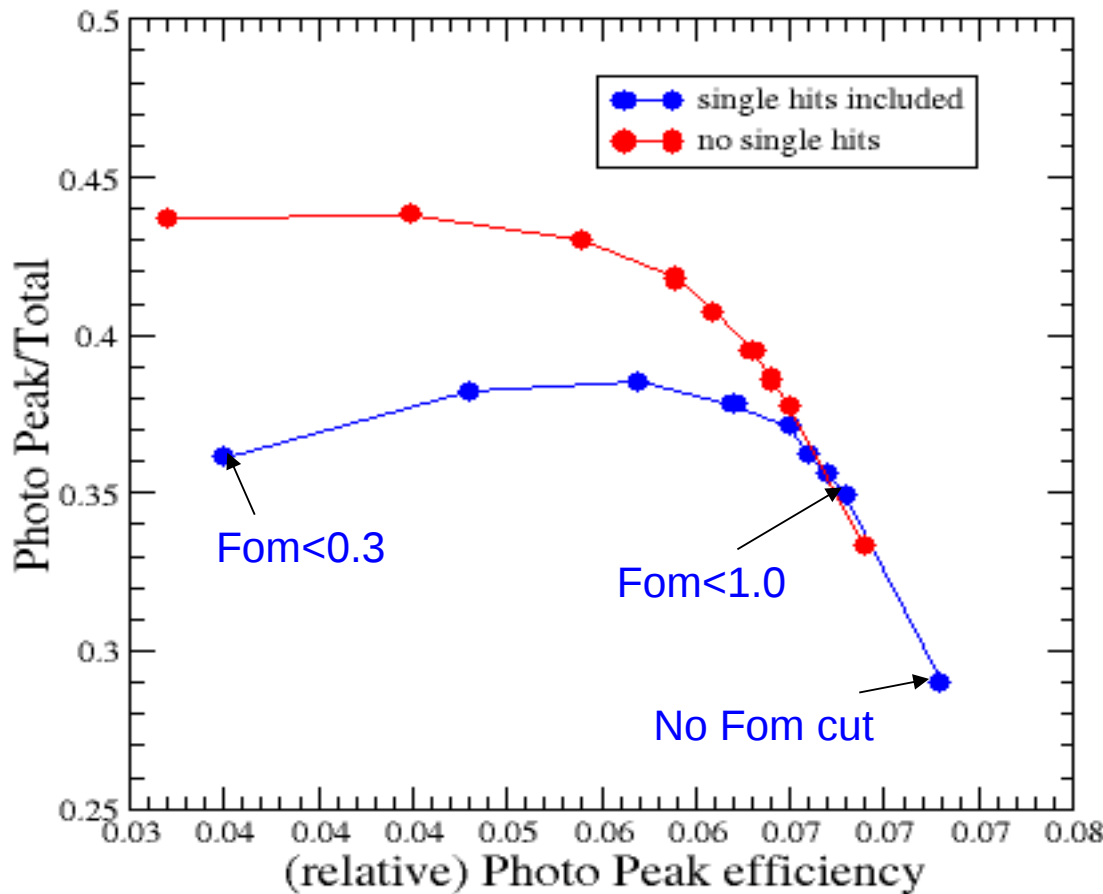
# FOM spectrum, *a measure of how well the interaction angles and interaction energies follow the Compton scattering formula*

figure of merit



We have to make the usual P/T vs Photo peak efficiency compromise

Using 10 keV low cut



Clearly we would like to do better...

Not a calibrated source, so this axis is arbitrary

So, the question is:

Is it the *data* or  
the *tracking*  
that has a problem?

***We will use Geant4 to  
simulate 60Co  
to find an answer***

THE NEW THING:  
Tracking Geant 4 data

Use G4toMode2.c to 'translate' G4 data to Mode2 format (as if it came from decomposition task, timestamps and all)

**Tracking code stays the same!!**

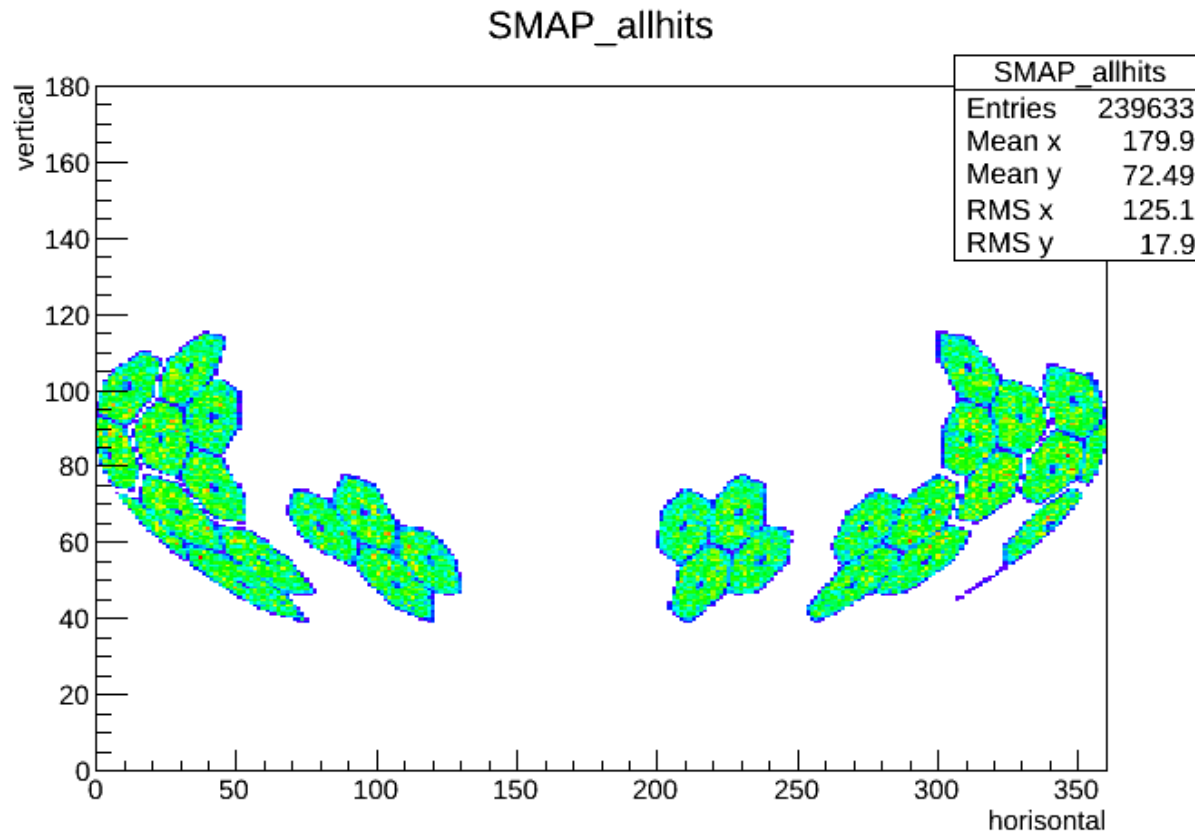
Also 'packing' the hits within ~5mm

+ smearing positions and energies

+ separate into crystal hits (as decomp task)



# Geant4 simulation, NSCL geometry, $^{60}\text{Co}$

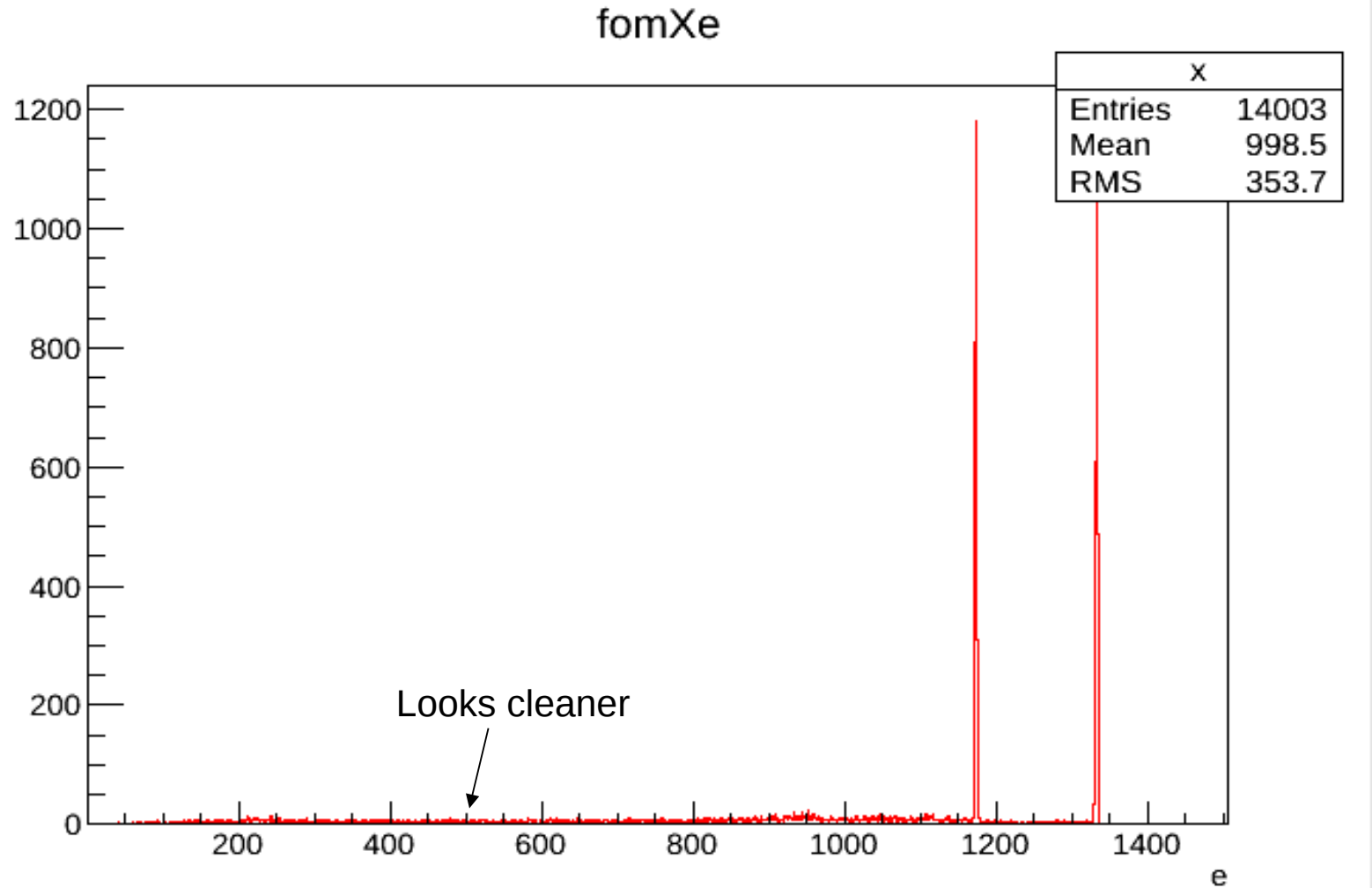


This data was supplied by *Amel Korichi* and is from the [AGATA Geant4 code](#)



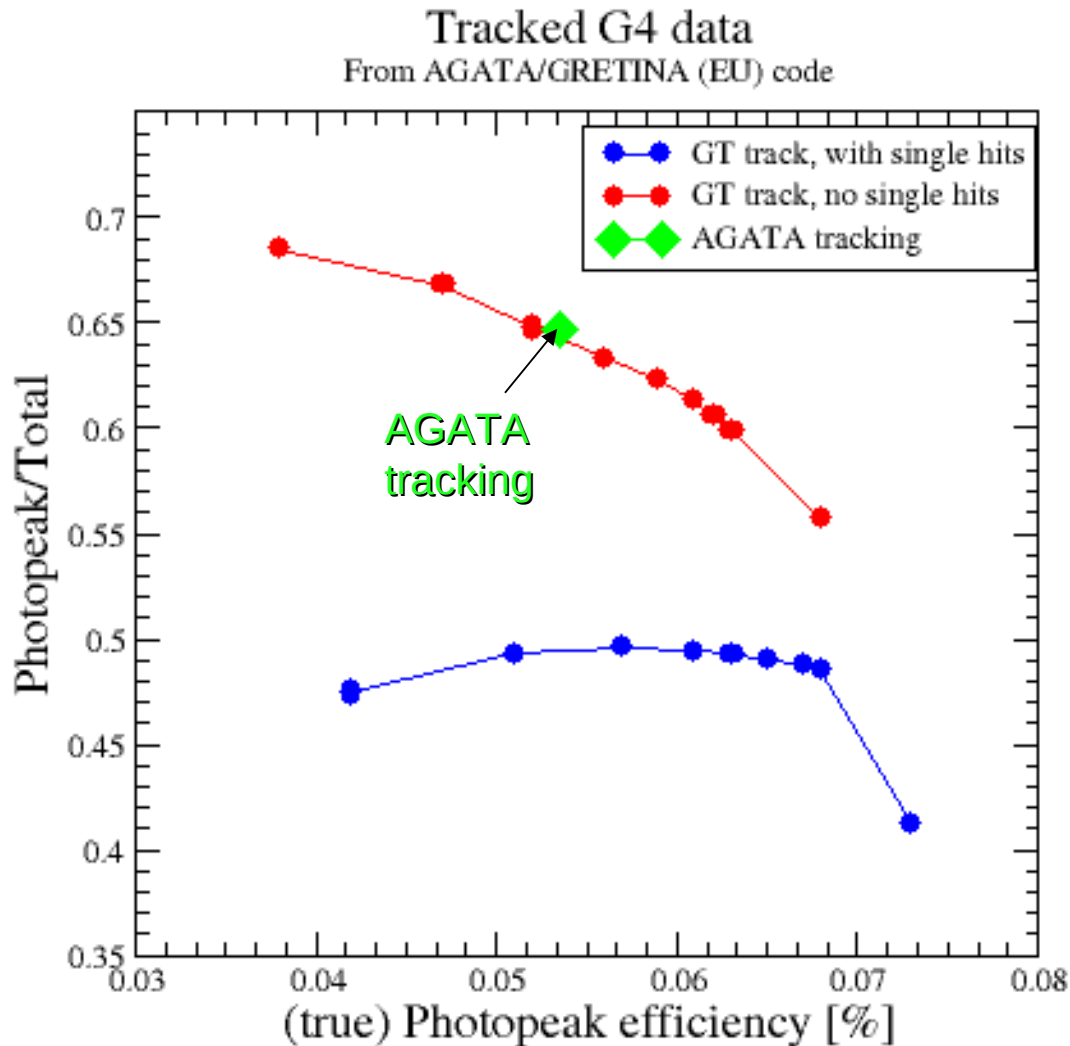


# Typical G4 tracked spectrum, FOM < 0.8



# Tracked Geant4 data from AGATA

G4 code



**It seems the GT tracking code does significantly better with G4 simulated data**

**And just as well as the AGATA tracking code**



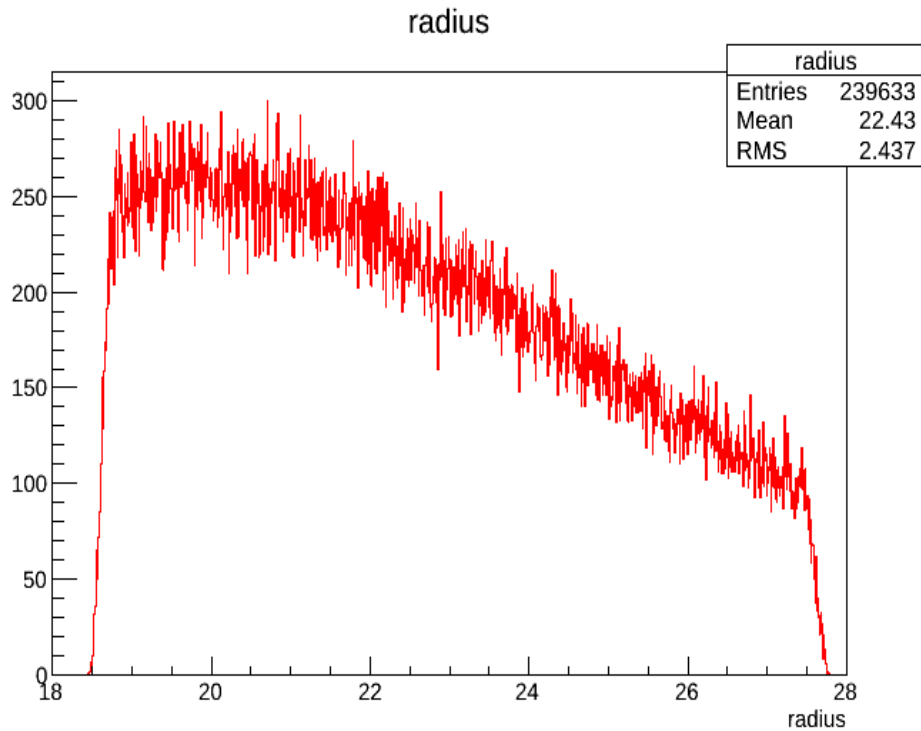
## Part way conclusions:

- Using simulated data, we have shown that the **GT tracking code is working fine** and it works as well as the AGATA tracking code
- We think the problem with tracking real data is that **the input from the decomposition task needs to be improved.**
- ...some evidence?:

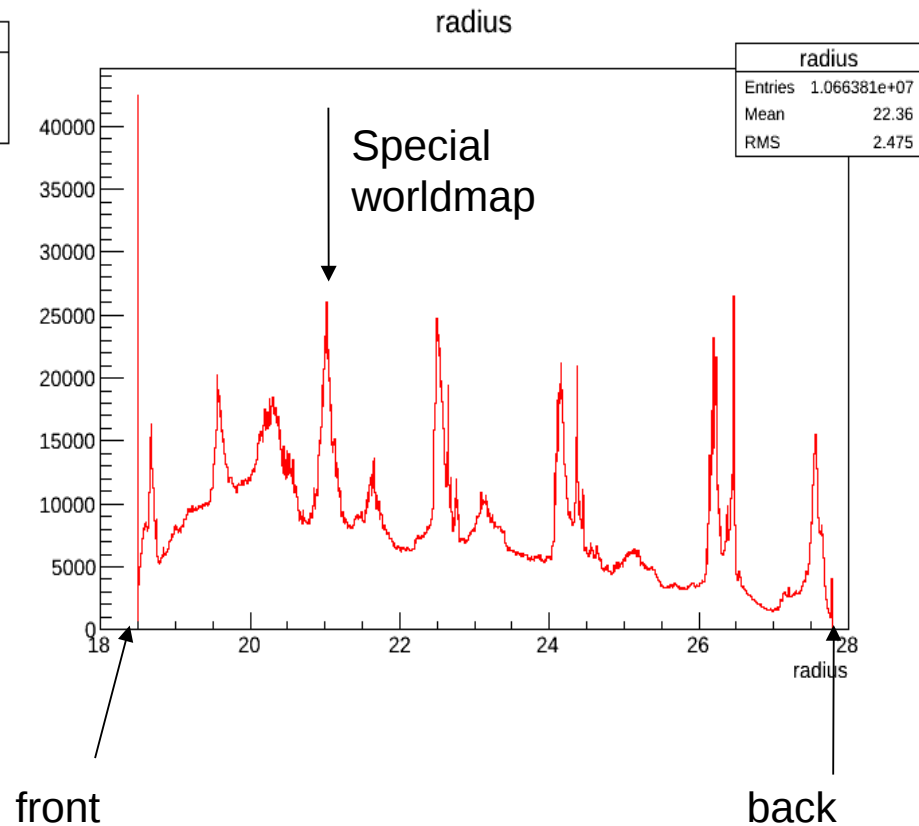


# Radius spectrum

## G4 Simulations



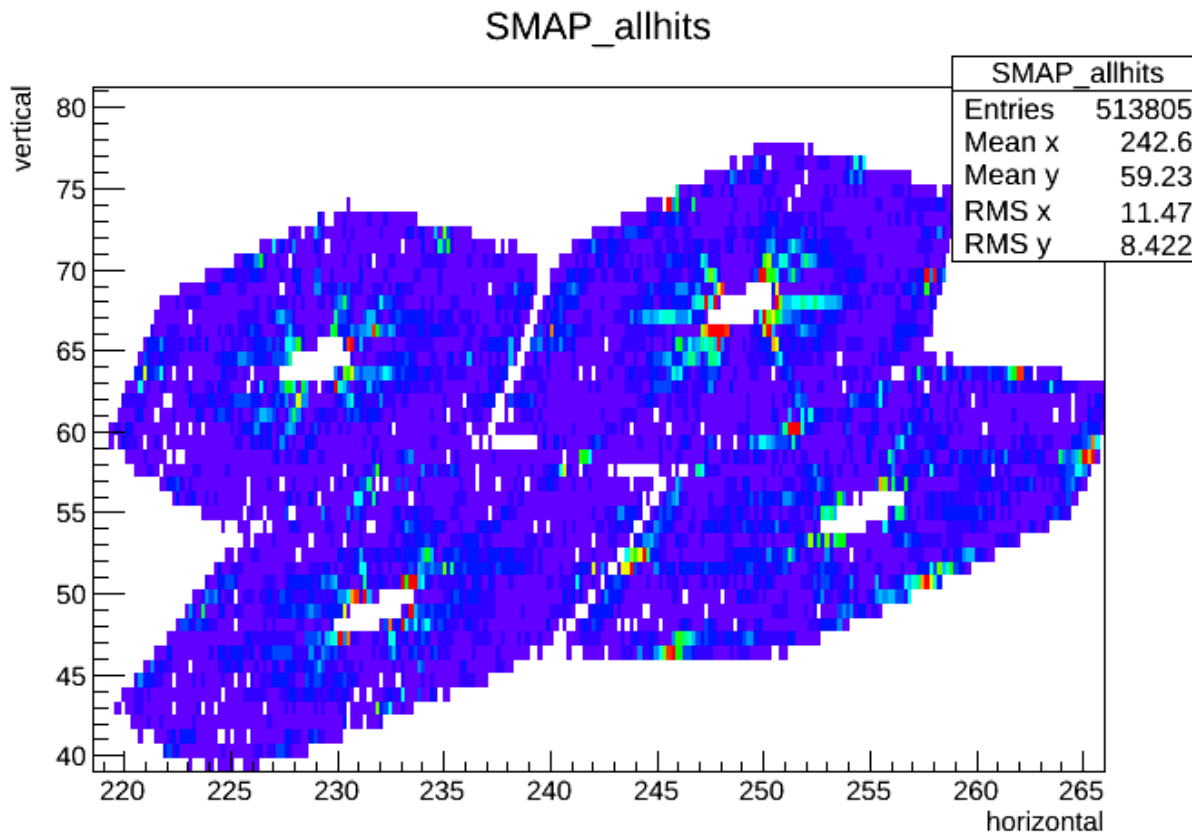
## Real data



→ Decomp task prefers to put interaction points at the segment boundaries



# Narrow radius SMAP, $20.9 < r < 21.1$



Decomp  
seems to  
favor  
center  
of crystal



## Conclusions

Now have G4 data to track, really ***tests the tracking code in a controlled fashion!***

Managed to compare to AGATA tracking!!

We can optimize tracking parameters

Still have problems with real data because the decomposed data favors segment boundaries

Have a new **G4 simulation group**: tl, Lew Riley (Ursinus), Con Beausang/Keegan Sherman (Richmond), Amel Korichi (IN2P3/ANL), Augusto Macchiavelli(LBNL), Vikram Prasher(UML)

***You can download the GT TRACKING code from: "<http://www.phy.anl.gov/gretina>". Any help is welcome!***

***New people in the US tracking team: Edana Merchan (UML) [will add pair interactions], Ragner***

