Subject: FRS Calibration Issue
Posted by SMilne on Tue, 22 Jul 2014 17:14:47 GMT
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Hi all,

So, I have been experiencing some weird issues with the final FRS Calibration step for a while now, which has been giving me a skewed 'Z vs A/Q plot' (see attached), but first, I thought I should explain all the steps I have taken prior to this, just in case I've made any mistakes along the way.

The order in which I have performed the FRS calibrations:
1) TPC - Position corrections, check sumgates, etc.
2) TOF - TOF Calibration, beta calibration, etc. using LISE++ Files
3) MUSIC - Aligning raw energy losses, etc.

TPC Calibrations
- Performed position calibrations for TPC21, TPC22, TPC41 and TPC42 using the fiber mask run files.
- Offsets and gains extracted from linear fits to plots of 'correct fiber positions vs raw positions', for the x and y positions.
- Replayed data, all worked fine and centroids are all within ~0.05mm of the correct position. (i.e. see attached example of 'y vs x')
- Checked/adjusted sumgates for experimental data, all fine.

TOF Calibrations
- Produced 4 LISE++ files, including all degrader thickness offsets etc. for 4 different settings in this experiment: 43Ti (isomer calibration setting), 46Ti, 46V, 46Cr
- Extracted LISE++ TOF and Beta values from the 'goodies option' on the tool bar, selecting TOF between S2 and S4 scintillator (which also gave the distance).
- (Beta was found from distance/TOF [this may very well be incorrect, but I can't see how else it can be extracted from LISE++, but then again, I am no expert])
- I then extracted the scintillator TOF_LL and TOF_RR for all these nuclei, from the raw spectra, then plotted 'LISE++ TOF vs raw TOF_LL(or raw TOF_RR)', and from the linear fits, obtained offset and gain coeficients which I put into the 'TofSystem.cal' file.
- Replayed the data for the 4 settings, measured the TOF in the TOF spectrum for all 4 nuclei, which all matched the LISE++ values within 0.4ns.
- I then plotted '(LISE++ Beta x Measured TOF) vs LISE++ Beta', and from the linear fit, the offset(-distance) and gain(time offset) were found and added to the 'TofSystem.par' file.
- Replayed the data, then measured beta for all settings, and all were within 0.16% of the LISE++ beta value.

MUSIC Calibrations [where the issues occur]
- Aligned all the raw energy spectra to an arbitrary value of 900 for the 46Ti setting, changing the gains in 'Music1.cal' and 'Music2.cal'.
- Replayed the data and measured the centroid of the combined raw energy losses for MUSIC1 and MUSIC2 for all 4 settings.
- Plotted 'aligned MUSIC1(or MUSIC2) energy loss vs LISE++ Beta' (see attached) and extraced a, b and c from quadratic fit (a + b*\beta + c*(\beta)^2).
- All seemed fine and added these into the 'FrsId.cal' file then replayed the 46Ti data.
- The end result is attached as well as the PID before this calibration (leaving an old calibration already in place). [where the old PID plot is using an incorrect 'Z_in 35', to get the '46Ti blob' at

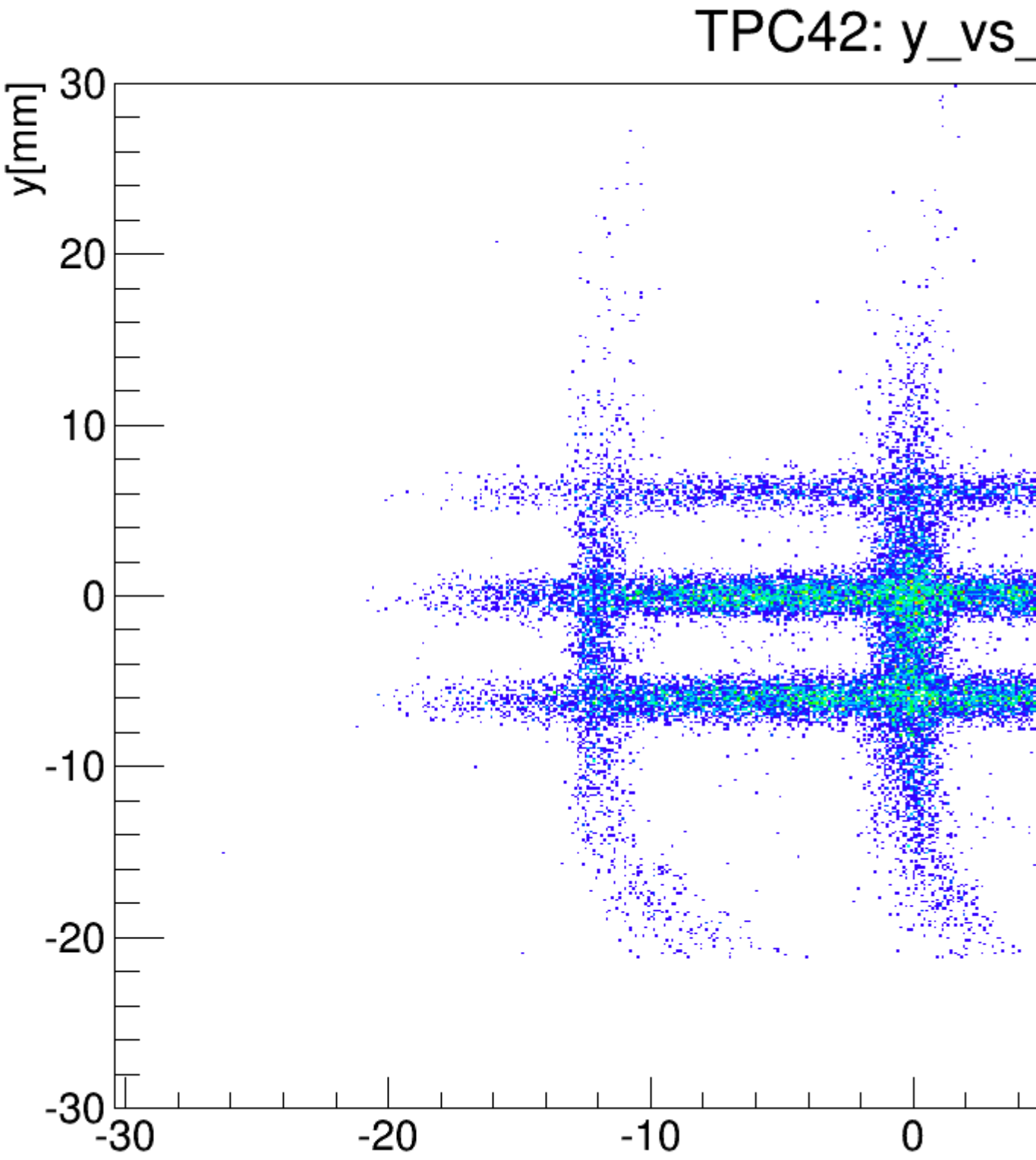
Z~22 and the new one is using the correct 'Z_in 22' in the FrsId.par file].

Can anyone see where I've went wrong or perhaps where I am mistaken in my current calibration procedure. If you require any more spectra etc. related to the problem, let me know.

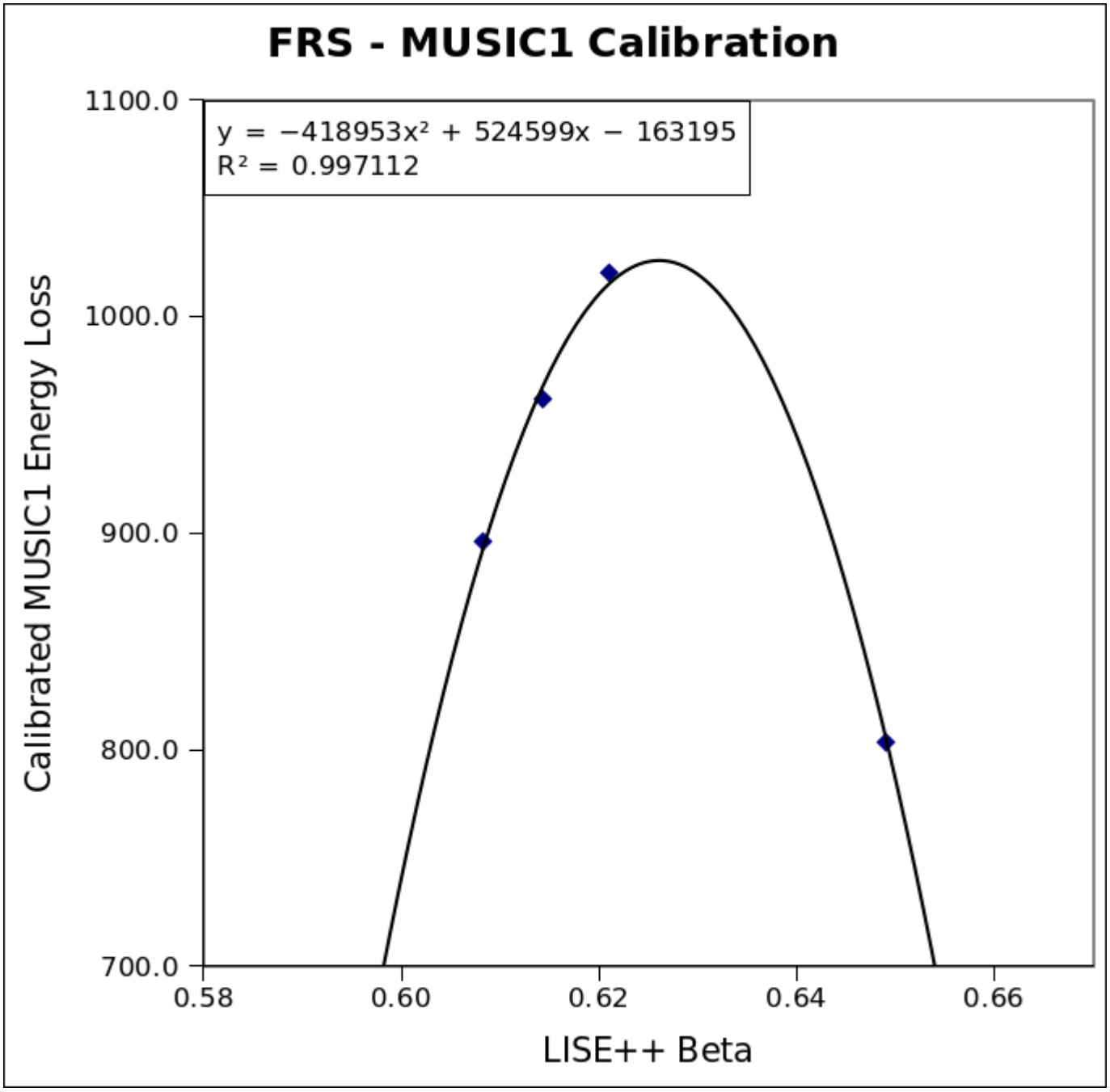
Many thanks,
Scott

File Attachments

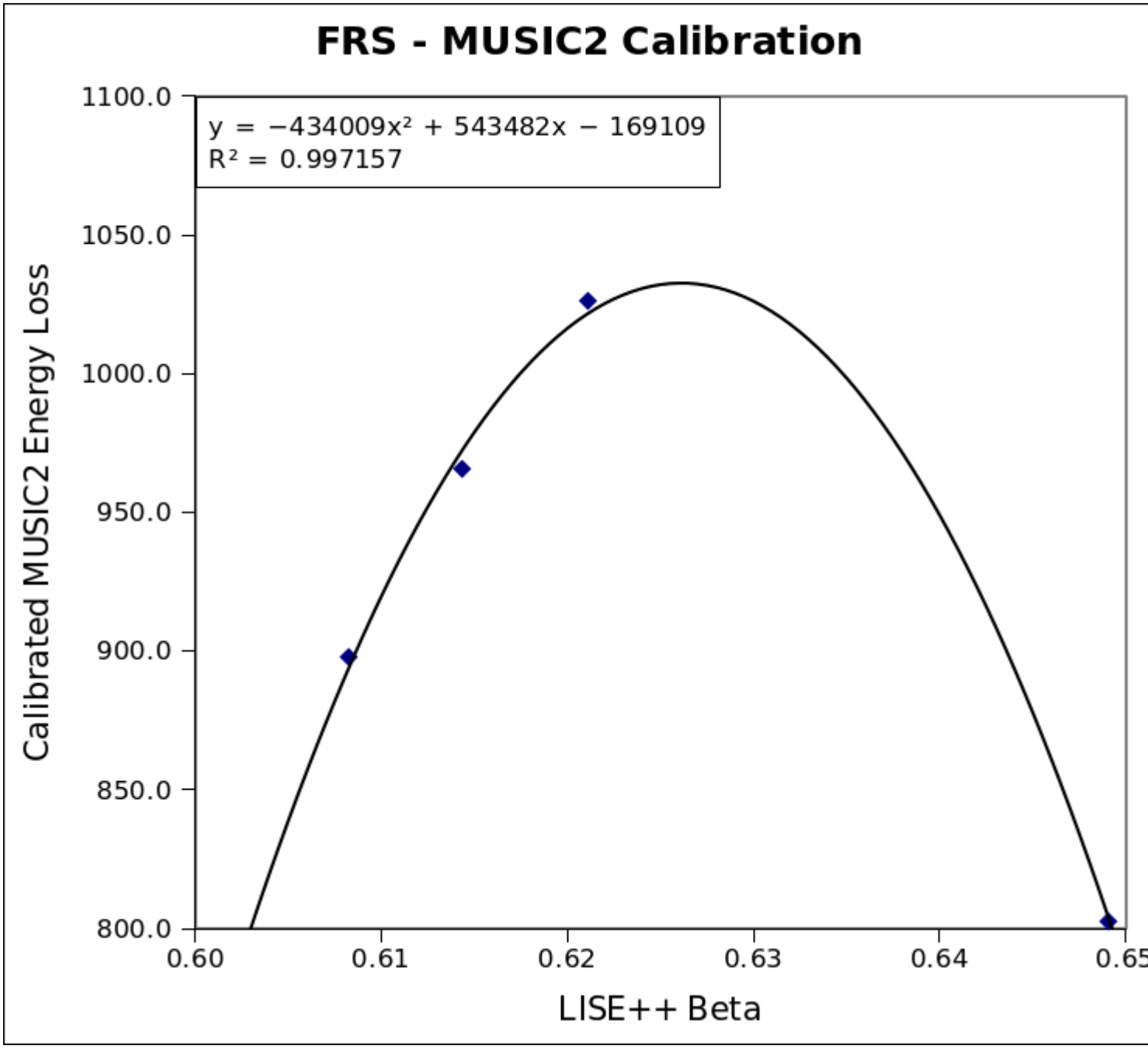
1) TPC42-yvsx.png, downloaded 460 times



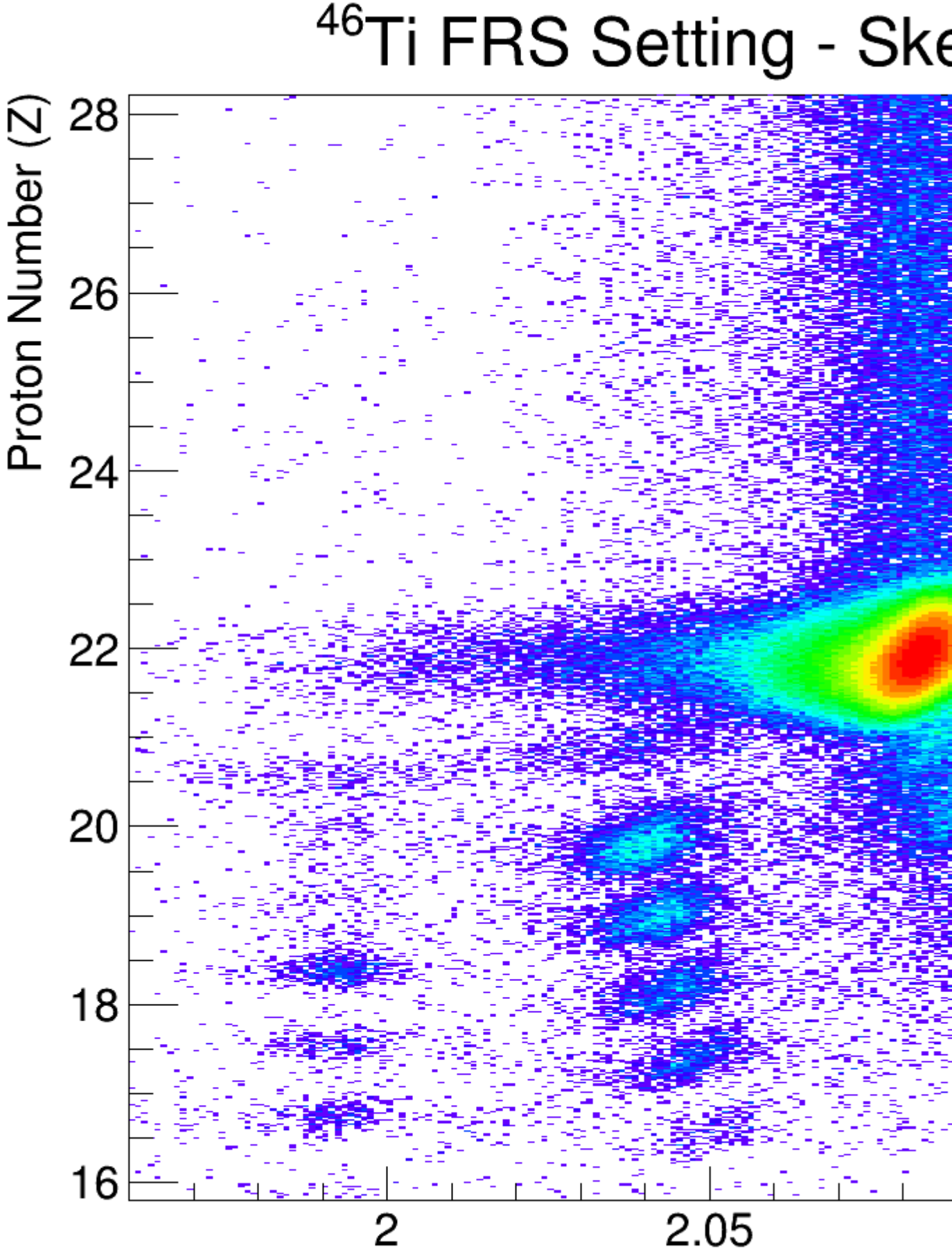
2) FRS-MUSIC1-Beta.png, downloaded 456 times



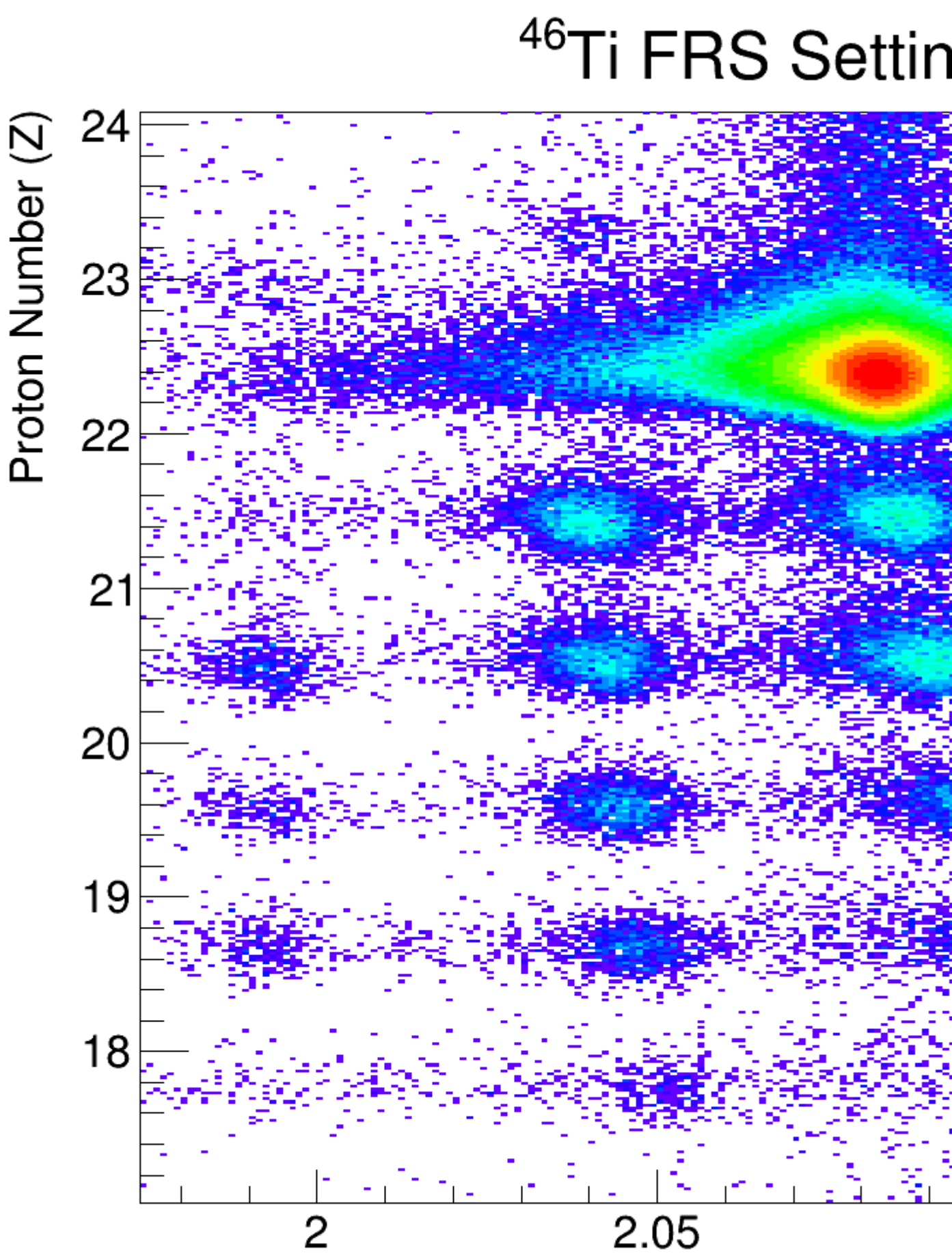
3) FRS-MUSIC2-Beta.png, downloaded 446 times



4) 46Ti-SkewedPID.png, downloaded 450 times


^{46}Ti FRS Setting - Ske
Proton Number (Z)
28
26
24
22
20
18
16
2
2.05

5) 46Ti-OldPID.png, downloaded 450 times


^{46}Ti FRS Settin
Proton Number (Z)
24
23
22
21
20
19
18
2
2.05