SE76 DATA STABILITY AND RUN SELECTION IN ALPACA

Elisabetta B. (TUM) Analysis Meeting 6 June 2023

MOTIVATION

- Check the evolution of muonic X-rays and gamma lines in Se76 data over the whole beam time (plot energy vs timestamp)
- Questions to address:
 - Can we combine all data together for analysis?
 - Is there any period which we want to exclude because problematic?

ENERGY VS TIME (CHANNEL 0)

- Stable conditions at **low energies**
- Uniform event rate during beam-time except for one period
- Same in all channels



ENERGY VS TIME (CHANNEL O) CLOSER LOOK TO MUONIC X-RAYS (455.6 & 466 KEV) L-series



Short beam down (inside run 14) probably, but negligible

ENERGY SPECTRUM (CORRELATED EVENTS IN CHANNEL 0)

- Comparison of event rates (counts/hour)
 between run 01, 06
 and 14
- Much lower rate of muonic X-rays and de-excitation gammas in run 06
- Same in all channels

What happened?



ENERGY VS TIME (CHANNEL O) CLOSER LOOK TO MUONIC X-RAYS (1945 & 1957 KEV) <u>Kseries</u>



Short beam down (inside run 14) probably, but negligible

DEBAGGING

- Event rate in MIDAS stable in the same period -> cannot be "beam-down"
- From ALPACA-DAQ logbook, no clear explanation found, but lots of change of DAQ setting in those hours (threshold, pulser settings, ...)

Low rate in ALPACA data, but not in MIDAS data



CONCLUSIONS

- Detectors stable during se76 beam time (30 Oct - 4 Nov) at low energies → Combine all data together for physics analyses
- On Nov 30 evening for about 6 hours we observe a much smaller rate of events: probably problem in ALPACA DAQ setting → Exclude run 04/05/07/08 from physics analyses
- Small shift observed at higher energies before and after 31/10 (change of calibration): this is outside the calibration range, so no conclusion for now

Se76 ALPACA run summary

Run Number	Comments	Live Time (h)
01	beam-on	15.35
02	empty	-
03	beam-on	11.19
04	low event rate	1.24
05	low event rate	1.00
06	low event rate	2.75
07	low event rate	0.50
08	low event rate	0.47
09	beam-on	29.27
10	beam-on	3.93
11	beam-on	15.34
12	beam-on	14.75
13	beam-on	1.82
14	beam-on	34.59
15	beam-off	
16	beam-off	
Total Live Time		132.20 h
Beam-on Total Live Time		126.25 h

PLOTS FOR ALL DETECTORS

ALL DETECTORS - LOW ENERGY











ALL DETECTORS - LOW ENERGY











L-SERIES MUONIC X-RAYS (455.6 & 466 KEV)





Channel 1



Channel 3



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L-SERIES MUONIC X-RAYS (455.6 & 466 KEV)





Channel 5





K-SERIES MUONIC X-RAYS (1945 & 1957 KEV)





Channel 1 1975 1970 1965 10 1960 1955 1950 1945 1940 1935 30/10 31/10 01/11 02/11 03/11 04/11



K-SERIES MUONIC X-RAYS (1945 & 1957 KEV)

Energy (keV)



Channel 6



Channel 5



