Preliminary study on material radiopurity & quasi-online reconstruction

CYGNO 2nd Collaboration Meeting

19-20 December 2022

Anna Calanca - RomaTre University & INFN-LNF
calanca@lnf.inf.it

ROMA TRE UNIVERSITÀ DEGLI STUDI

INFN
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Frascati

1. Introduction

- **Low radioactive GEM 50x80 cm^2**

  Achieve knowledge of the radiopurity of different materials (radiopurity.org);

  Test of the LNF radiopurity facility;

- **Quasi-online reconstruction**

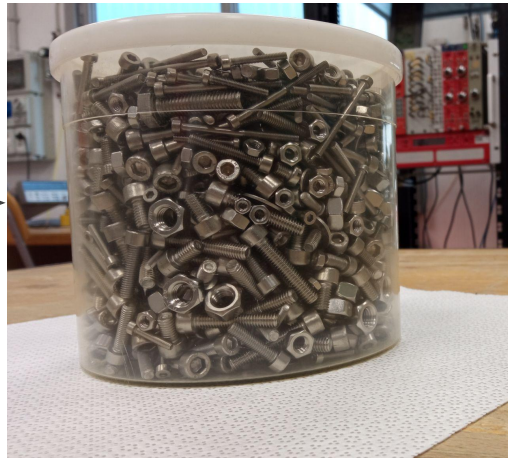
  study the correlation between variables in the reconstructed runs;

  study the behaviour of this correlation below and above 10KeV.

2. Low radioactive GEMs 50x80 cm^2

- Study on different radioactive materials (www.radiopurity.org)

- Sensitivity test of HPGe detector at LNF with a sample of 4.7 kg of steel screws (12h of data taking)



Pacific Northwest NATIONAL LABORATORY

radiopurity.org

SNOLAB

CYGNO Experiment

2. Low radioactive GEMs 50x80 cm^2

- Results : sensitivity of the order of 10^{-5} Bq, it is not possible to study radiopurity of material of interest for LIME (sensitivity requested < 10^{-6} Bq) ;

- Possible solutions:
  - longer data taking (≈ months) ✗
  - enlarge the sample weight ✗

- Ordered clean GEMs foil and Plexiglass inner frame from Rui De Oliveira (CERN)

...Meanwhile...

3.Correlation study for quasi-online reconstruction

- Now : data from official full reconstruction code

..**Plugin** full reconstruction code.. (work in progress)

- Future : Choose fundamentals macro variables to speed up reconstruction processing without data quality loss

3.Correlation study for quasi-online reconstruction

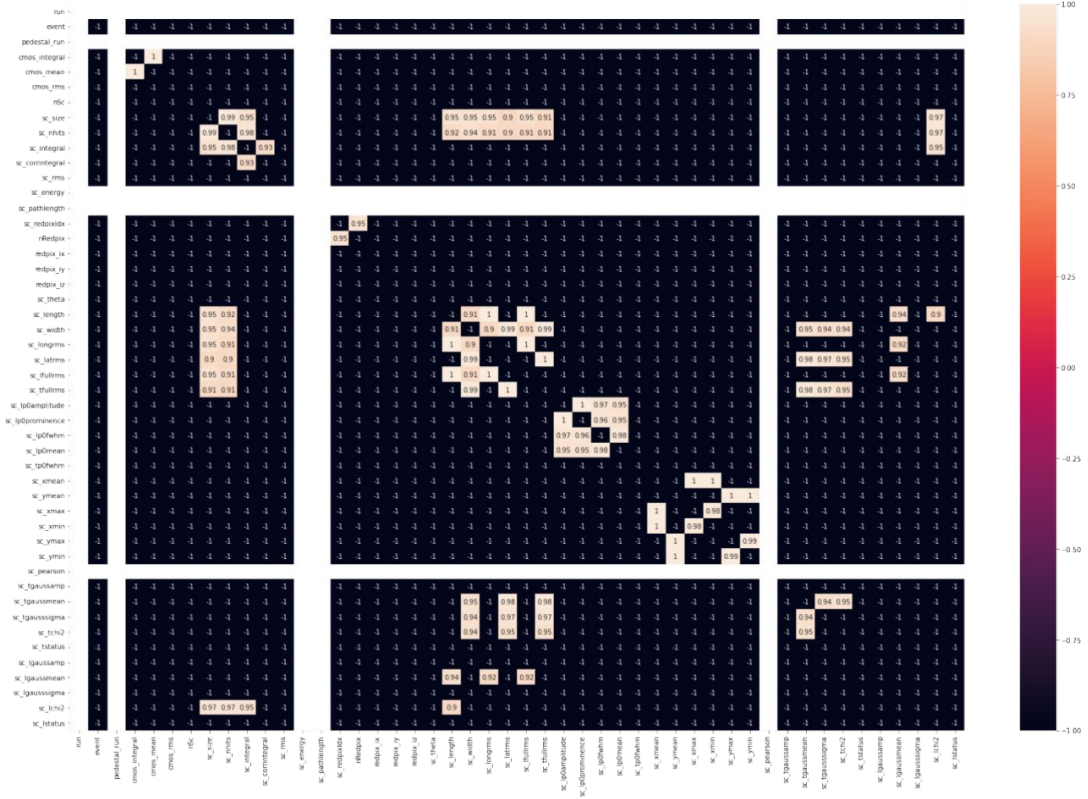
- Study of the behaviour of the correlation :
  set variables correlation threshold > 0.9 & <1;
  first results: different variables are correlated over the threshold

  Examples:

  sc_integral & sc_size correlation: 0.951

  sc_tfullrms & sc_latrms correlation: 0.999

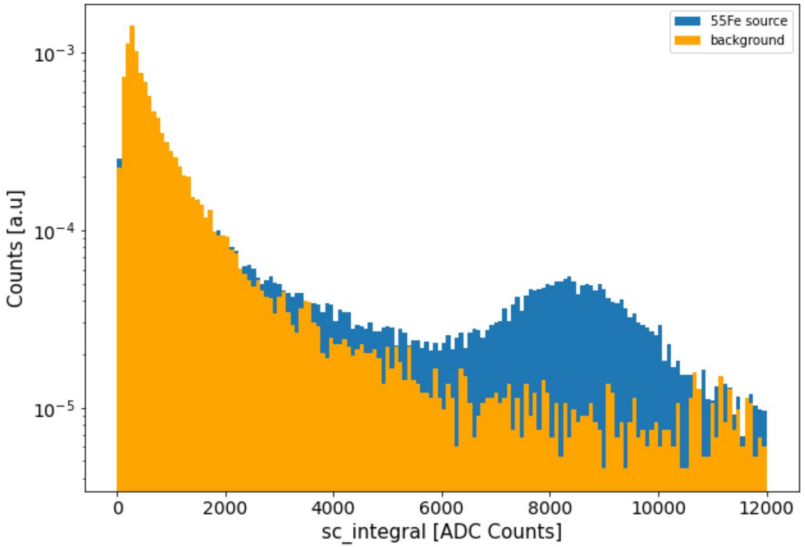
3.Correlation study for quasi-online reconstruction

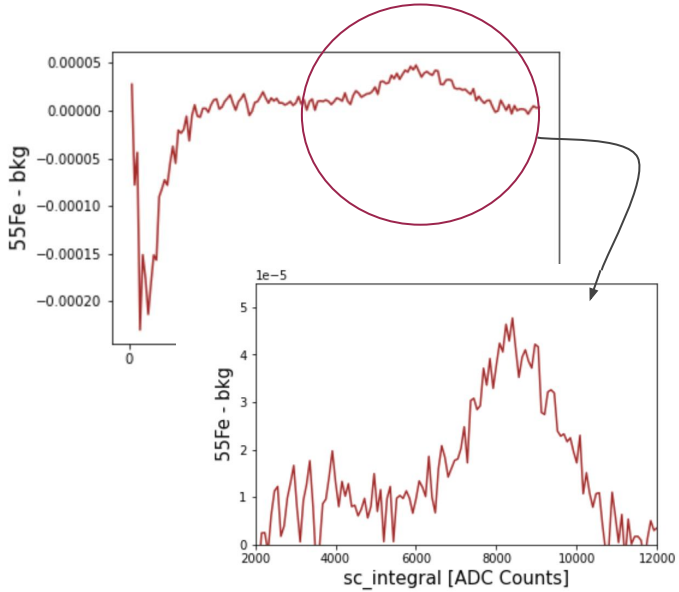


- black “-1” = correlation below the threshold (0.9)
- Odm(10^3) -> Odm(10^2)
- **Faster reconstruction!**

3.Correlation study for quasi-online reconstruction

- Calibration parameters for LIME underground reconstruction of the ^{55}Fe peak (≈ 400 img/run, 13 run)





..work in progress..

4. Future developments

- **Low radioactive GEM 50x80 cm^2**
  - construction of “clean” GEM 50x80 cm^2
  - mechanical resistance stress tests on these GEMs
  - implementation of GEMs’ system

- **Low radioactive field cage**
  - test on GIN
  - mechanical assembly and stress test

- **Quasi-online reconstruction**
  - complete the LIME calibration for the ^{55}Fe source
  - reducing even more the “dead time” of online reconstruction

Thank you!