

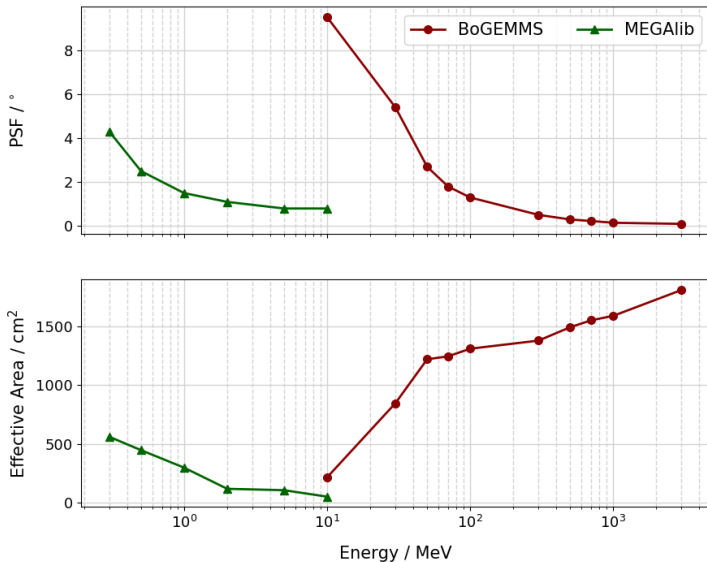


SWG 1<sup>st</sup> progress meeting

## Pair reconstruction in PACT (Pair And Compton Telescope)

P. Cumani, M. Hernanz, V. Tatischeff

## e-ASTROGAM



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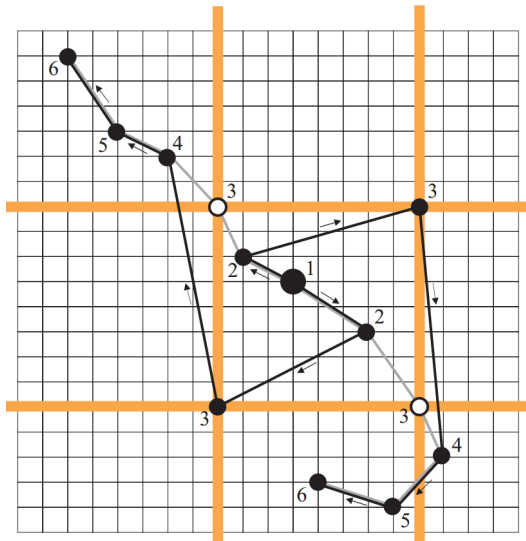
- Compton regime: MEGAlib
- Pair regime: BoGEMMS

Develop a single framework to reconstruct ALL gamma rays in the 0.3 MeV to 3 GeV

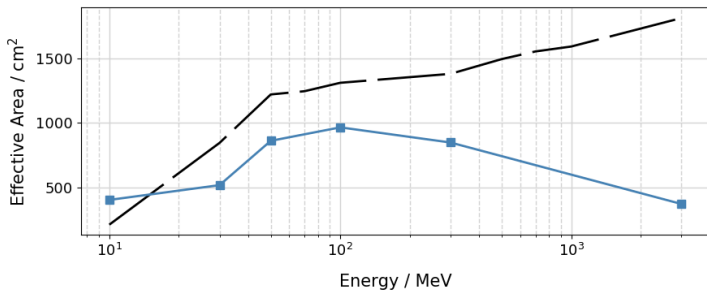
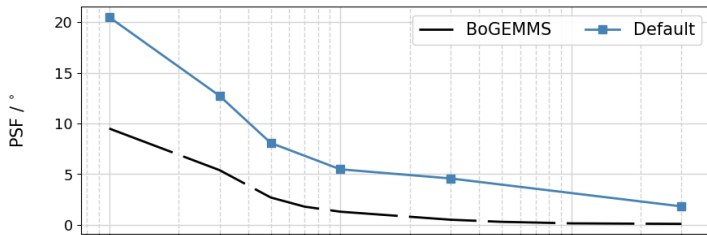
## MEGAlib reconstruction

- 1 Compton/Pair discrimination: look for a vertex in the tracker
  - One layer with exactly one hit
  - Below: at least two layers with exactly two hits
  - Above: no hits
- 2 Track reconstruction:
  - 1 Append hits to the found vertex. If two hits are possible the straightest solution is adopted
  - 2 Post-processing: to e.g. solve wrong interaction mapping during clusterization process

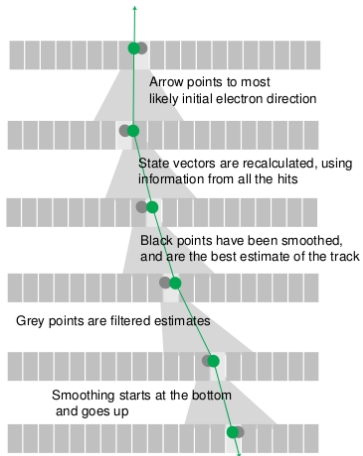
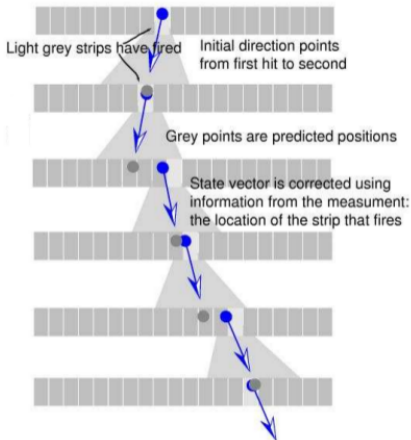
## MEGAlib reconstruction: clusterization



# MEGAlib reconstruction



# Kalman filter



## Kalman filter: 2D vs 3D

Usual implementation of the Kalman filter:

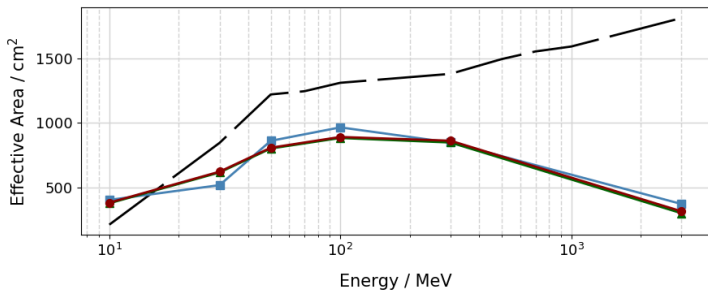
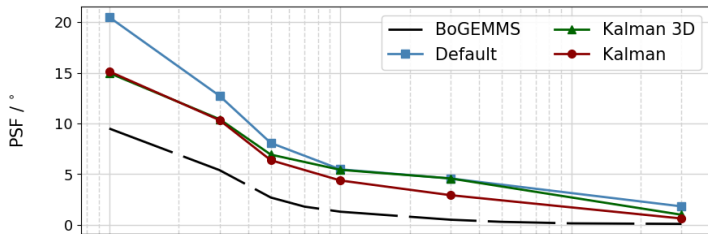
- The X and Y view are treated separately
- The tracks in the two views are subsequently combined in a 3D track using length/energy estimation from the multiple scattering

3D implementation:

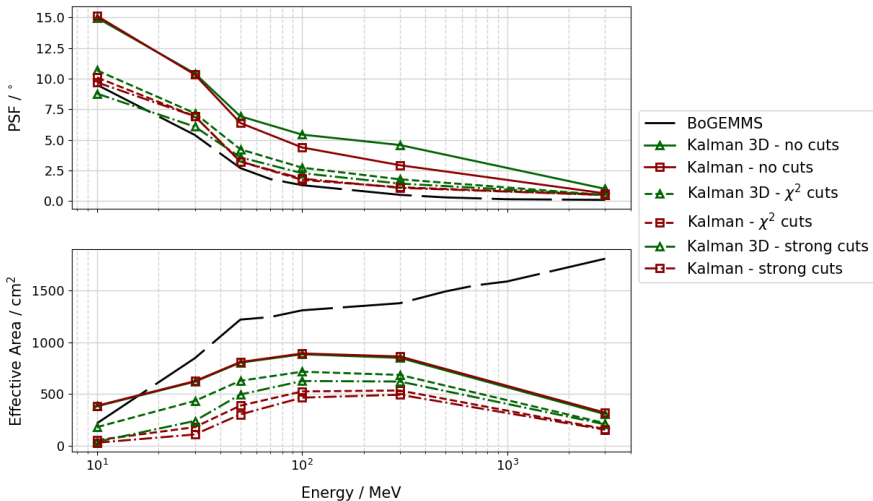
- Use X,Y coordinates of the clusters from the start
- No need to pair the tracks at the end
- The X/Y pairing on the clusters is dealt by MEGAlib (no post-processing for now)



## Pair reconstruction



# Pair reconstruction



## Pair reconstruction

Comparison with BoGEMMS:

- PSF comparable only if cuts are applied
- Effective area comparable only at the lowest energies

Is the trigger too low-energies oriented?

## Trigger and Vetoes

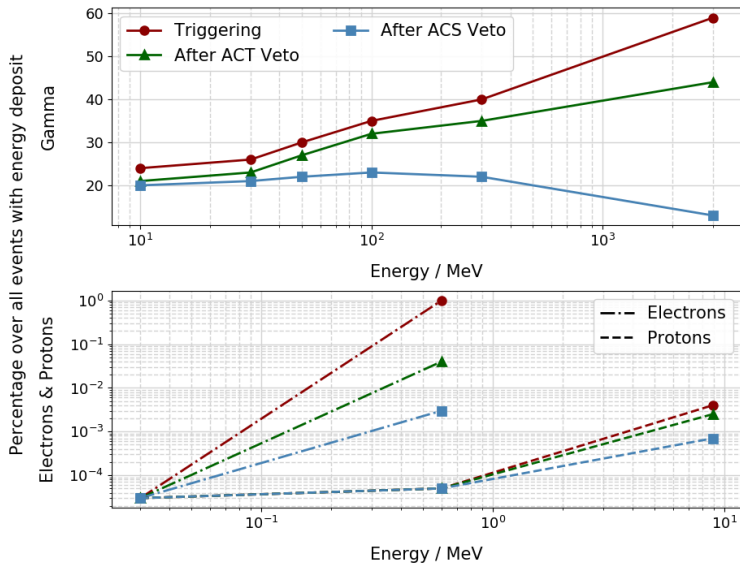
Applied so far:

- Tracker trigger: 1 or more
- Calorimeter trigger: 1 or more
- Veto AC top
- Veto AC Side

Anticoincidence:

- Monolithic
- Threshold 100 keV

# Trigger and Vetoes



## Collaboration MEGAlib/BoGEMMS

- Use both MEGAlib and BoGEMMS as input for a common pipeline/work
- In the common pipeline it is possible to add, remove, change different steps and different algorithms for the same step
- First step: develop a converter from the MEGAlib simulation output to the so-called S1 format

## Conclusion

- First version of the Kalman filter implemented in MEGAlib
- A study on the trigger is necessary to compare the results
- Started a MEGAlib/BoGEMMS collaboration with the same purpose