

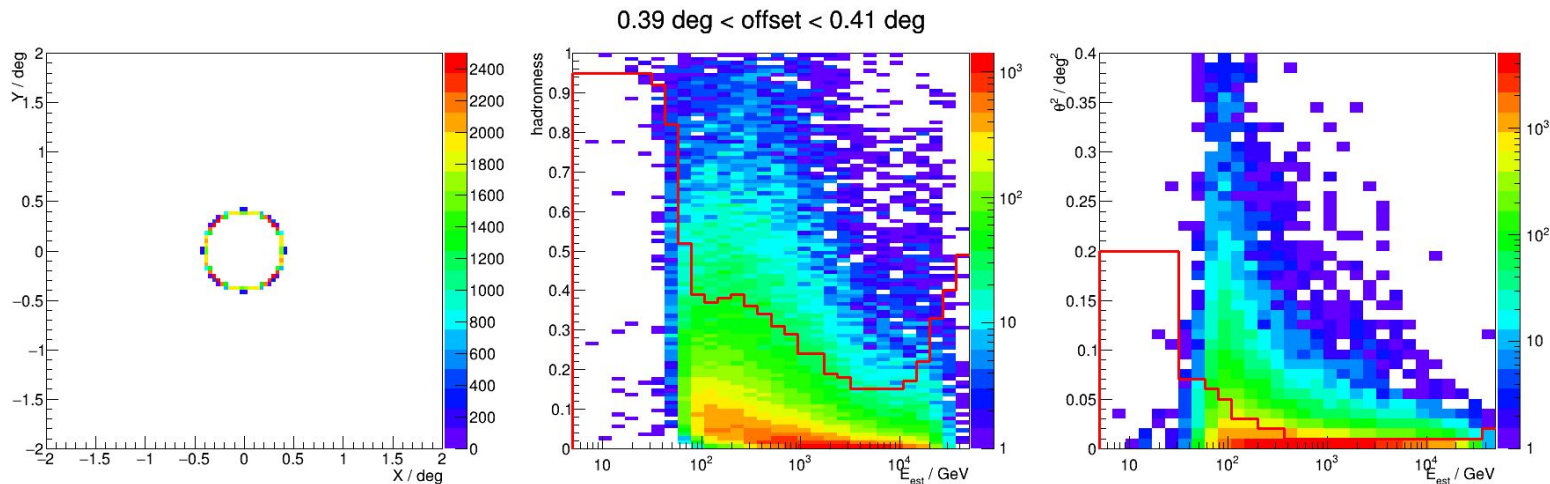
# **Release of MAGIC observations 05029747 and 05029748 for energy-dependent spectrum implementation in gammapy**

Cosimo

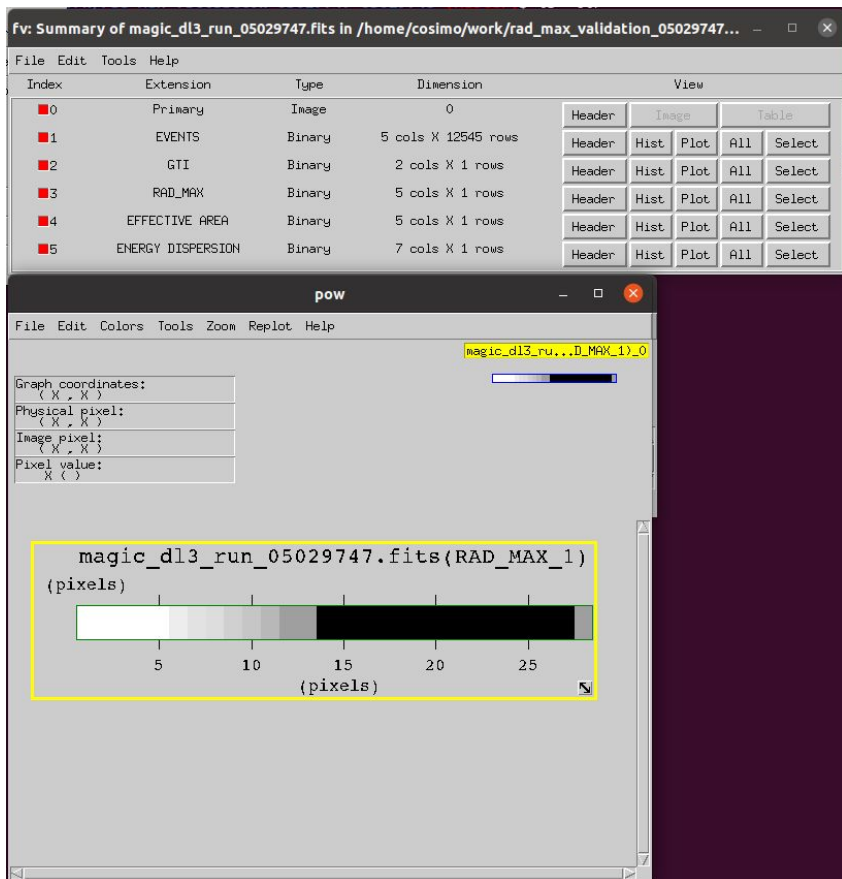
Gammapy developers call, 26/11/2021

# Runs 05029747 and 0529748

- > same two runs released for the joint-crab paper;
- > part of the sample used for the [stereo-upgrade performance evaluation](#);
- > reprocessed with the new version of the magic\_dl3 converter to have IRF components with energy-dependent theta2 cuts;
- > for this two specific runs ring-wobble (single-offset) MC were used: only 1 bin in offset;
- > in each  $E_{\text{est}}$  bin, cuts determined from a given efficiency (or quantile) of the hadronness and theta2 MC distributions.



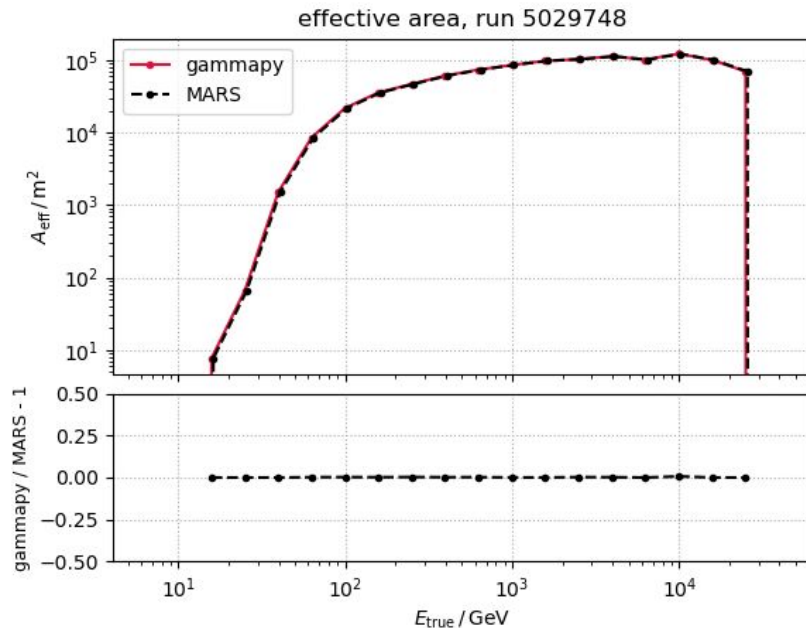
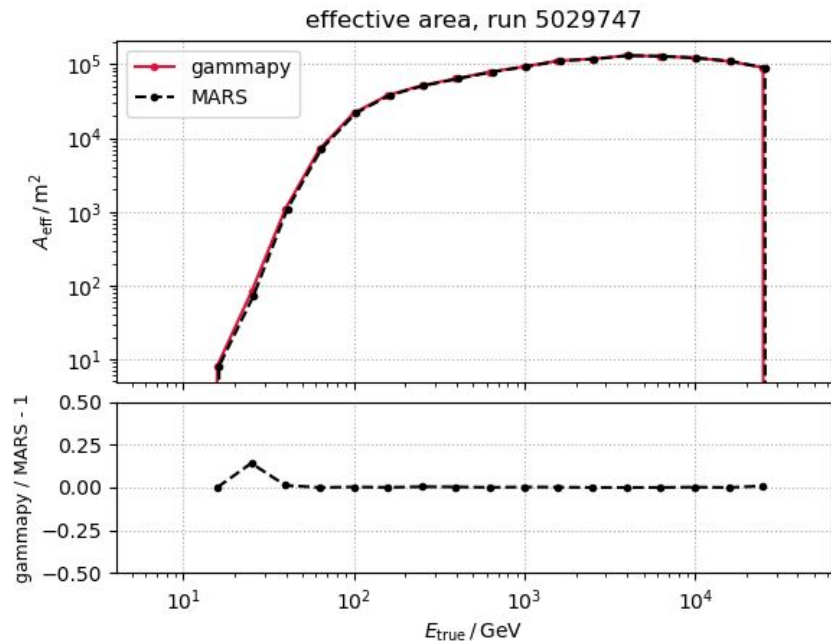
# RAD\_MAX HDU



- > energy-dependent hadronness and theta2 cuts applied at IRF components calculation;
- > energy-dependent hadronness cuts applied at event list selection, theta2 cuts stored in the RAD\_MAX HDU following the [GADF specs](#);
- > Max already implemented the loading of the RAD\_MAX table in a IRF-like object ([gammapy.irf.RadMax2D](#)) added to the Observation class;

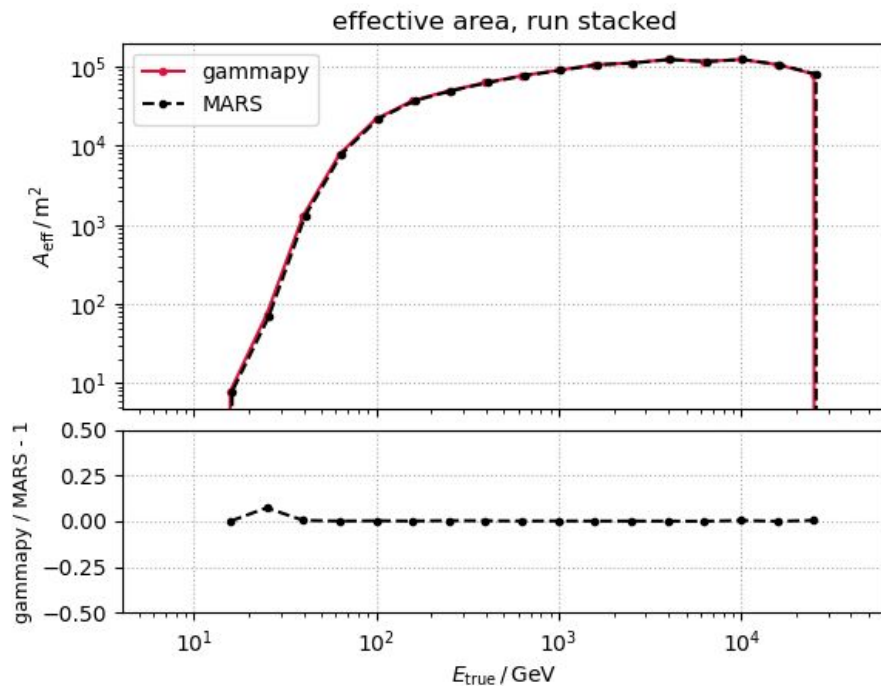
# Validation against MARS: IRF components, effective area

- Starting from the same MC and observations used for the DL3 production, I performed a spectral estimation with MARS and compared the results with gammapy.



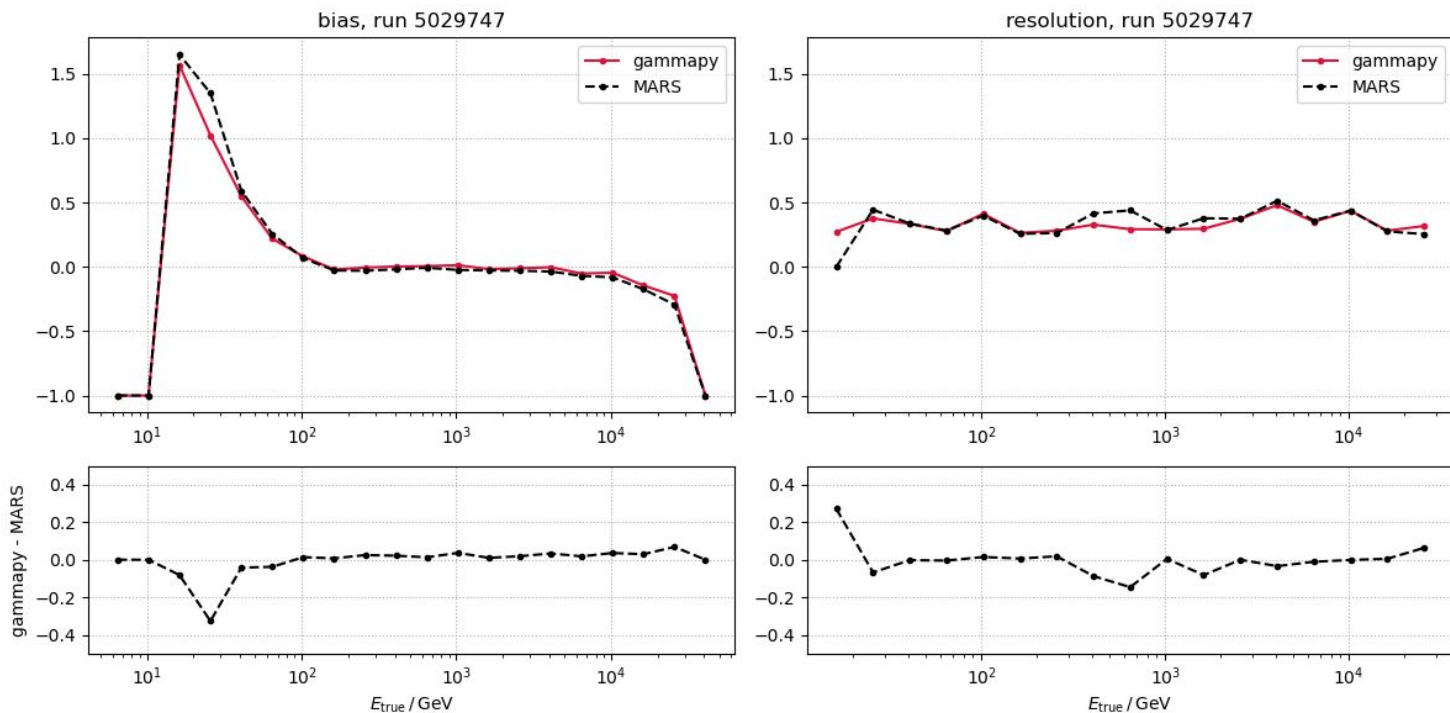
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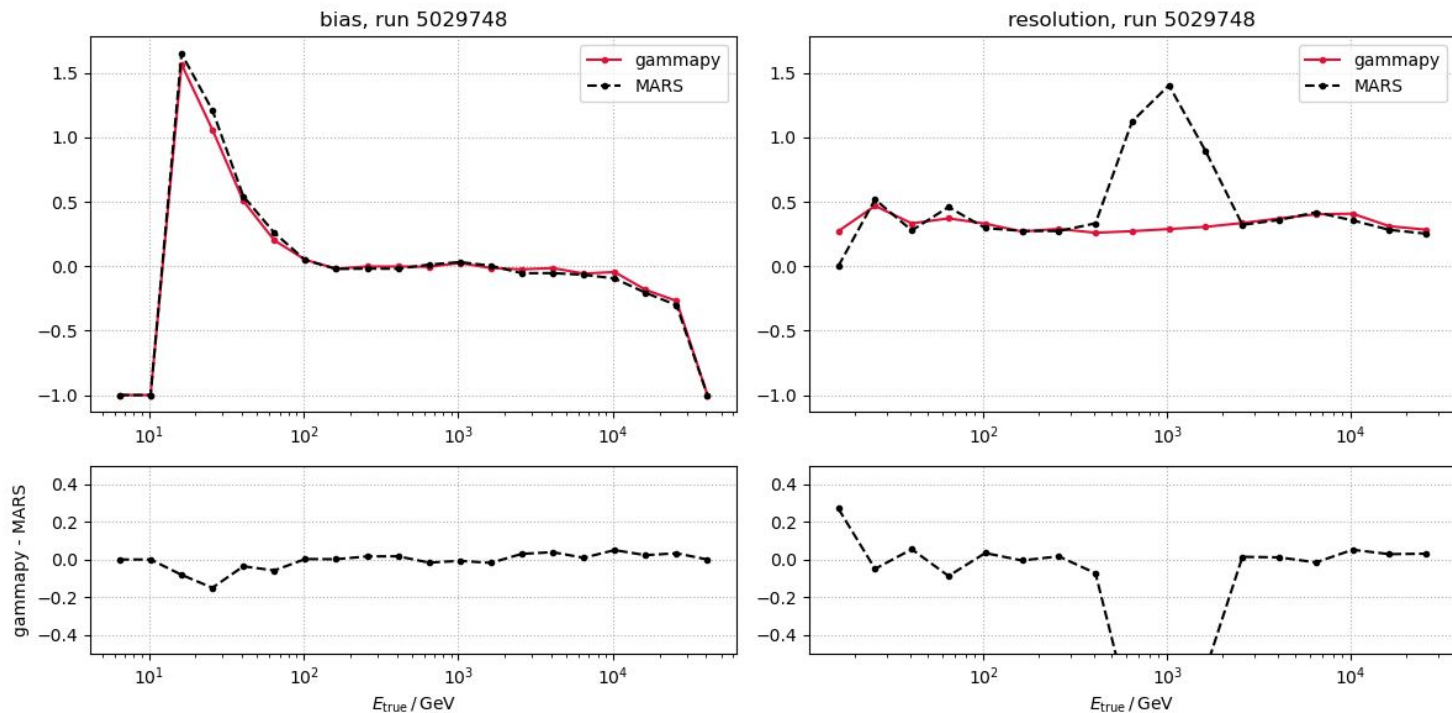
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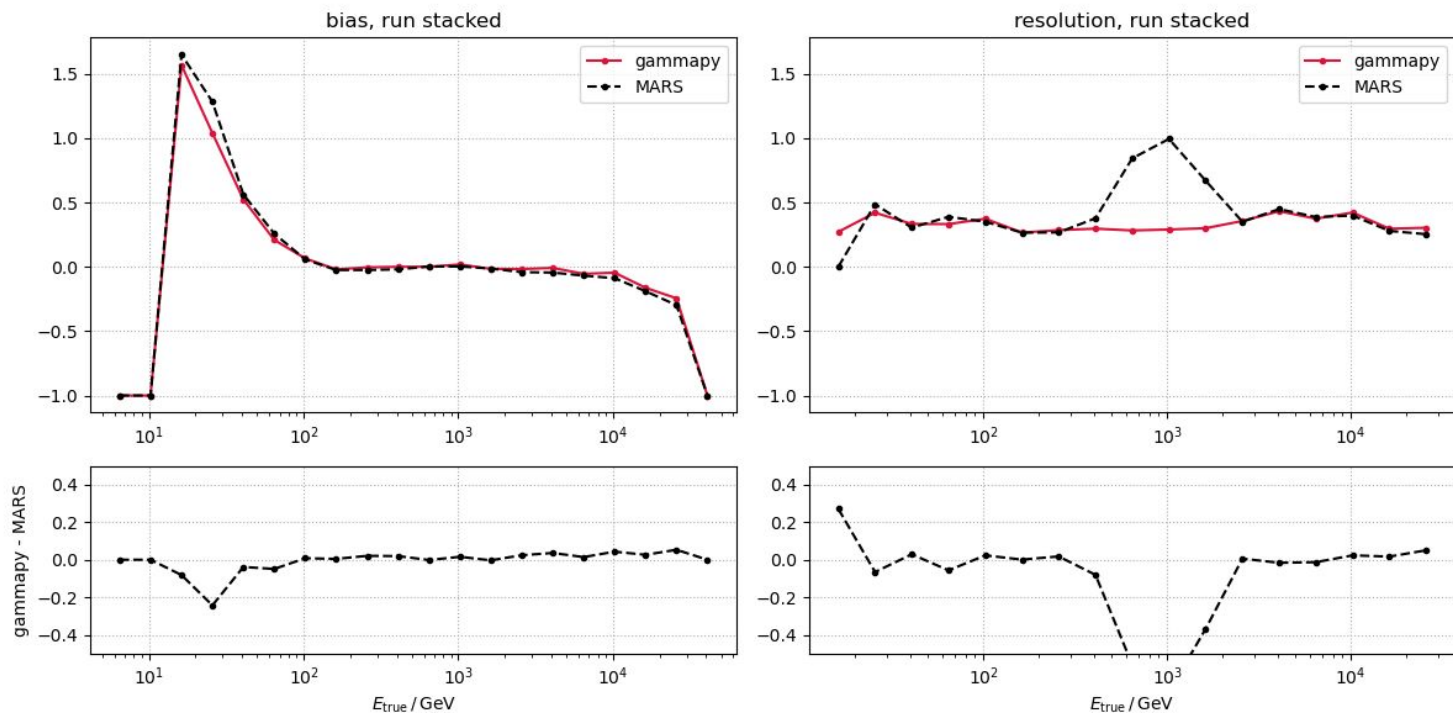
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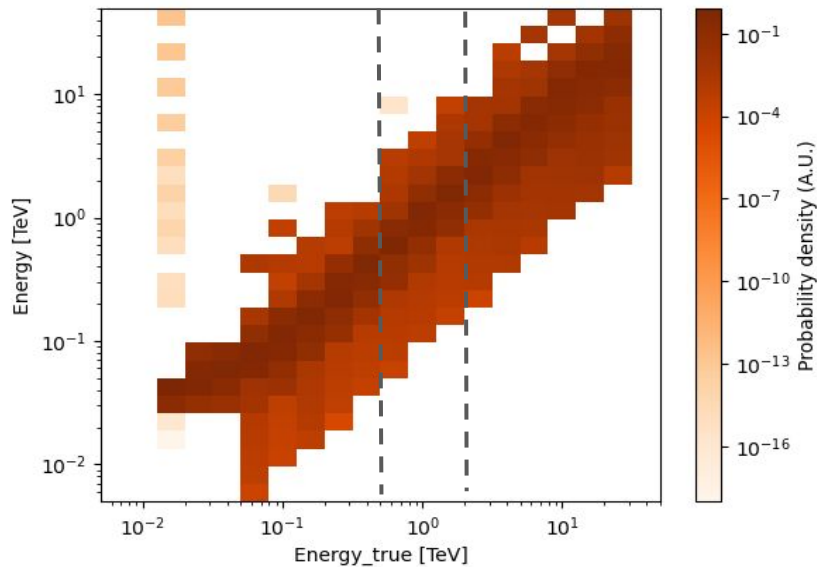
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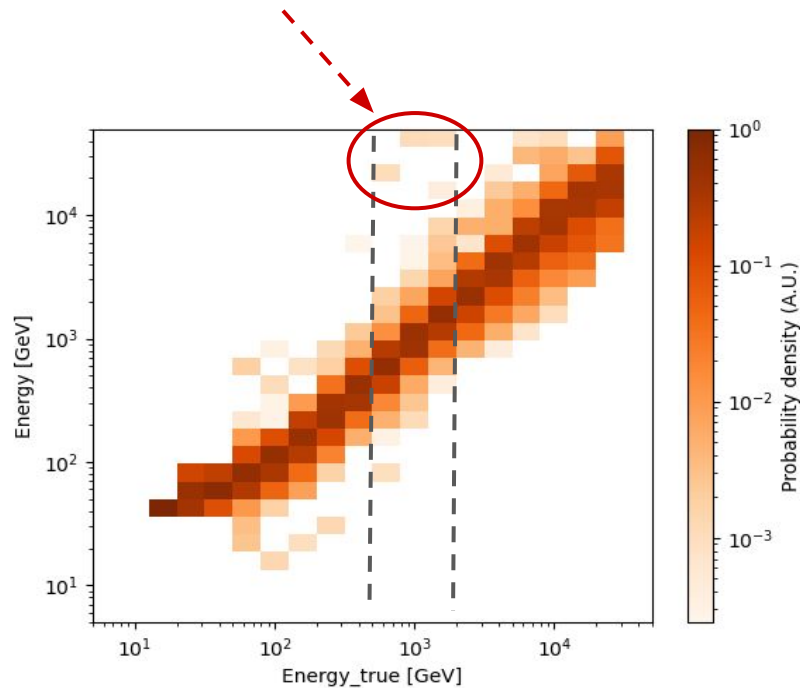


# why the bump around 1 TeV in MARS resolution?

> when filling mu vs E\_true I use a mu range [0.1, 1], some events are thus clipped. Any suggestion? To increase the range of mu would mean to increase as well the number of reconstructed energy bins in order to have a decent granularity of the energy dispersion.



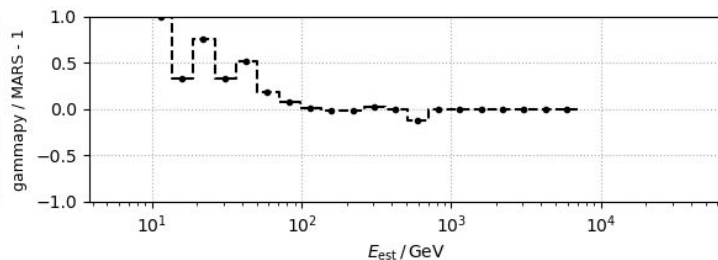
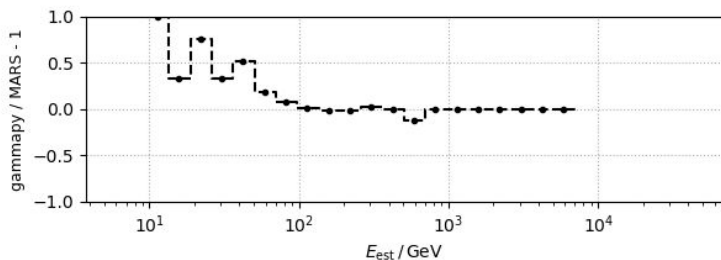
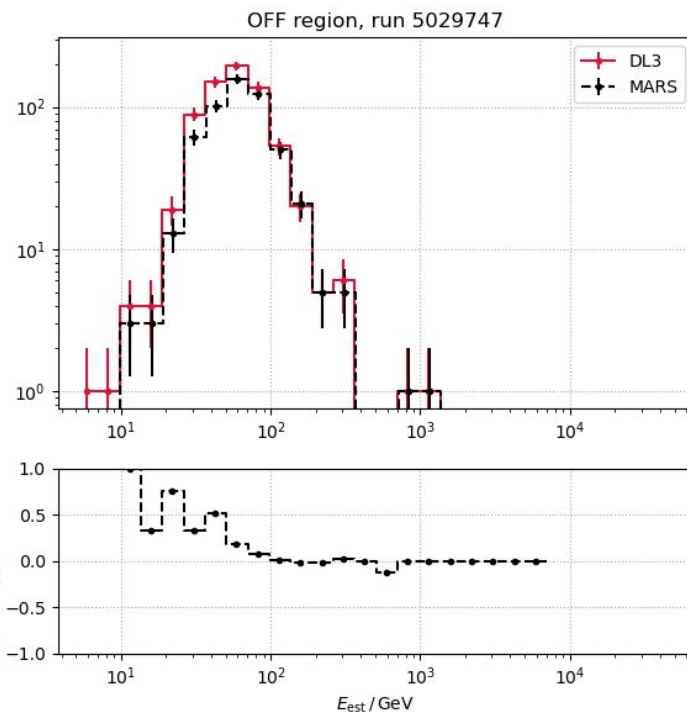
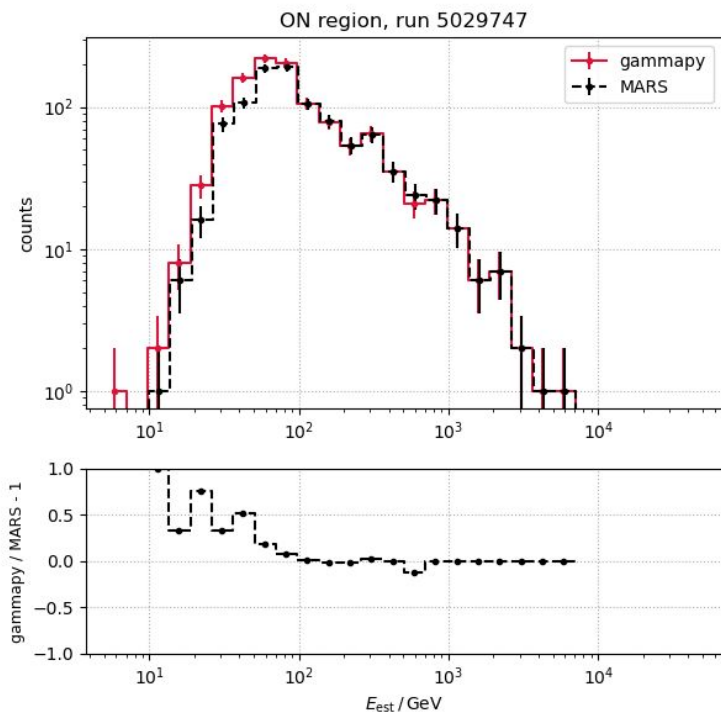
Gammapy



MARS (flute)

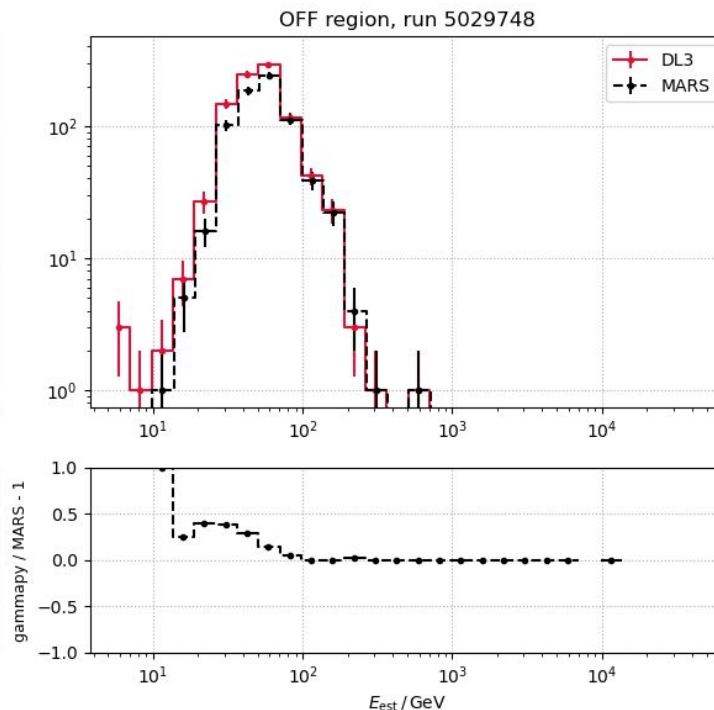
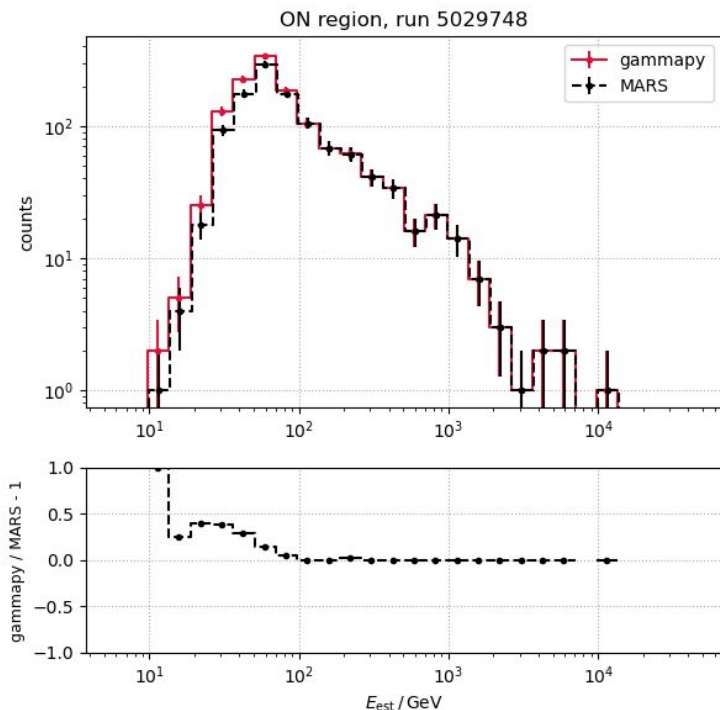
# Validation against MARS: spectrum extraction

> To get the approval I had to show a reconstructed spectrum. I extracted ON and OFF counts in each  $E_{\text{est}}$  bin with the theta2 plot function and then directly filled a pha\_ and bkg\_ OGIP files.



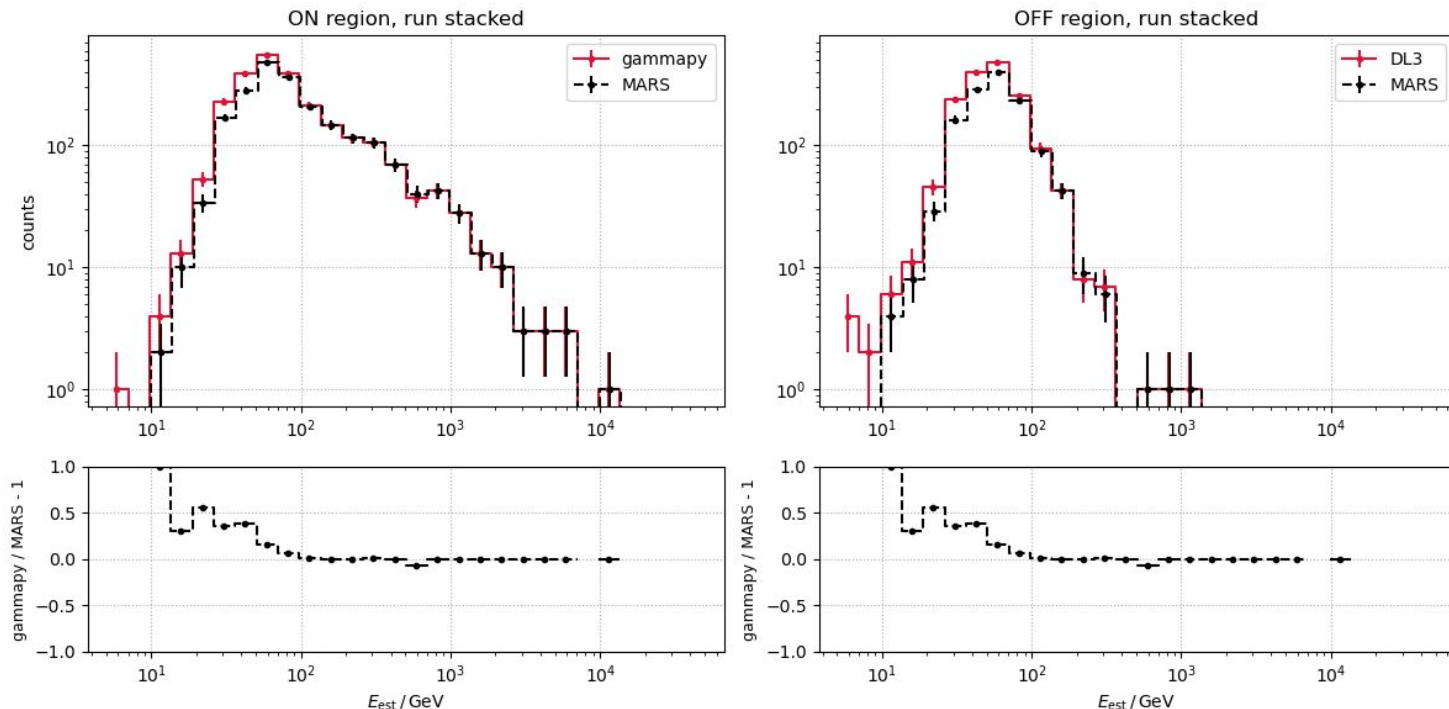
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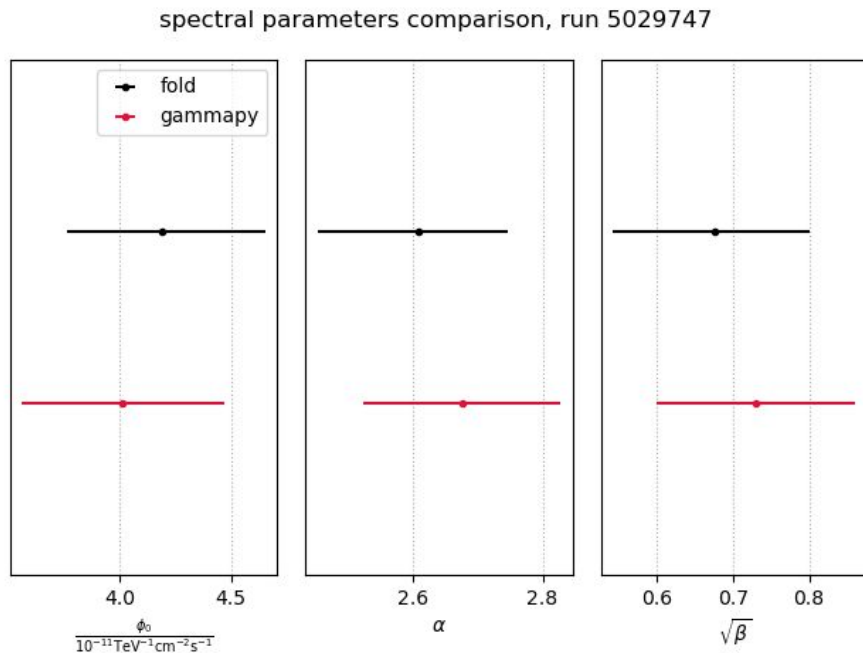
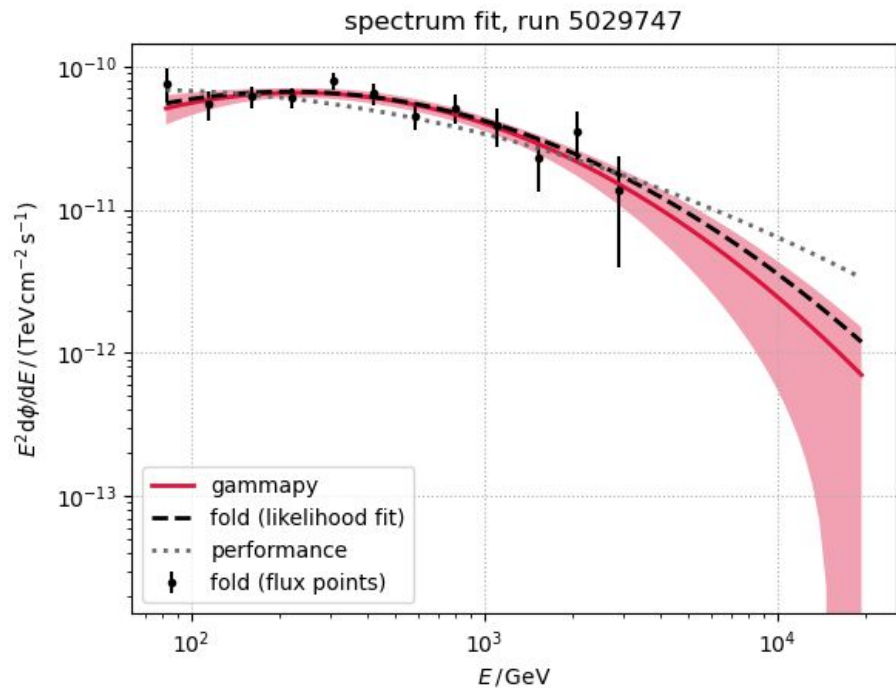
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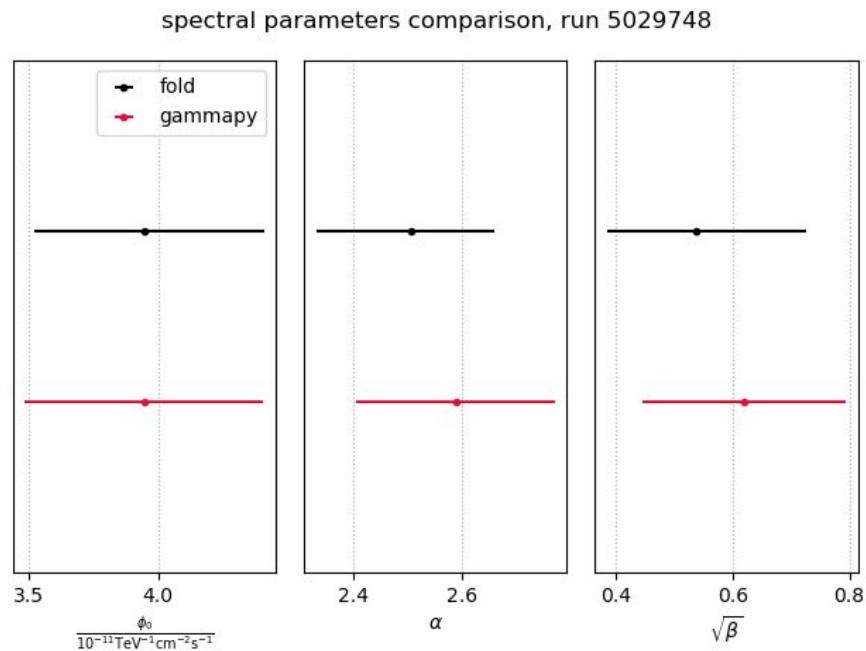
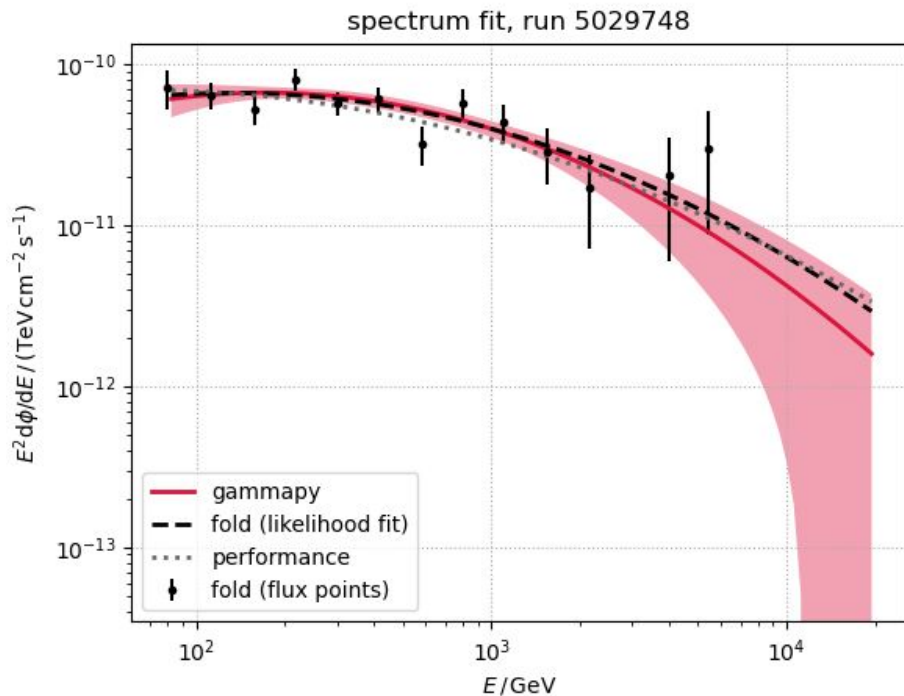
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> I loaded the OGIP files generated in a SpectrumDatasetOnOff and performed the fit.



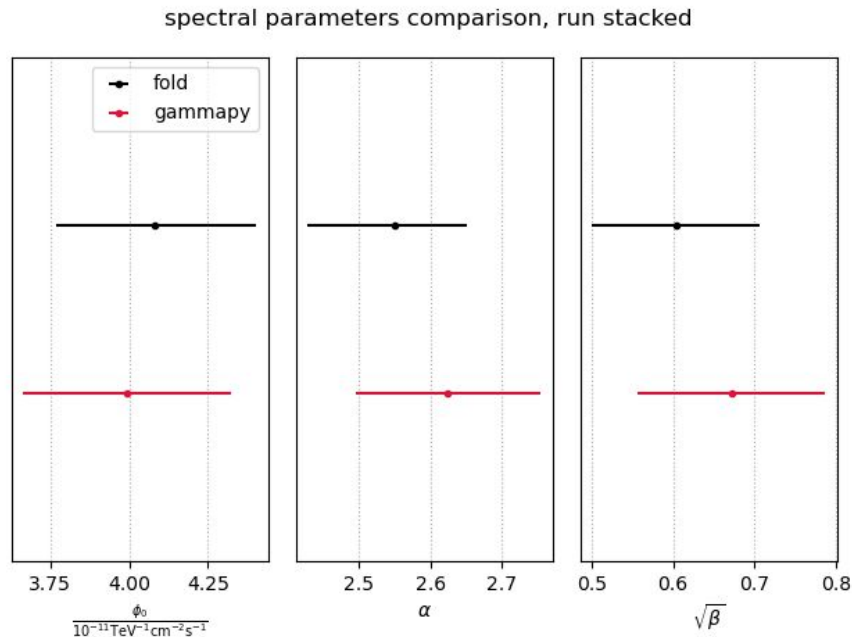
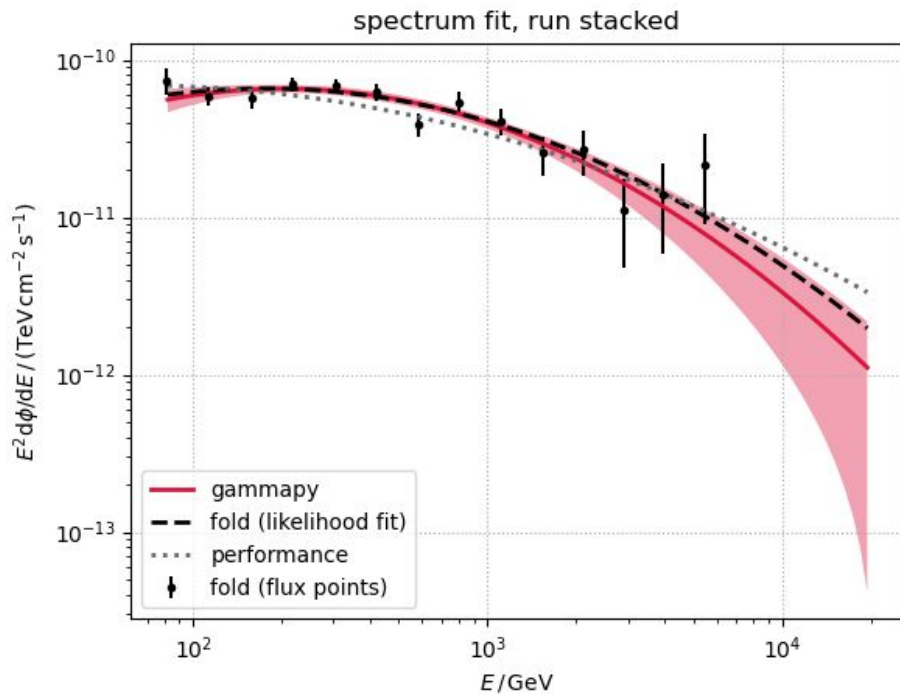
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# Some good news and request

- > The Software Board agreed to add these two runs to the gammapy-extra repository;
- > we kindly ask, once the energy-dependent spectrum extraction is implemented, to add our data and their reduction to the gammapy-benchmarks;
- > I might upload a new version of the same data in the future (solving some discrepancies, finding missing keywords...);
- > anyone interested to work on this in the co-working week?

## The better news:

- > within MAGIC, for each result approval, at least two independent analysis with compatible results are requested (cross check). Both are performed with MARS;
- > after the energy-dependent spectrum extraction is correctly implemented in gammapy, **all the MAGIC analysis release requests should also include a DL3 analysis, it can be one of the cross checks**. Already announced to the collaboration by the software coordinator.