SST-1M: STATUS OF MUONS SIMULATIONS

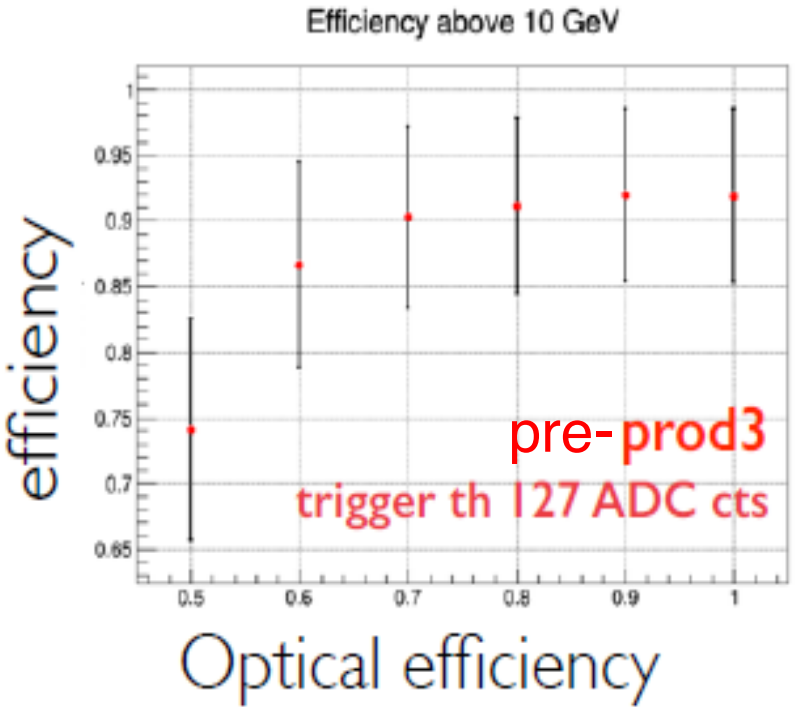
M. Heller for the SST-1M muon team

(V. Beshley, E. Prandini, R. Moderski)

26.10.2015 - Barcelona

LATEST SIMULATIONS: UPDATED CONFIG FILES (PRE-PROD3)

trigger efficiency



Main changes from prod2:

- photon detection efficiency
- mirror psf
- mirror reflectivity
- light collectors
- pulse shape
- single photo-electron spectrum

note: trigger based on digital sum from a 7 pix sector
„SMALL" simulations: only muons producing whole rings in the camera

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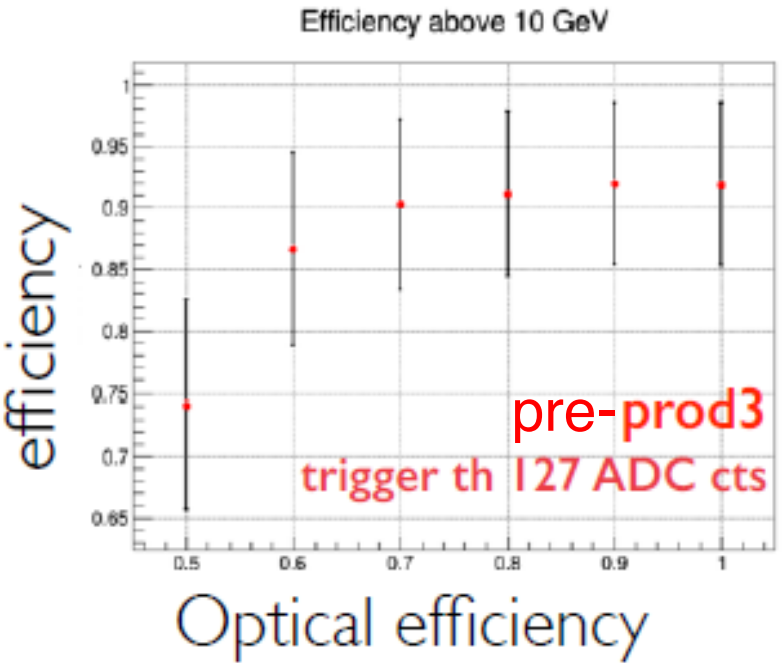
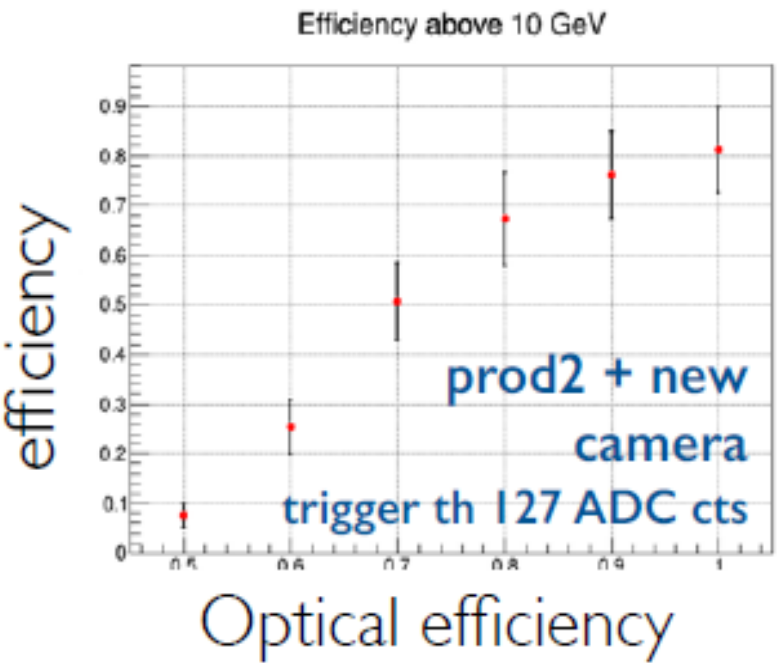
LATEST SIMULATIONS: UPDATED CONFIG FILES (PRE-PROD3)

trigger efficiency





Clear improvement and flat efficiency curve already with trigger threshold 127 ADC counts

note: in these simulations 127ADC = 25.4PE

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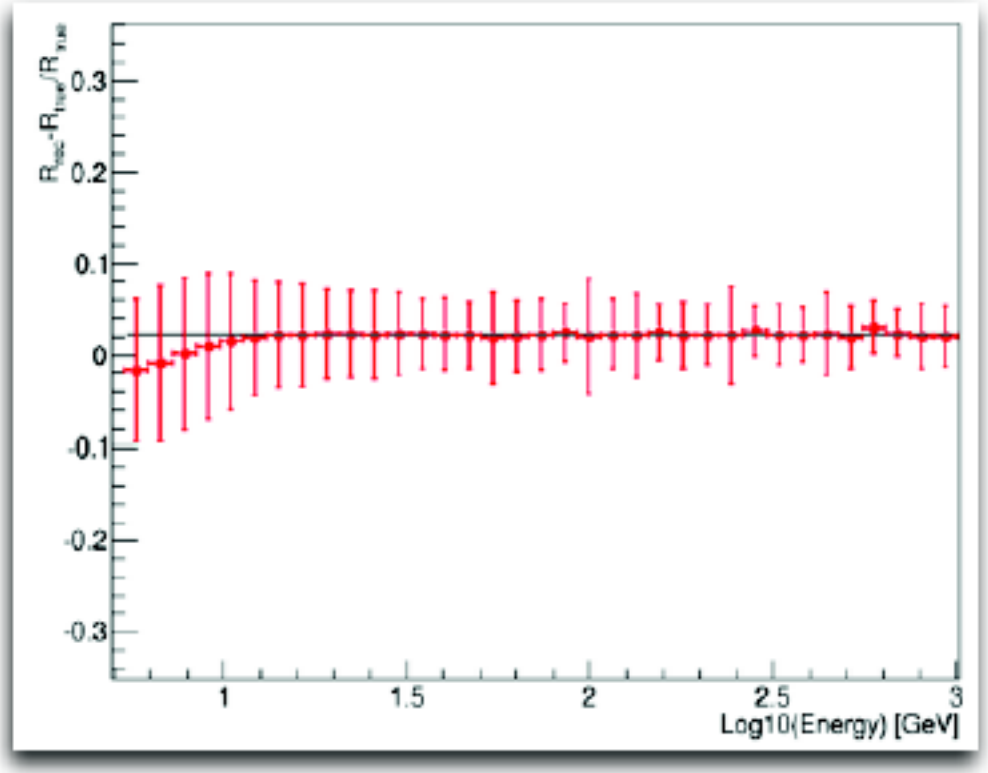
BIAS ON RING RADIUS RECONSTRUCTION (PRE-PROD3)

- Bias is ~ 2%
- Previous bias (<1%) was estimated with prod2 files
- Bias on IP in progress…



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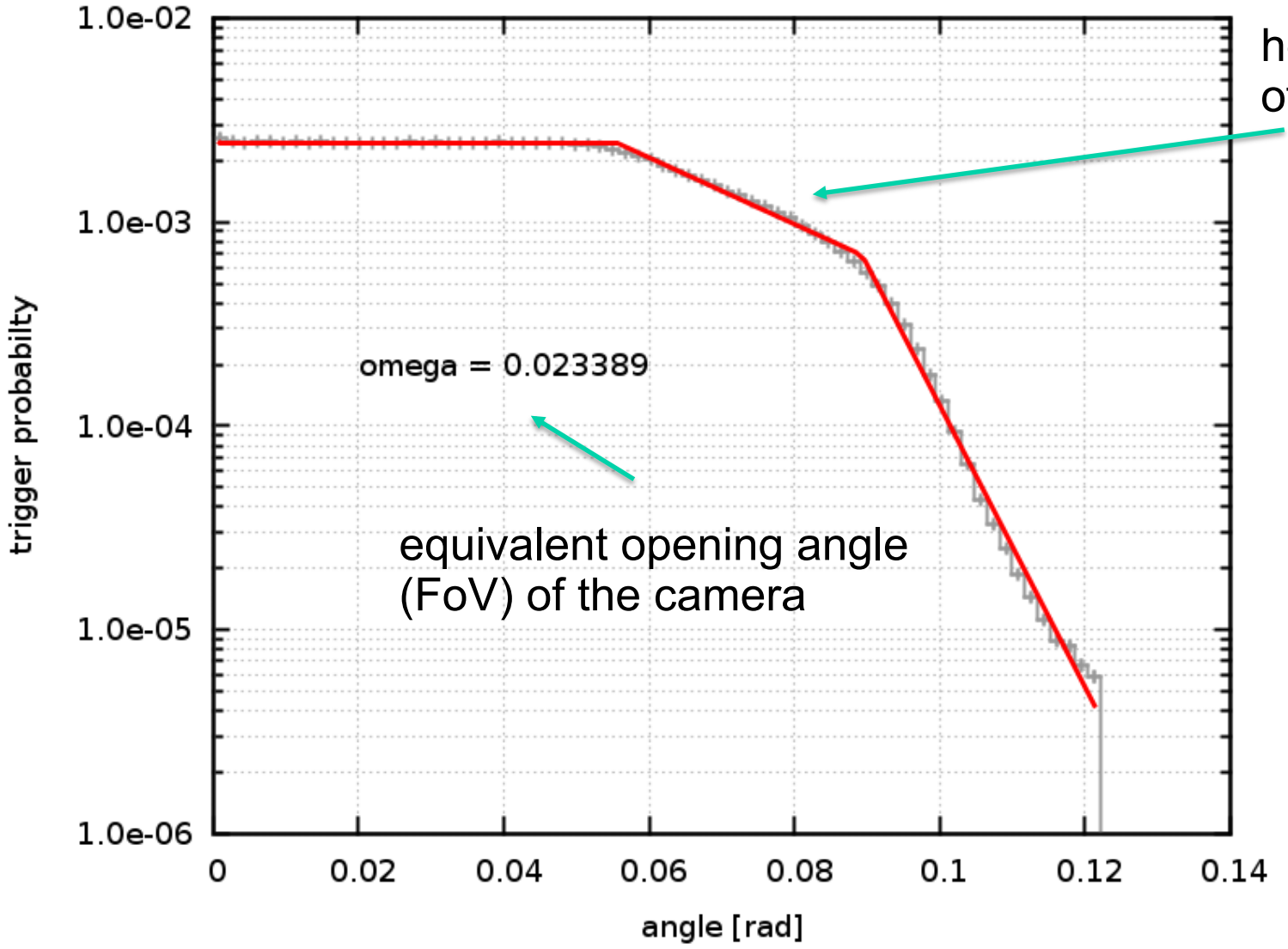
MUON TRIGGER RATE
BASE PARAMETERS OF SIMULATIONS

- We are using **Prod-3** configuration files for the simulations
- New standard site is **Paranal** at altitude 2150.0m
- Parameters for CORSIKA simulations:

NSHOW	10^9
SITE	Paranal
VIEWCONE	0. 7.
CSCAT	10 200.e2 0.
FIXCHI	100.

these are „BIG” simulations

MUON TRIGGER
ANGULAR PROFILE



MUON TRIGGER RATE CALCULATION

Muon rate

=

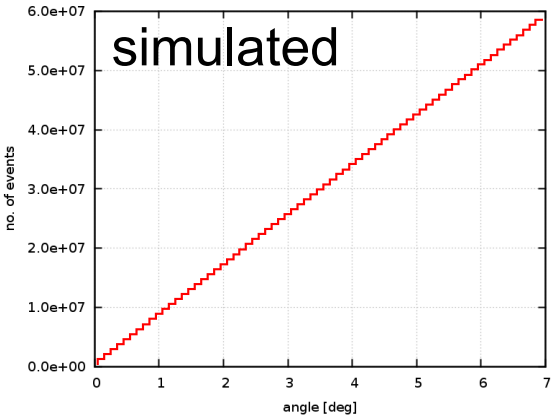
solid angle (calculated from angular profile)

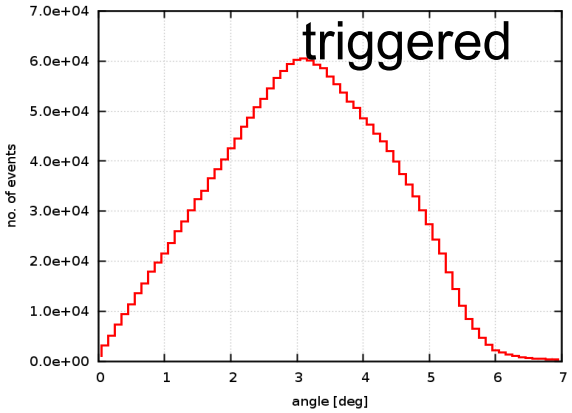
×

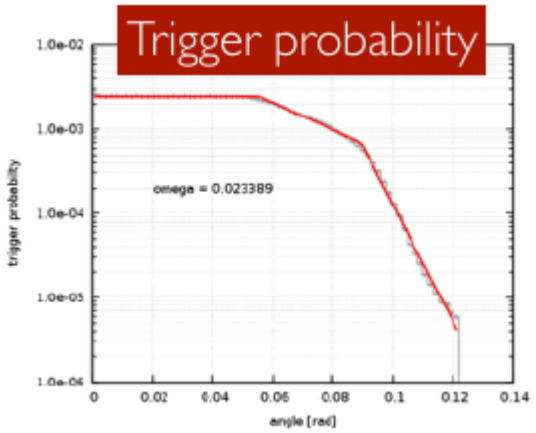
effective area

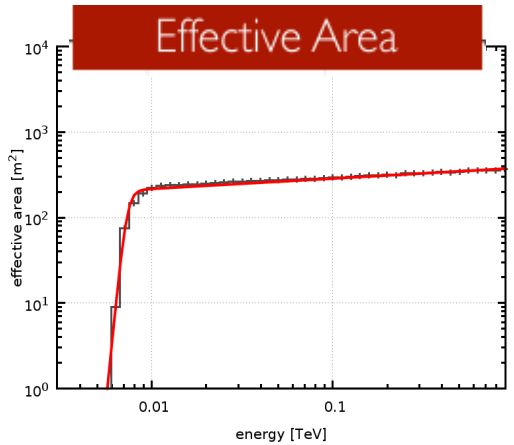
×

muon flux









From theory

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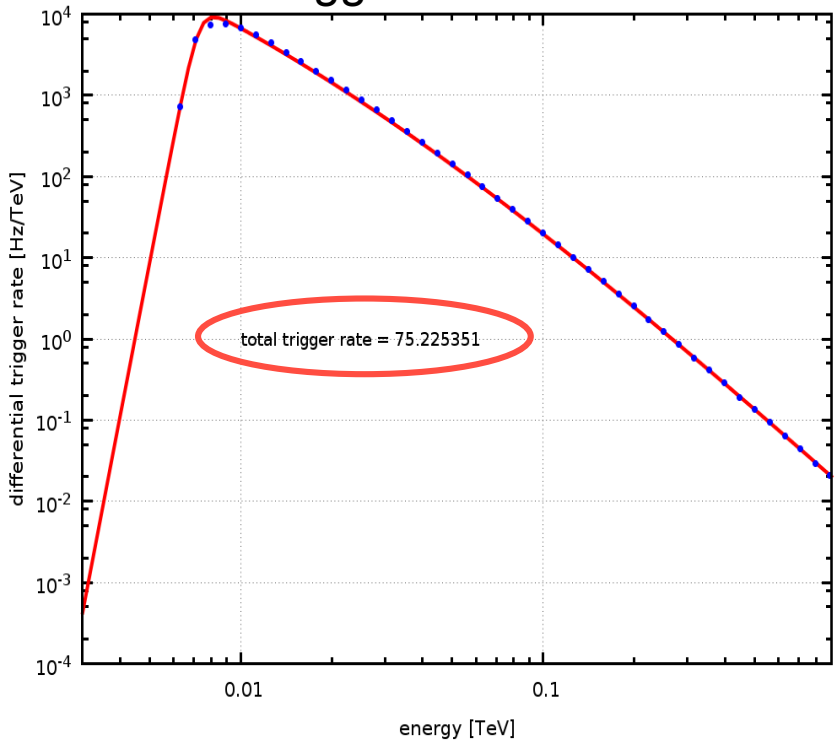
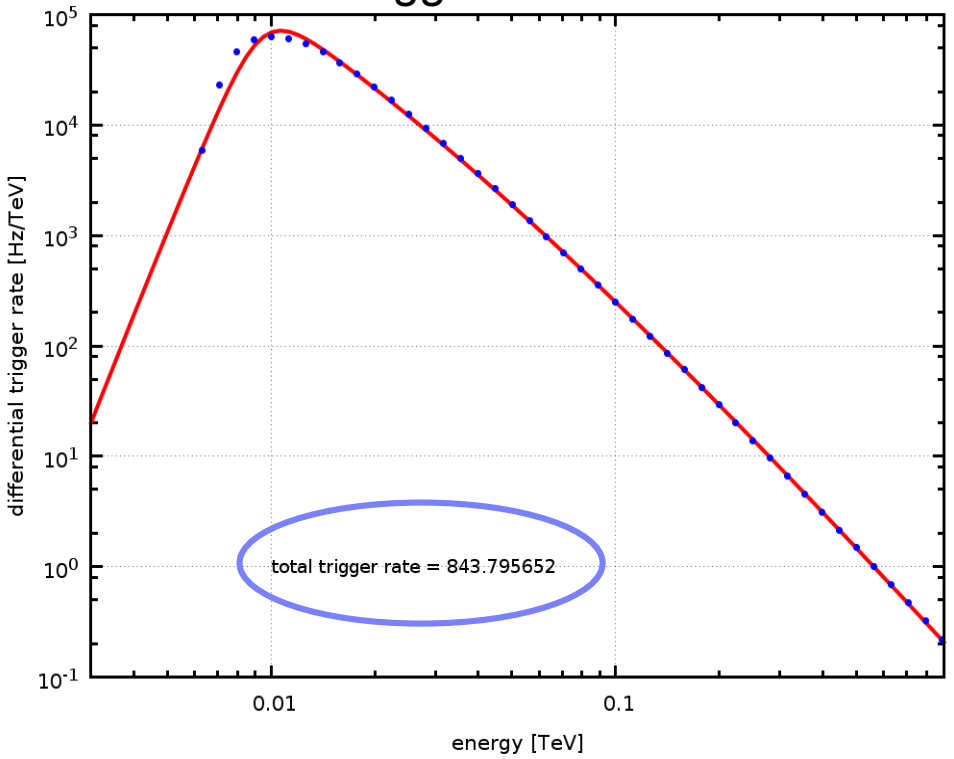
MUON TRIGGER RATE

SST-1M

trigger threshold („safe”)
344 ADC (17.2 PE)
total trigger rate ~75 Hz



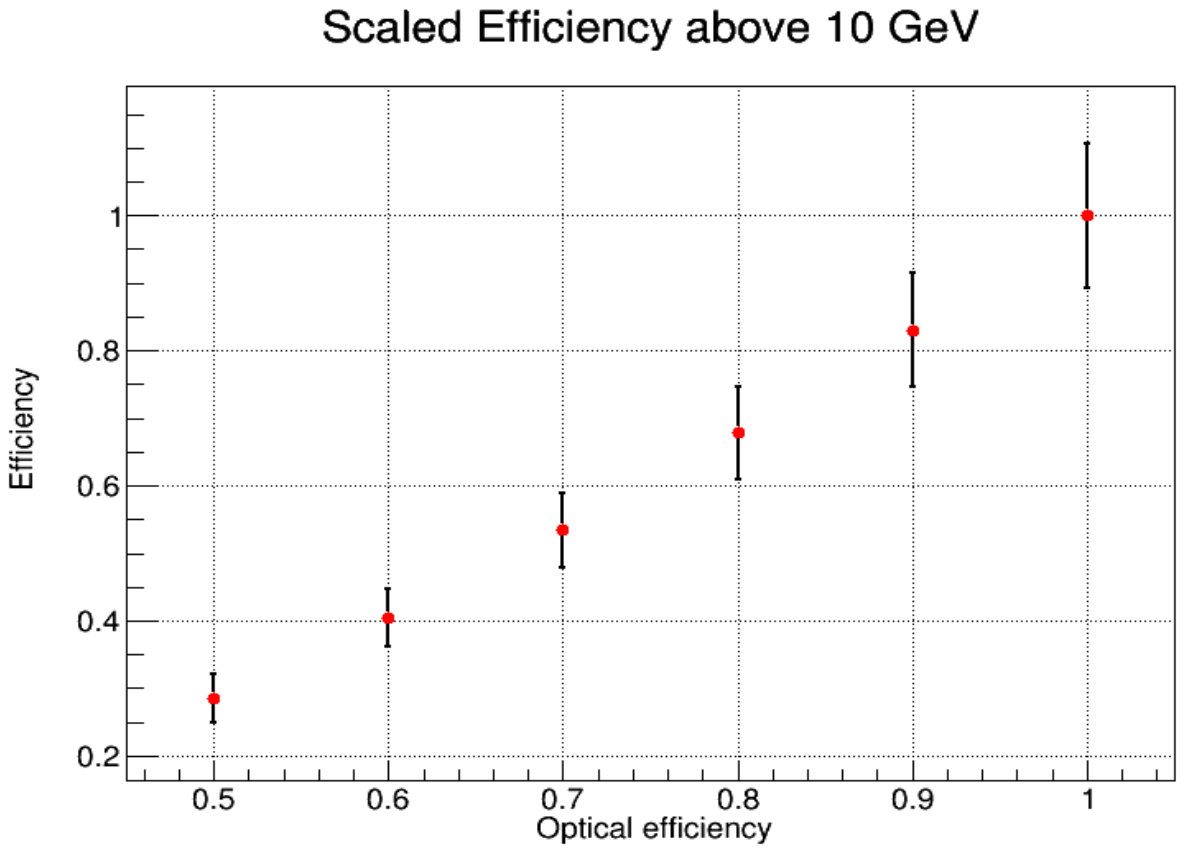
trigger threshold
127 ADC (6.35 PE)
total trigger rate ~844 Hz



red line — approximation
blue points — raw data

THE TRIGGER EFFICIENCY FOR MUON TRIGGER RATE

trigger threshold **344 ADC** counts



note: these are „BIG" simulations
so such a behaviour is expected

Conclusions

- The (total) muon trigger rate is strongly dependent on the trigger threshold selected, but anyway sufficient to provide enough muon events for calibration
- „Good” muon pre-selection is necessary to receive flat muon efficiency curve (only muons above 10 GeV producing full rings)
- Additional trigger schemas under investigation (see Muon pre-selection talk)