

BIB studies (V)

Camilla Curatolo*, Paola Sala, Francesco Collamati,
Alessio Mereghetti, Donatella Lucchesi

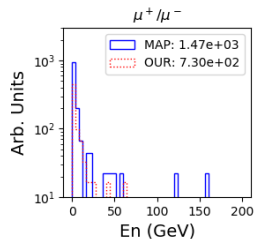
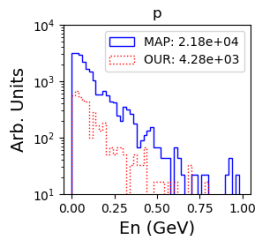
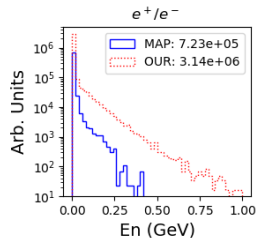
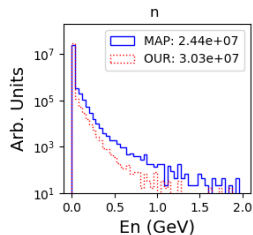
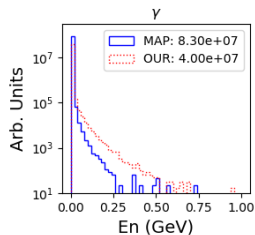
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- Analysis of BIB obtained by μ^- beam of 2×10^{12} particles: comparison between our and MAP results @1.5 TeV CM energy
- MAP data simulated by MARS15
- Our framework: LineBuilder+FLUKA
- Both files with energy threshold cuts as stated in "Detector background at muon colliders" Mokhov et al. (2011):
 - $\gamma, e^+/e^-$ 200 keV
 - neutron 100 keV
 - proton, μ^+/μ^- 1 MeV
- Only muon decays within 25 m from IP considered

COMPARISON

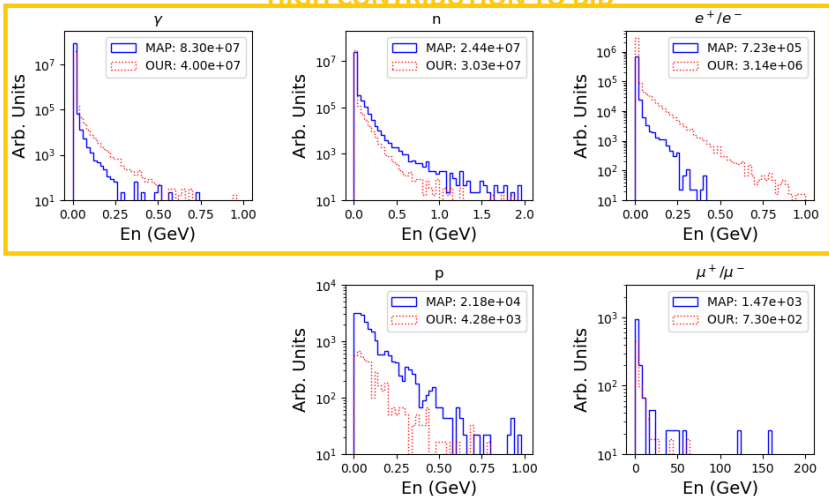
Energy distribution



COMPARISON

Energy distribution

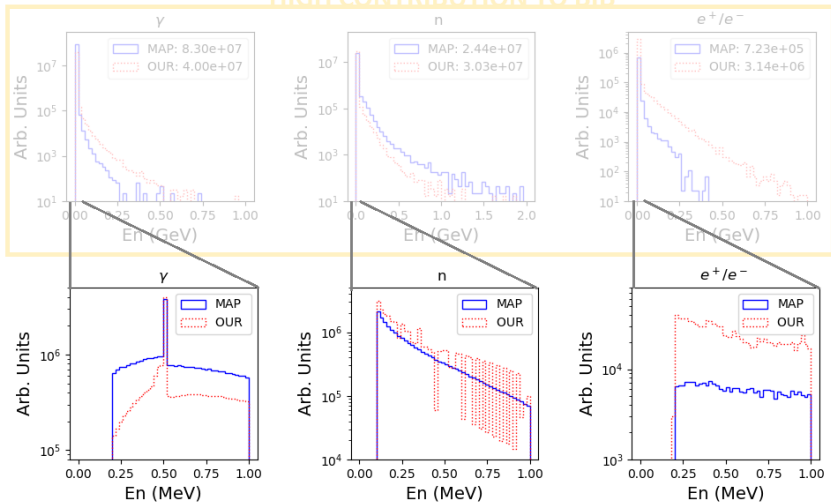
HIGH CONTRIBUTION TO BIB



COMPARISON

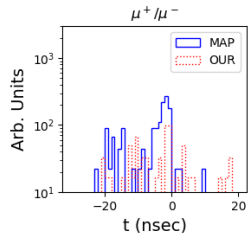
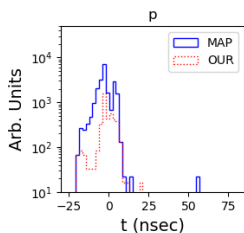
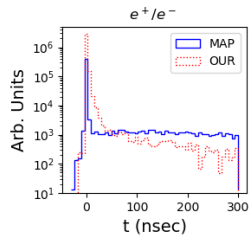
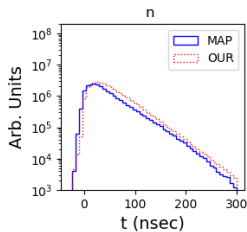
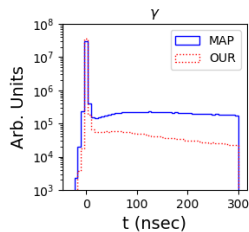
Energy distribution ZOOM

HIGH CONTRIBUTION TO BIB



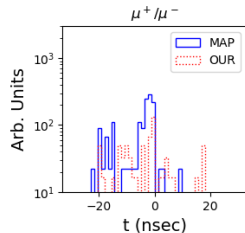
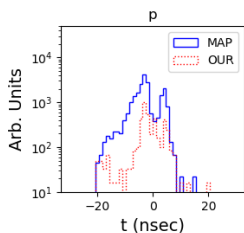
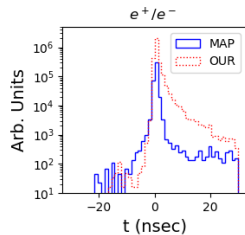
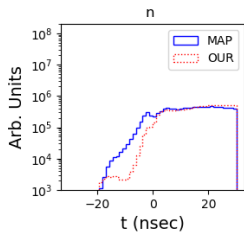
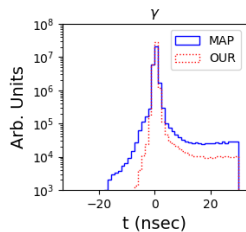
COMPARISON

Time distribution



COMPARISON

Time distribution ZOOM

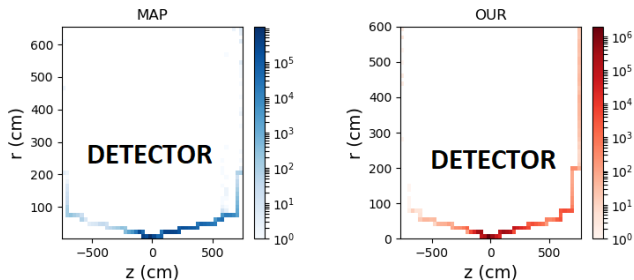


COMPARISON

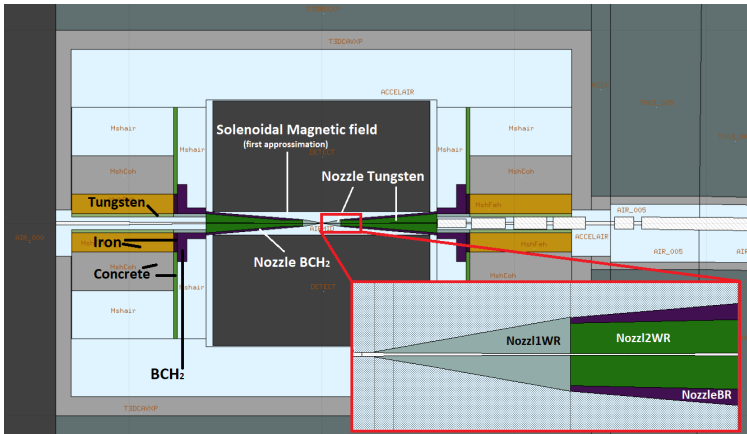
BIB for 2×10^{12} muons:

| Particle (E_{th} , MeV) | MAP | OUR |
|----------------------------|-------------------|-------------------|
| Photon (0.2) | $8.3 \cdot 10^7$ | $4 \cdot 10^7$ |
| Neutron (0.1) | $2.44 \cdot 10^7$ | $3 \cdot 10^7$ |
| Electron/positron (0.2) | $7.23 \cdot 10^5$ | $3.14 \cdot 10^6$ |
| Proton (1) | $2.18 \cdot 10^4$ | $4.28 \cdot 10^3$ |
| Muon (1) | $1.47 \cdot 10^3$ | $7.3 \cdot 10^2$ |

Colormap of BIB entering the detector

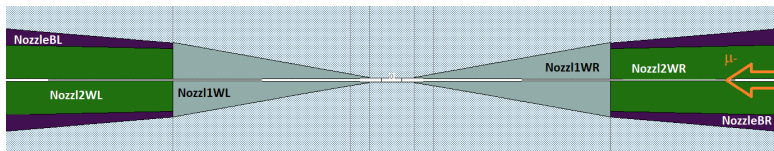
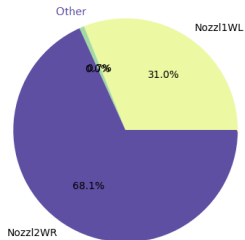


- Good agreement of our results obtained by LineBuilder+FLUKA and MAP results by means of MARS15
- Some more considerations regarding our results and a possible further optimization: analysis of position of particles exit and first interaction



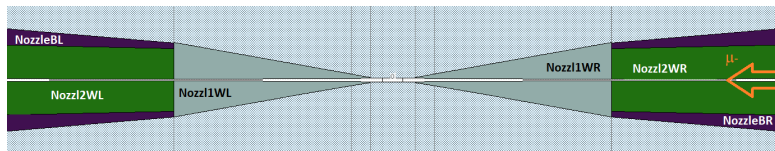
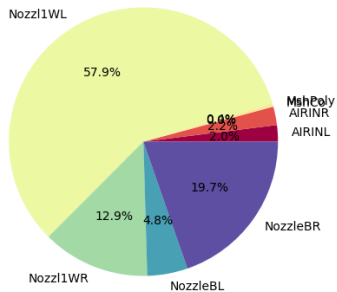
OUR RESULTS

Part of the machine where the first interaction occurs after the muon decay



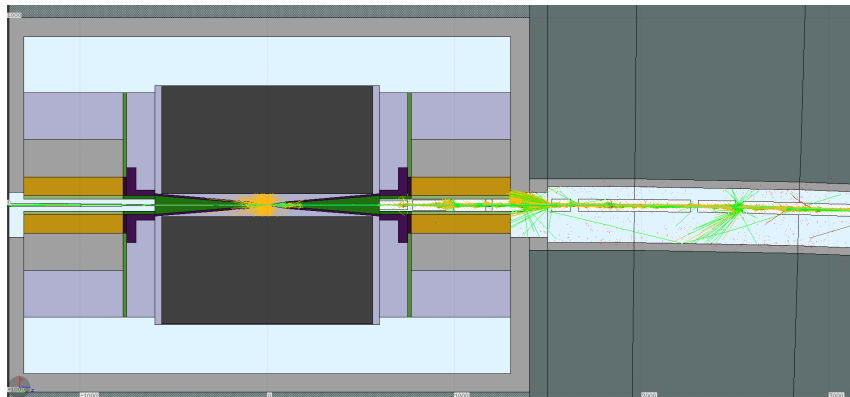
OUR RESULTS

Part of the machine where the particles exit (entering the detector)



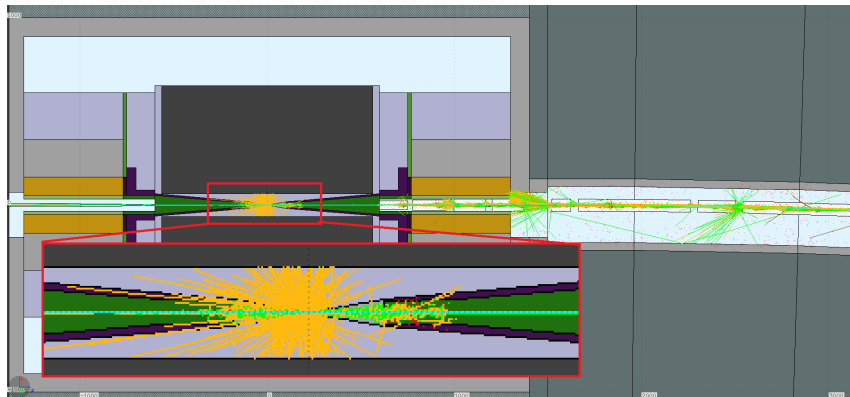
OUR RESULTS

Particles tracks in the machine (without neutrons)



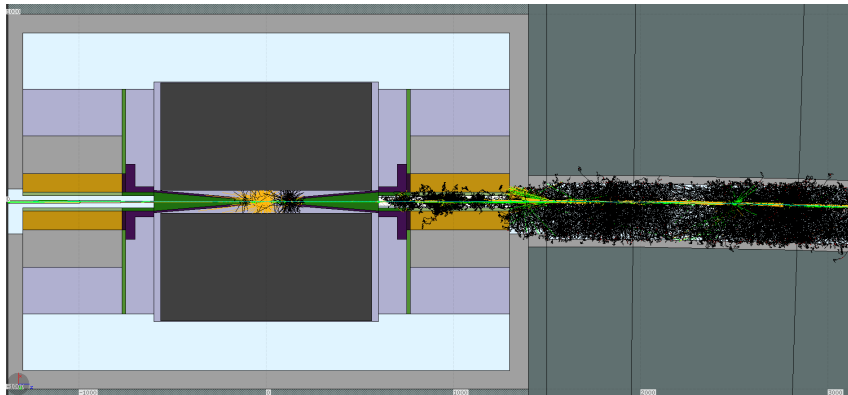
OUR RESULTS

Particles tracks in the machine (without neutrons)



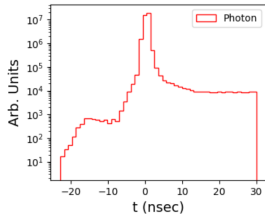
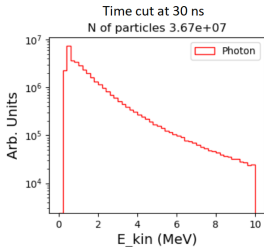
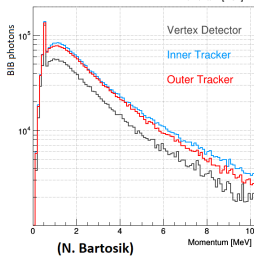
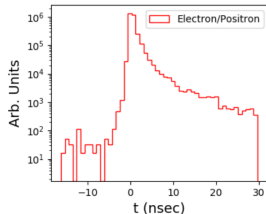
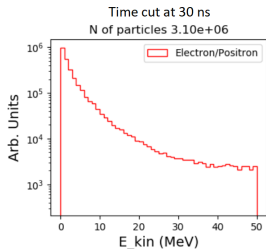
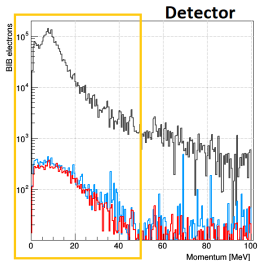
OUR RESULTS

Particles tracks in the machine (with neutrons)



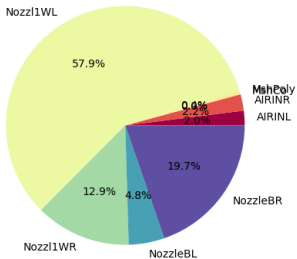
OUR RESULTS

Time and energy cut for detector

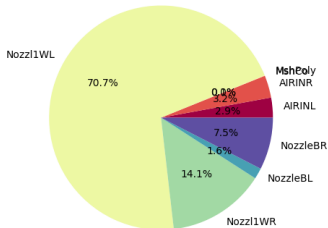


OUR RESULTS

Time and energy cut for detector: most of particles are within 30 ns but part of the machine where the particles exit (entering the detector) changes percentage



Time cut at 30 ns



WORK IN PROGRESS

- Further analysis considering other possible time/energy cuts
- Investigation of passive elements between quadrupoles for 1.5 TeV CM
- Simulation without nozzle for 1.5 TeV CM
- Simulation 3 TeV CM