Hadronic Models Meeting

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Humboldt Universität zu Berlin

April 25, 2023

pi0

Comparison pO/pp

pseudorapidity range of LHCf: $|\eta| > 8.4$

pi0 proton-Oxygen central

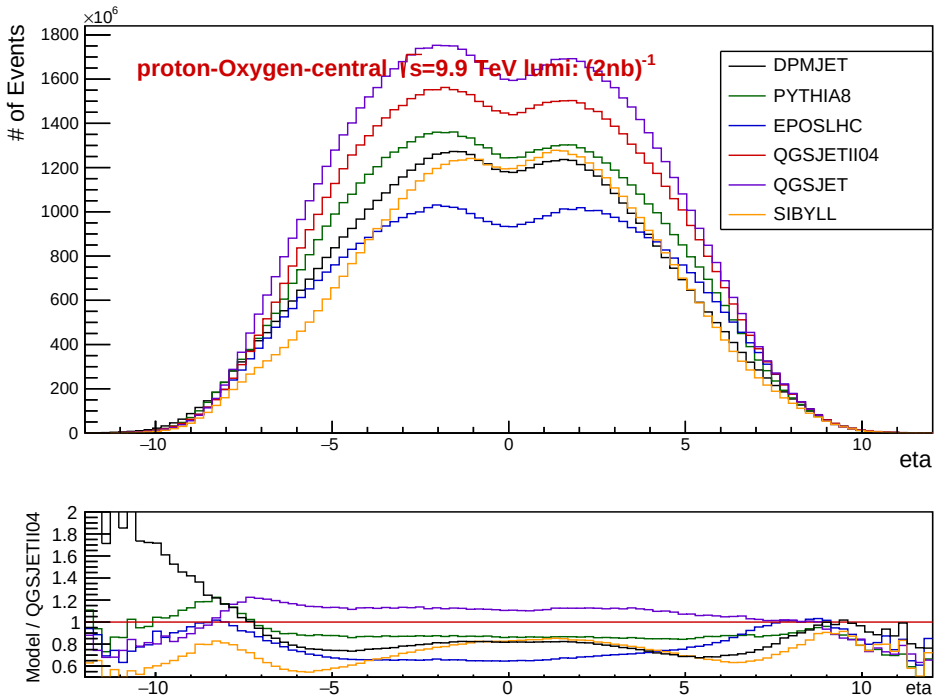

Figure: proton oxygen collision, pi0 η range

pi0 proton-proton central

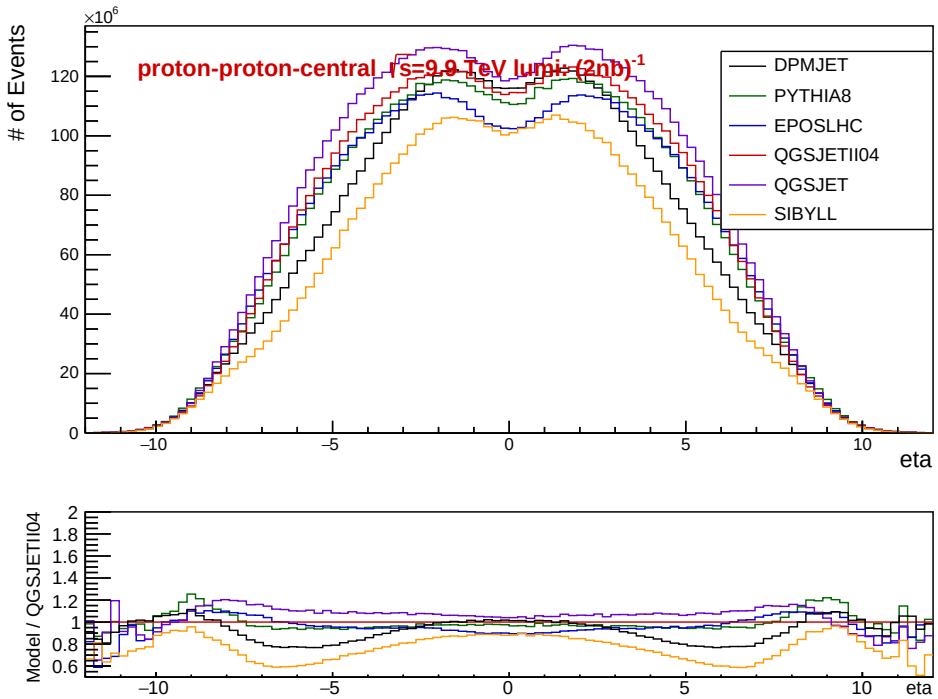

Figure: proton proton collision, pi0 η range

Comparison pO/pO fixed target

pseudorapidity range of LHCf: $|\eta| > 8.4$

pi0 proton-Oxygen central

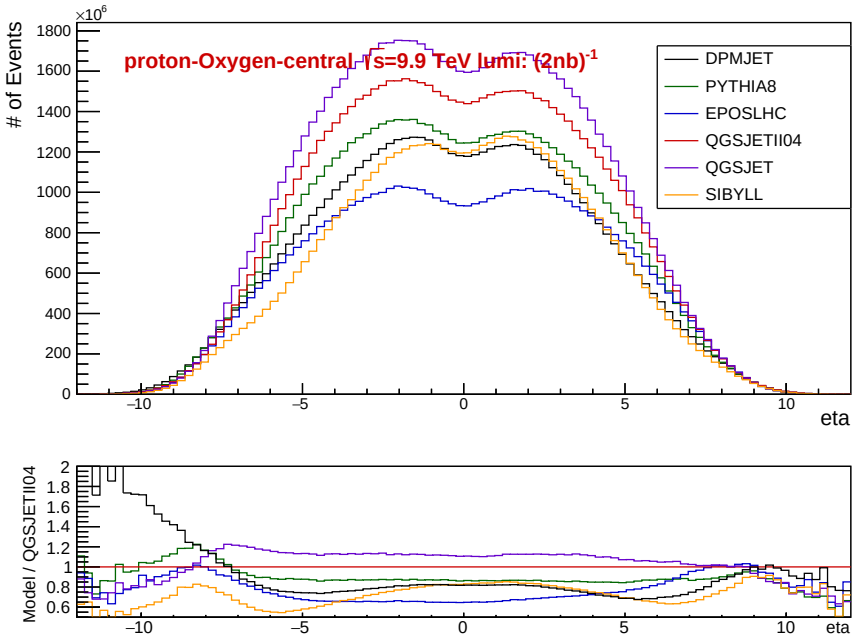

Figure: proton oxygen central collision, pi0 η range

proton oxygen fixed-target

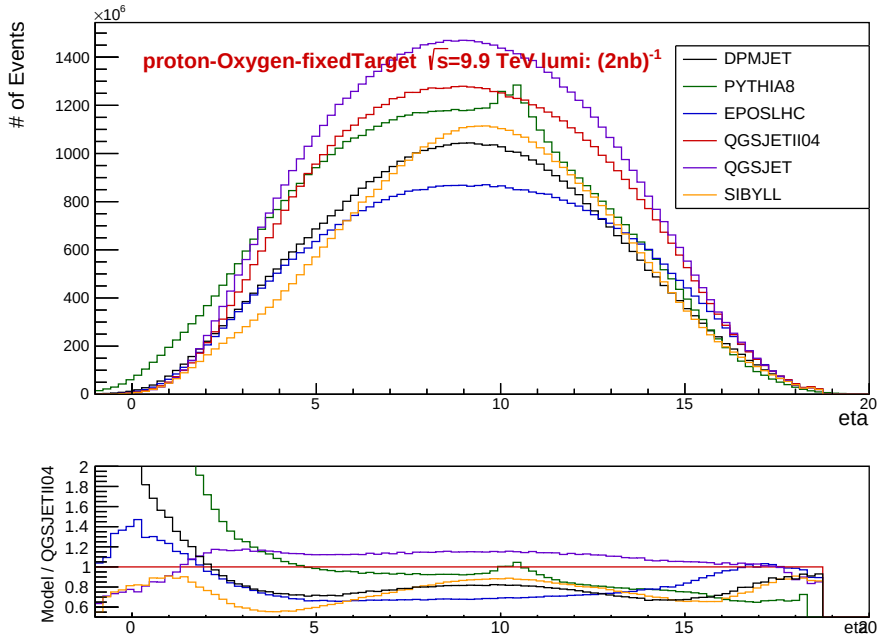

Figure: proton oxygen collision fixed target, pi0 η range

Comparison pp fixed target/pO fixed target

pseudorapidity range of LHCf: $|\eta| > 8.4$

pi0 proton-Oxygen fixed-target

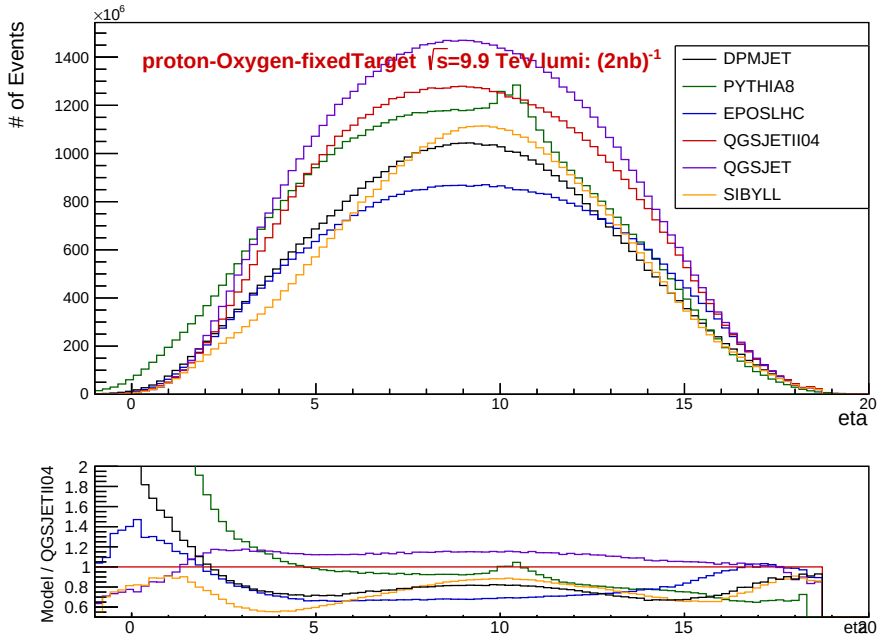

Figure: proton oxygen collision fixed target, pi0 η range

pi0 proton-proton fixed-target

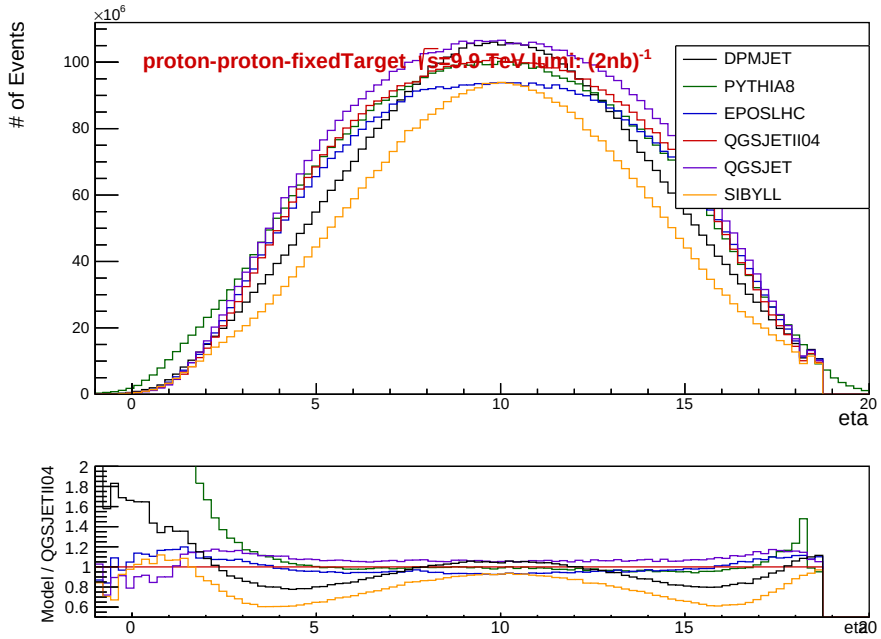

Figure: proton proton collision fixed target, pi0 η range

Neutrons

Oxygen remnant side

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-oxygen central

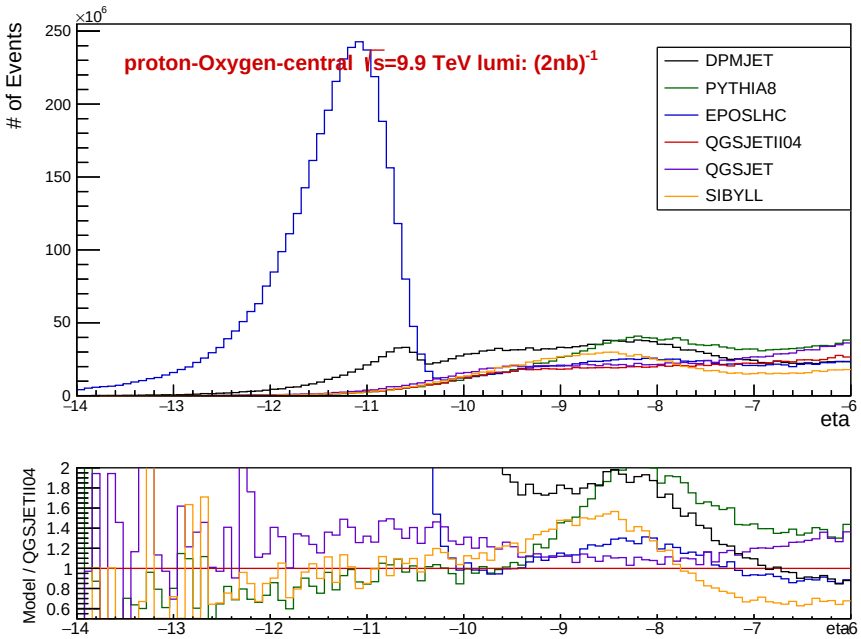

Figure: proton oxygen collision, neutrons η oxygen remnant side

neutrons, proton-oxygen central, log plot

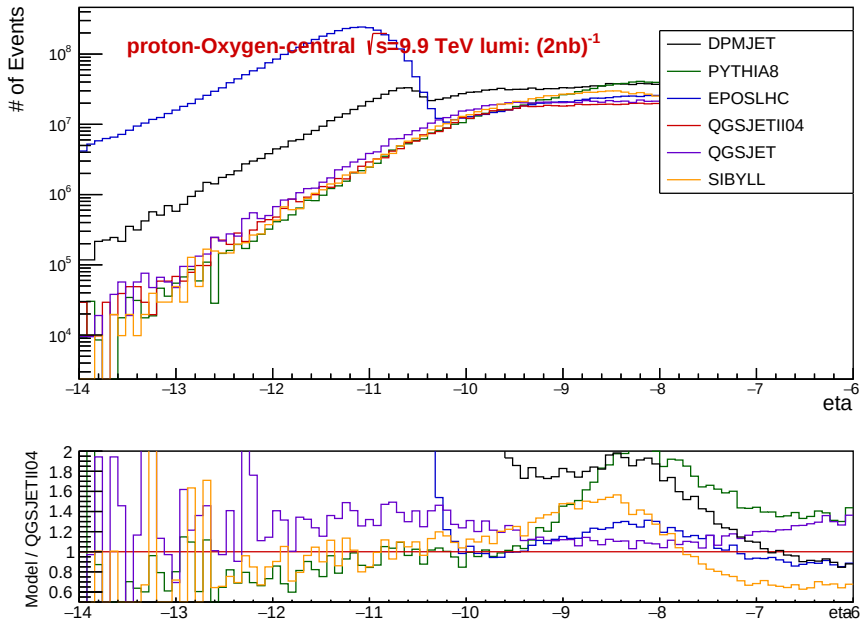

Figure: proton oxygen collision, neutrons η oxygen remnant side

Proton remnant side

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-Oxygen central

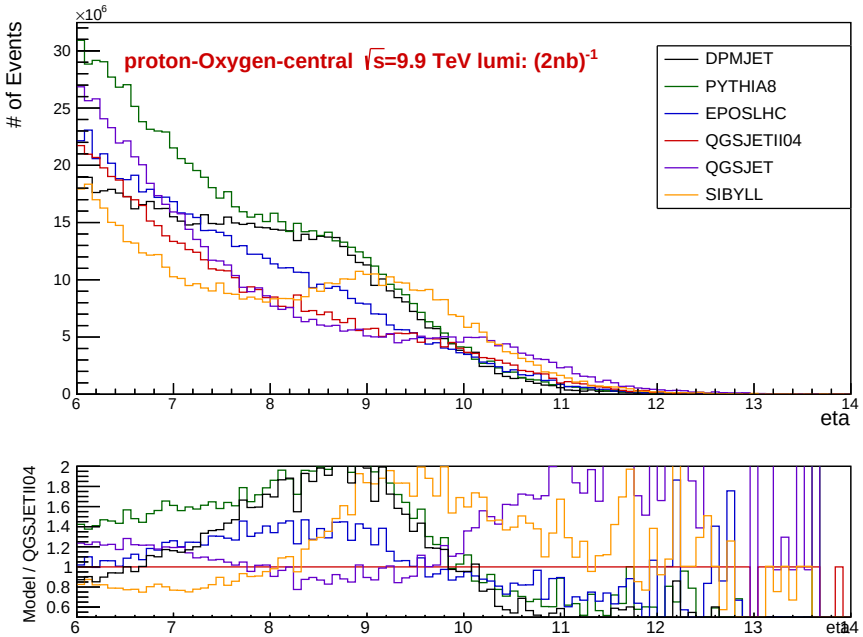

Figure: proton oxygen collision, neutrons η, proton remnant side

neutrons, proton-Oxygen, log plot

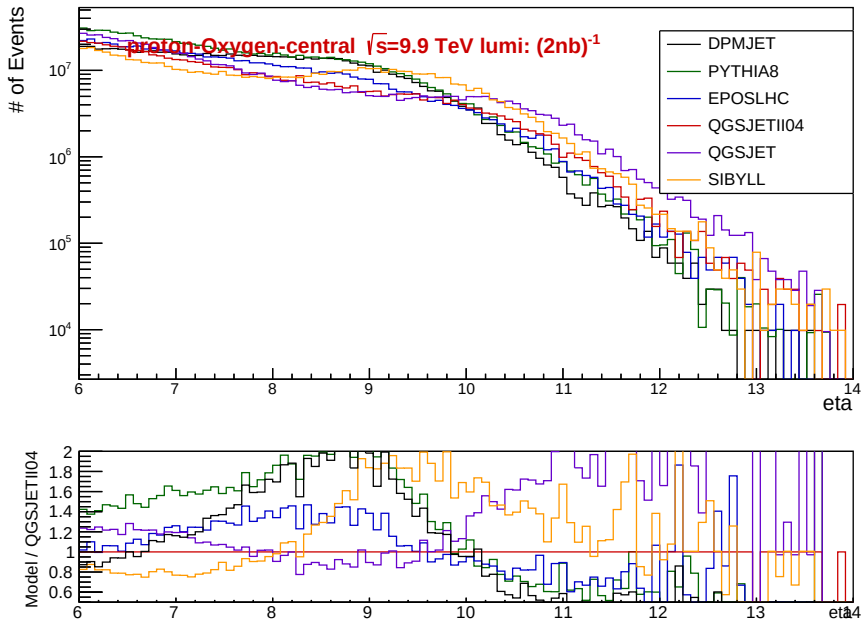

Figure: proton oxygen collision, neutrons η, proton remnant side

Comparison pO/pp

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-Oxygen central

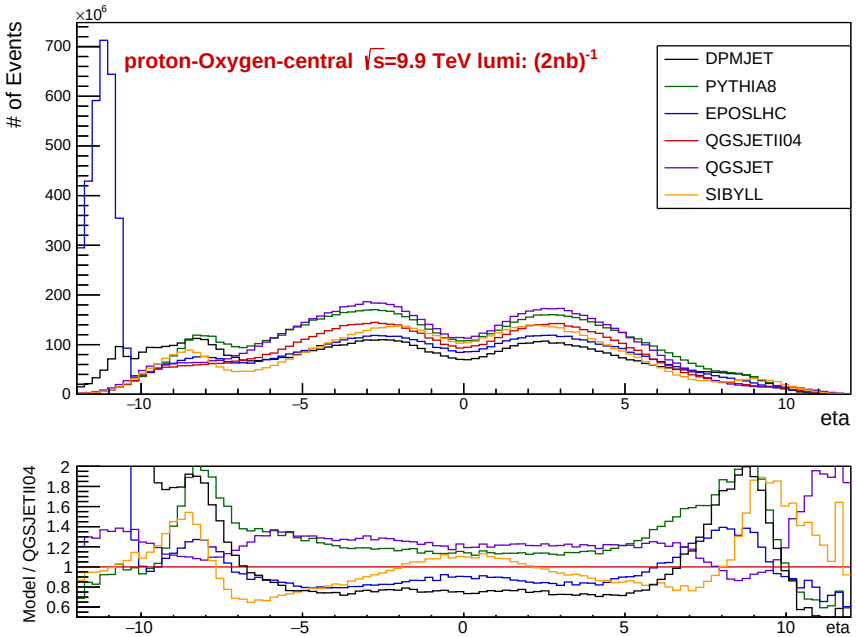

Figure: proton oxygen collision, neutron η range

neutrons, proton-proton central

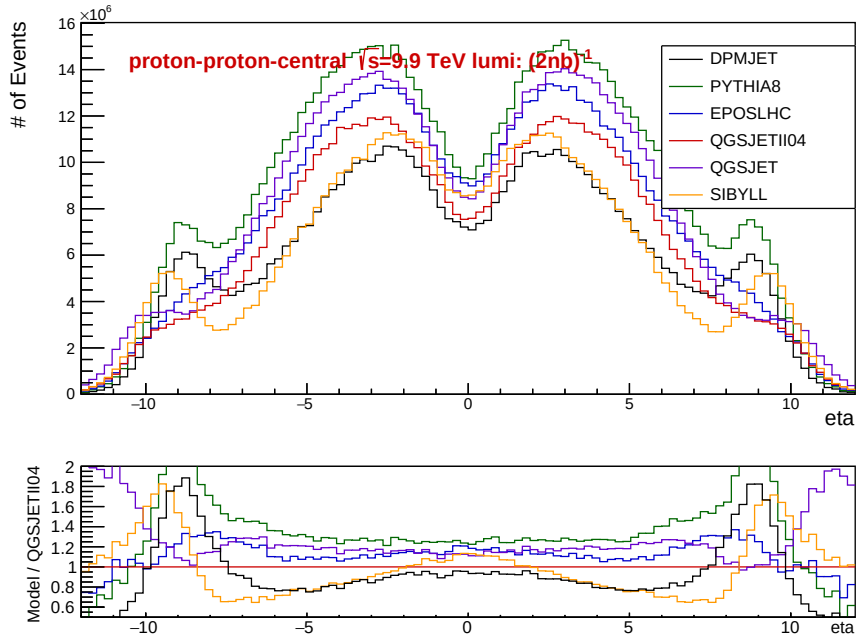

Figure: proton proton collision, neutron η range

Comparison of p-O plots central/fixed-target

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-Oxygen central

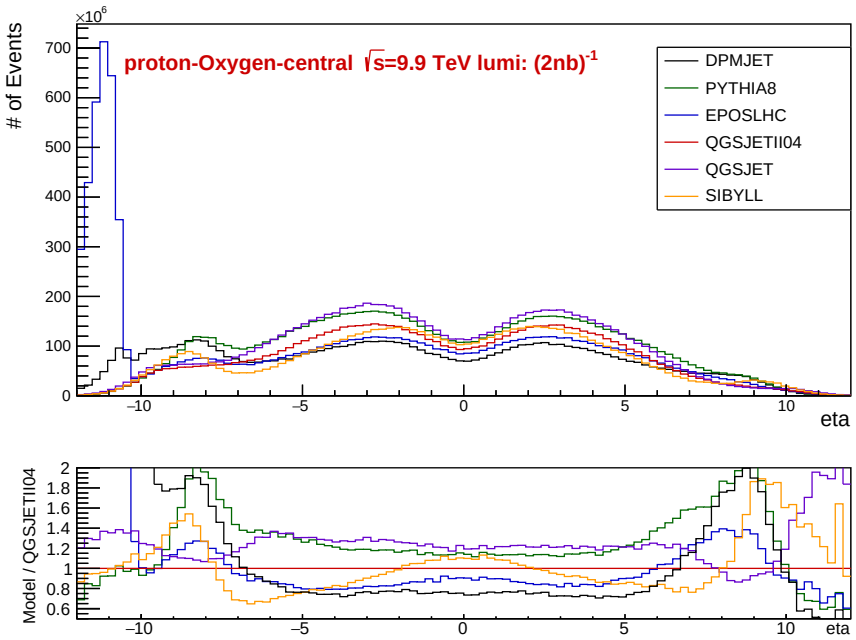

Figure: proton oxygen collision, neutron η range

neutrons, proton-Oxygen fixed-target

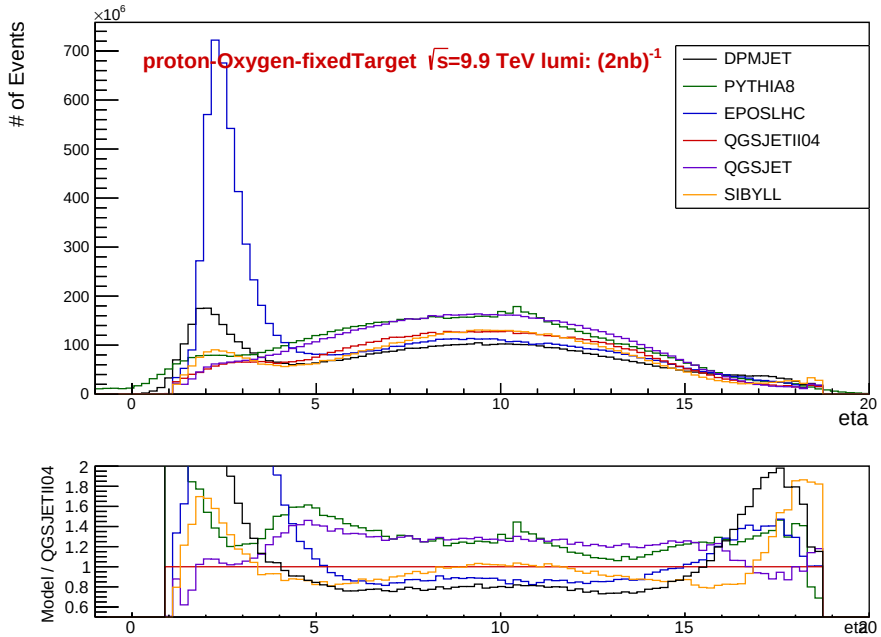

Figure: proton oxygen collision fixed target, neutron η range

Comparison of fixed-target plots

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-Oxygen fixed-target

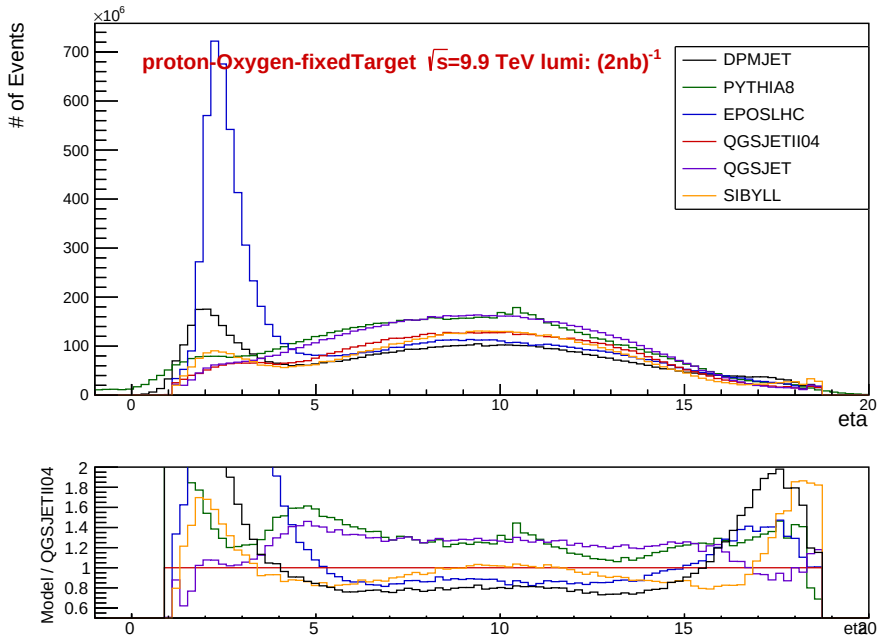

Figure: proton oxygen collision fixed target, neutron η range

neutrons, proton-proton fixed-target

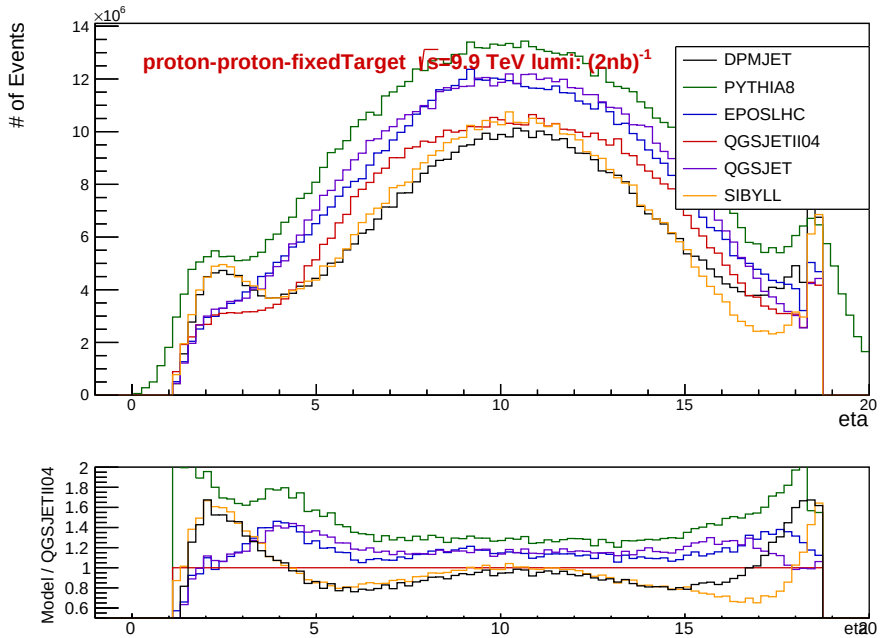

Figure: proton proton collision fixed target, neutron η range

Energy plot comparison

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-Oxygen

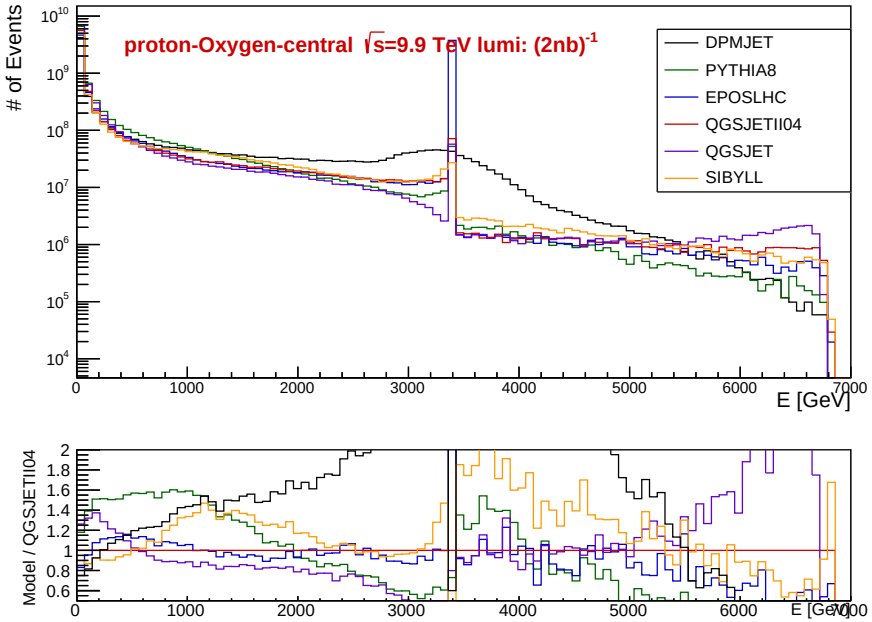

Figure: proton-Oxygen collision, energy spectrum

neutrons, proton-Oxygen, fixed-target

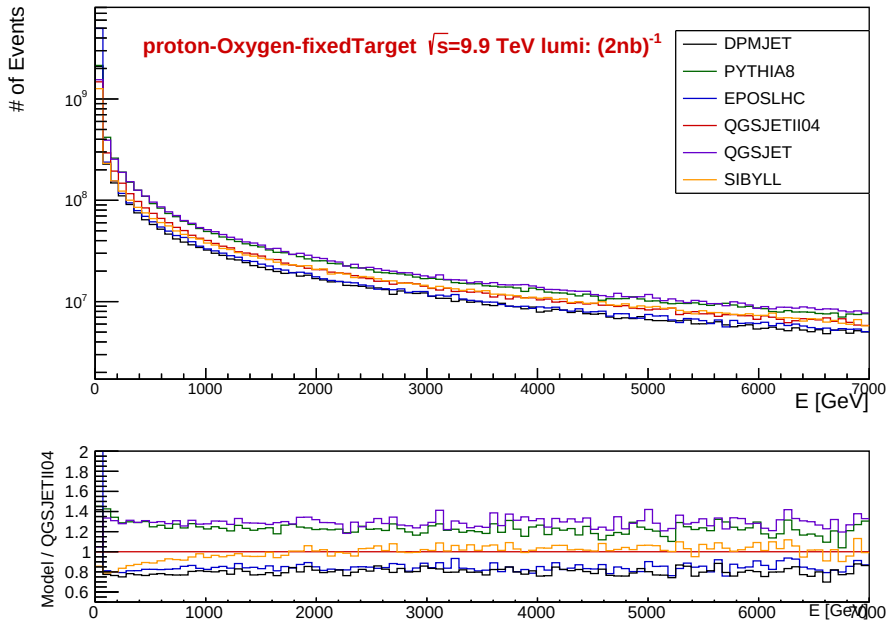

Figure: proton-proton collision, energy spectrum

Momentum plot comparison

pseudorapidity range of LHCf: $|\eta| > 8.4$

neutrons, proton-Oxygen

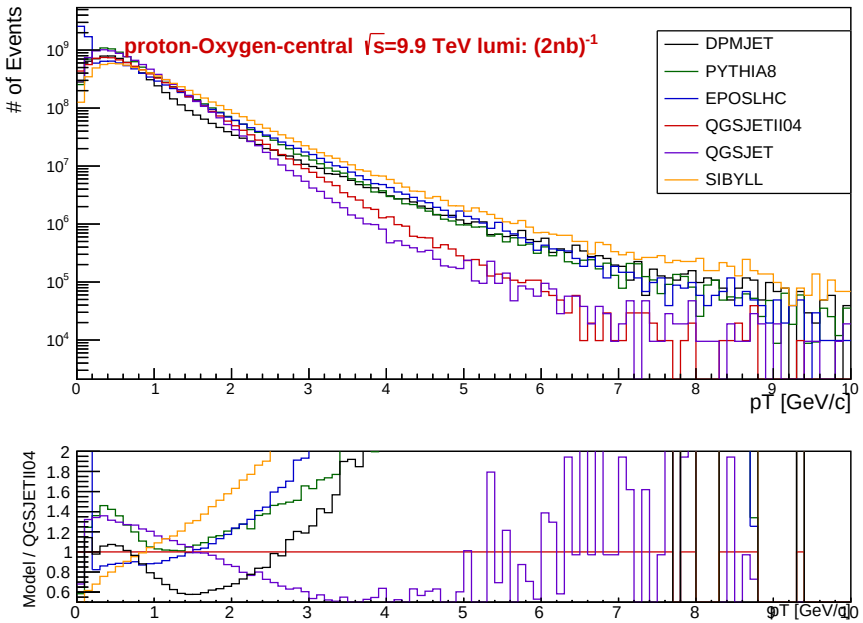

Figure: proton-Oxygen collision, momentum spectrum

neutrons, proton-proton

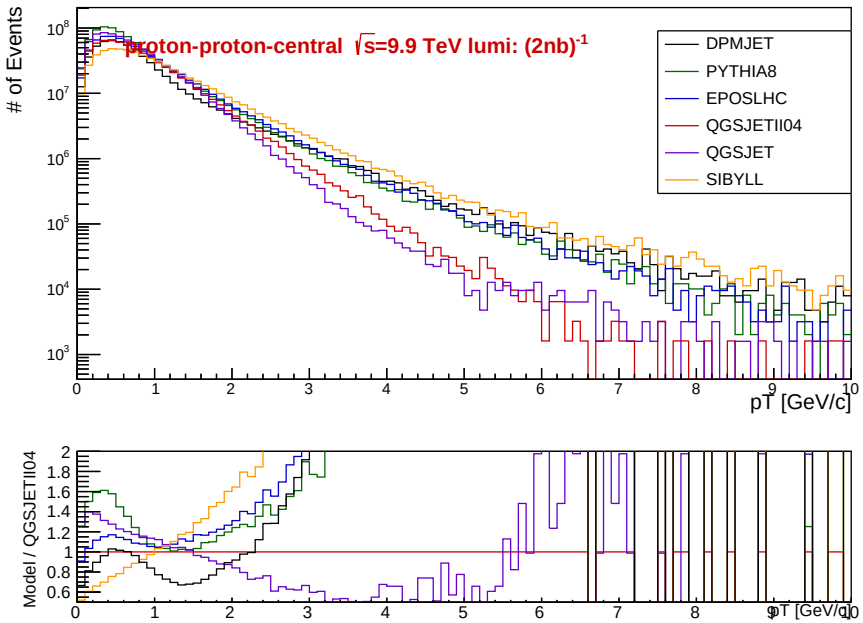

Figure: proton-proton collision, momentum spectrum

protons

Comparison pO pp fixed target, log plot

pseudorapidity range of LHCf: $|\eta| > 8.4$

protons, proton-Oxygen, fixed target

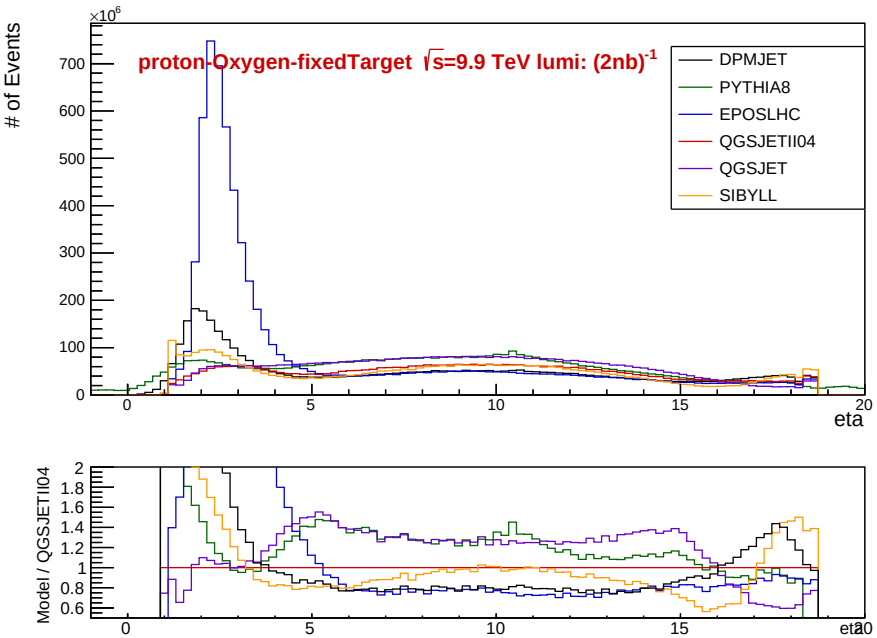

Figure: proton-Oxygen collision, fixed-target, η

protons, proton-Oxygen, fixed-target

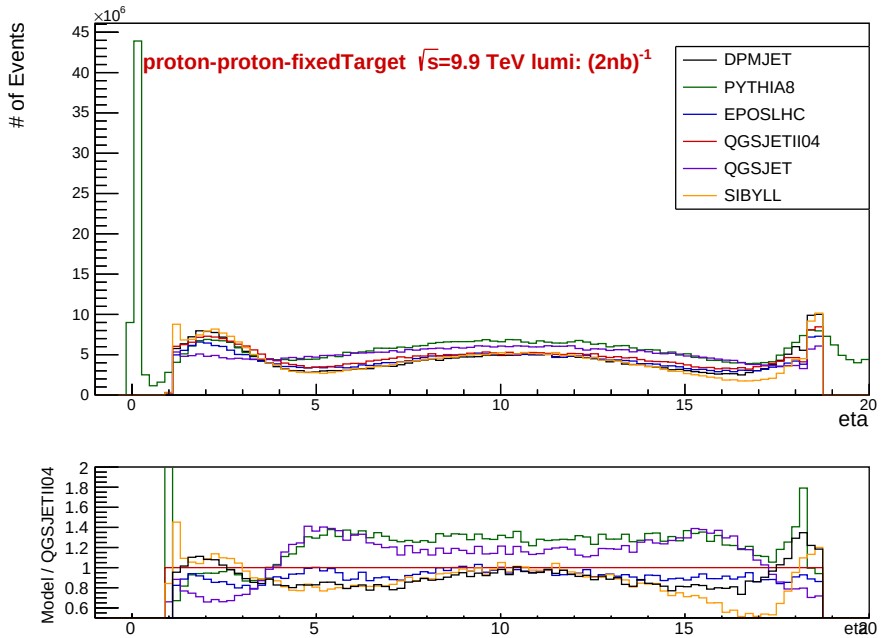

Figure: proton-proton collision, fixed-target, η

Comparison pO pp fixed target

pseudorapidity range of LHCf: $|\eta| > 8.4$

protons, proton-Oxygen, fixed target, log plot

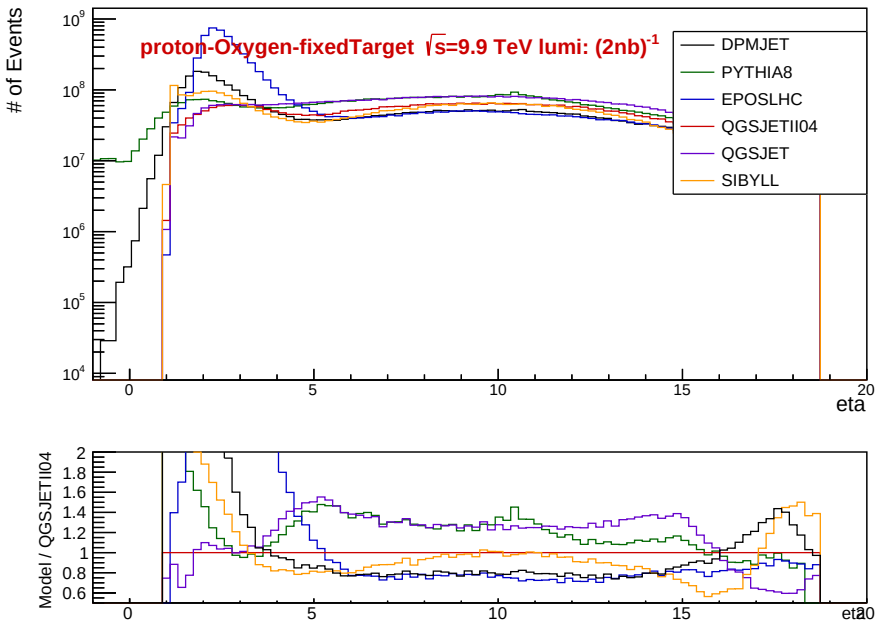

Figure: proton-Oxygen collision, fixed-target, η

protons, proton-proton, fixed-target, log plot

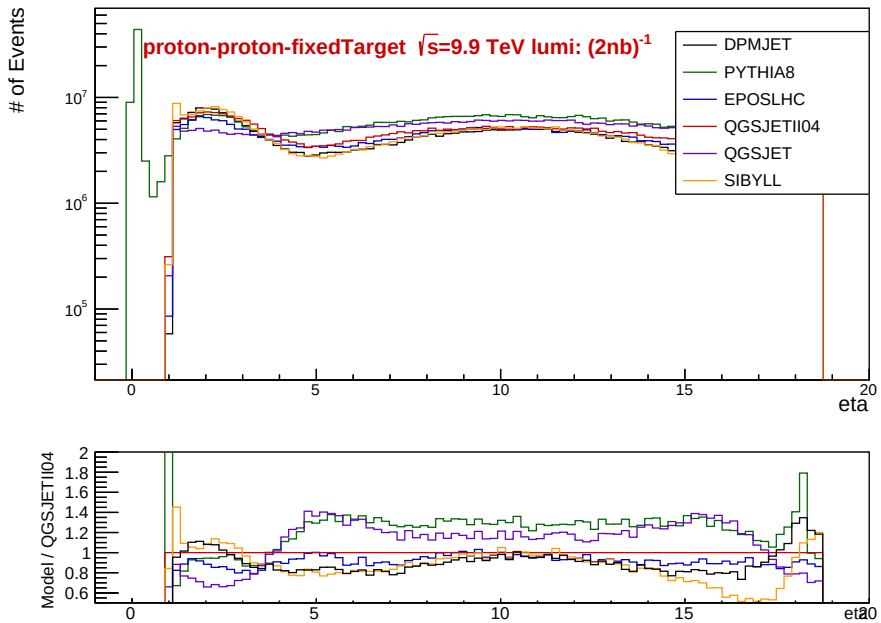

Figure: proton-proton collision, fixed-target, η

Conclusion

- proton-Oxygen discrepancies over whole η range, for central and fixed-target collisions
- proton-Oxygen, fixed-target: Pythia peak
- fixed-target plots: negative η for Pythia and DPMJET
- proton-proton discrepancies in forward region
- EPOSLHC behavior for high negative η
- LHCf can measure most interesting area
- cuts for various generators at high/low pseudorapidity

Backup

Acceptance for different event Generators

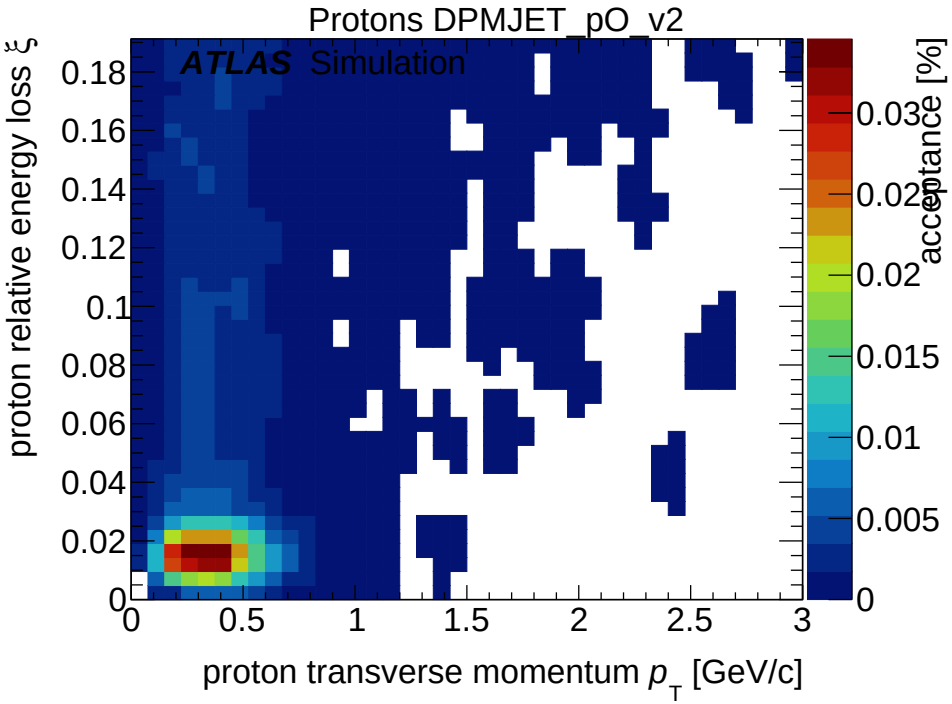

Figure: DPMJET proton distribution

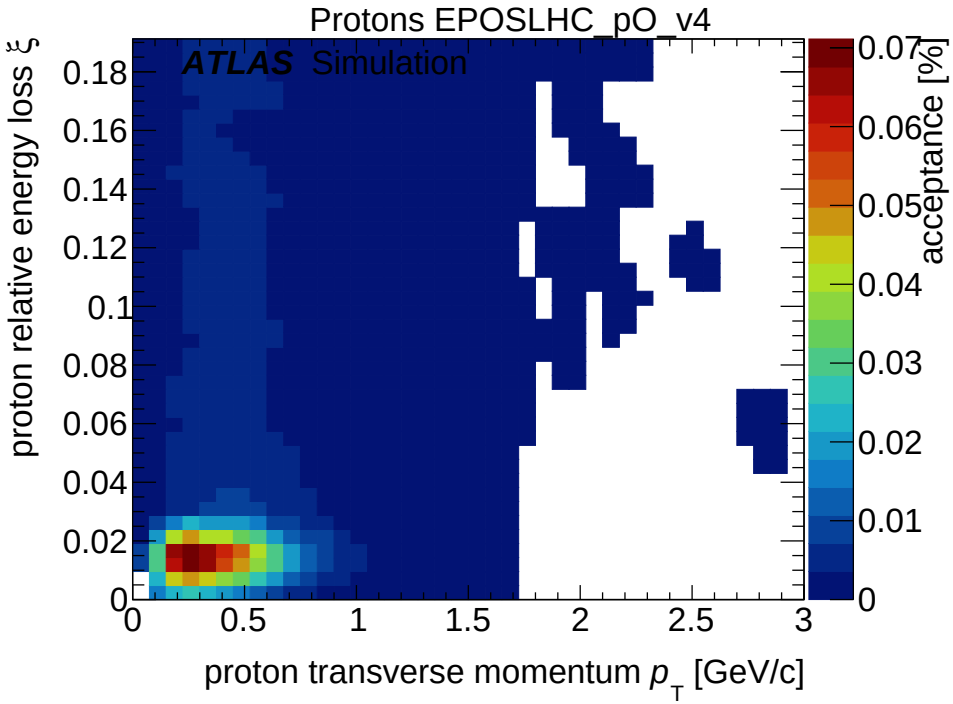

Figure: EPOSLHC proton distribution

Acceptance for different event Generators

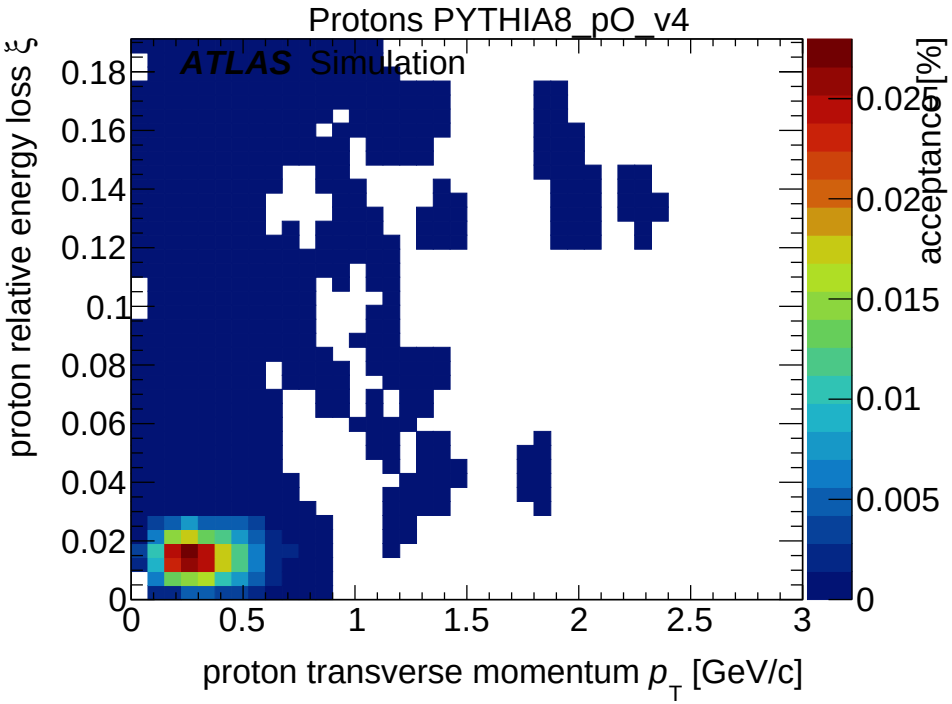

Figure: PYTHIA8 proton distribution

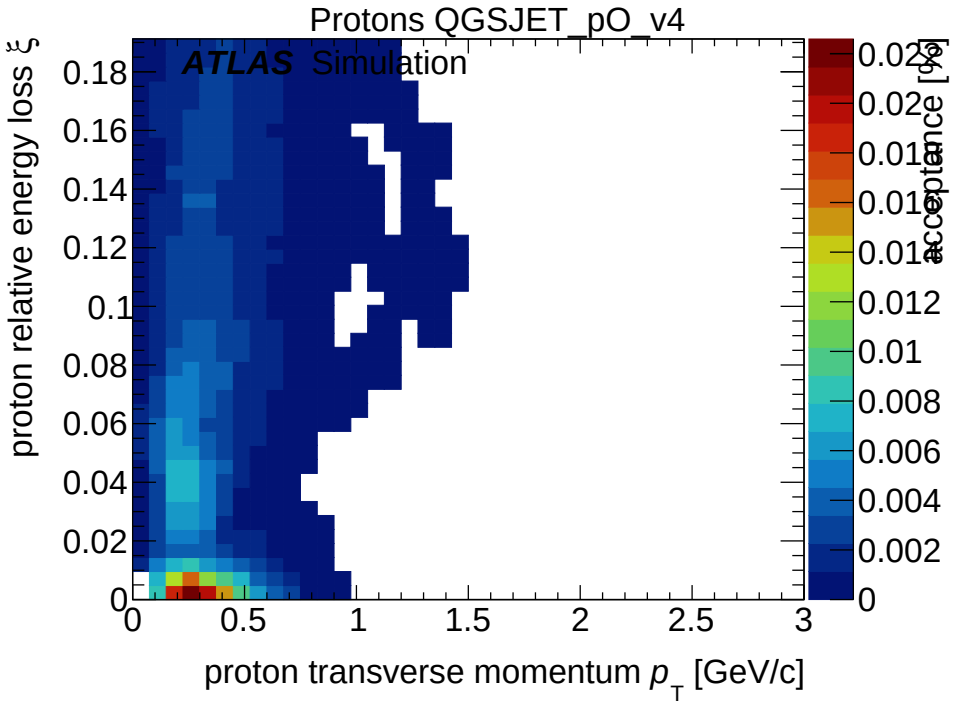

Figure: QGSJET proton distribution

Acceptance for different event Generators

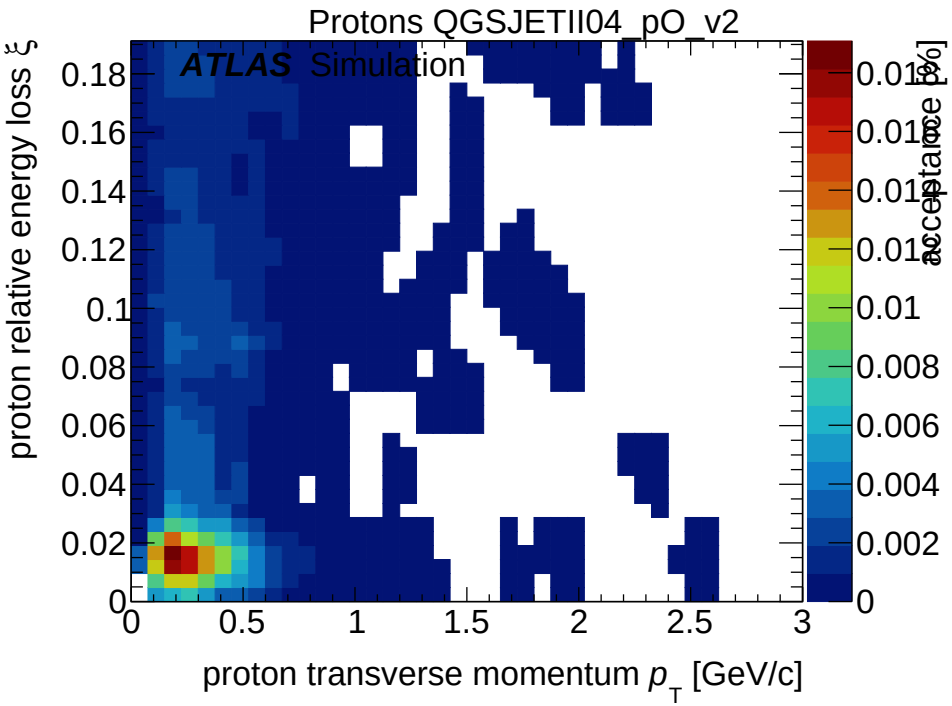

Figure: QGSJETII04 proton distribution

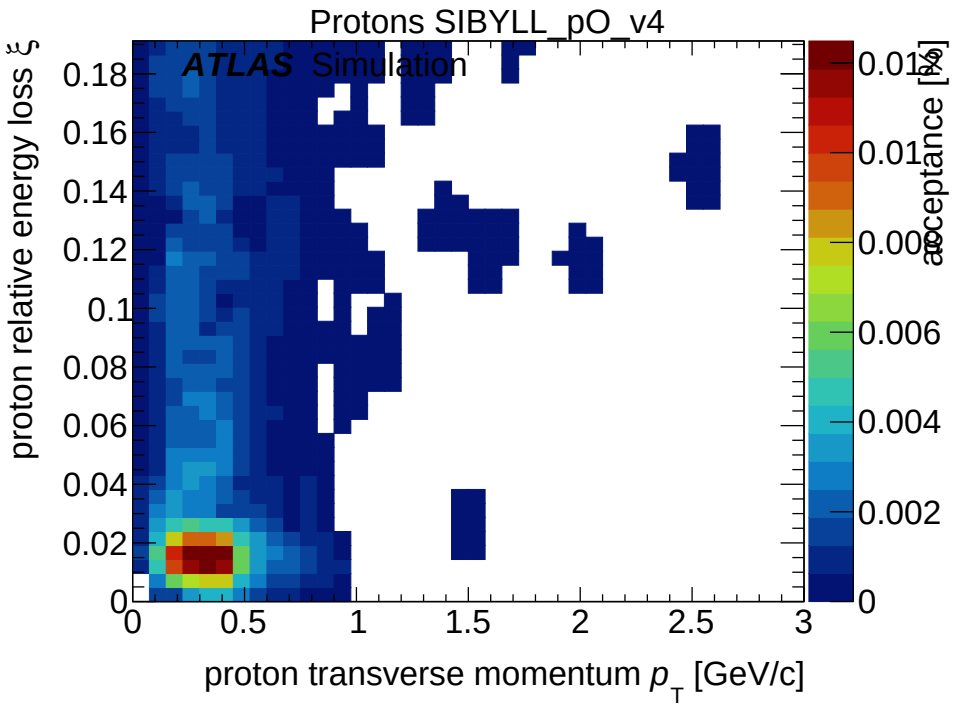

Figure: SIBYLL proton distribution

Acceptance for AFP

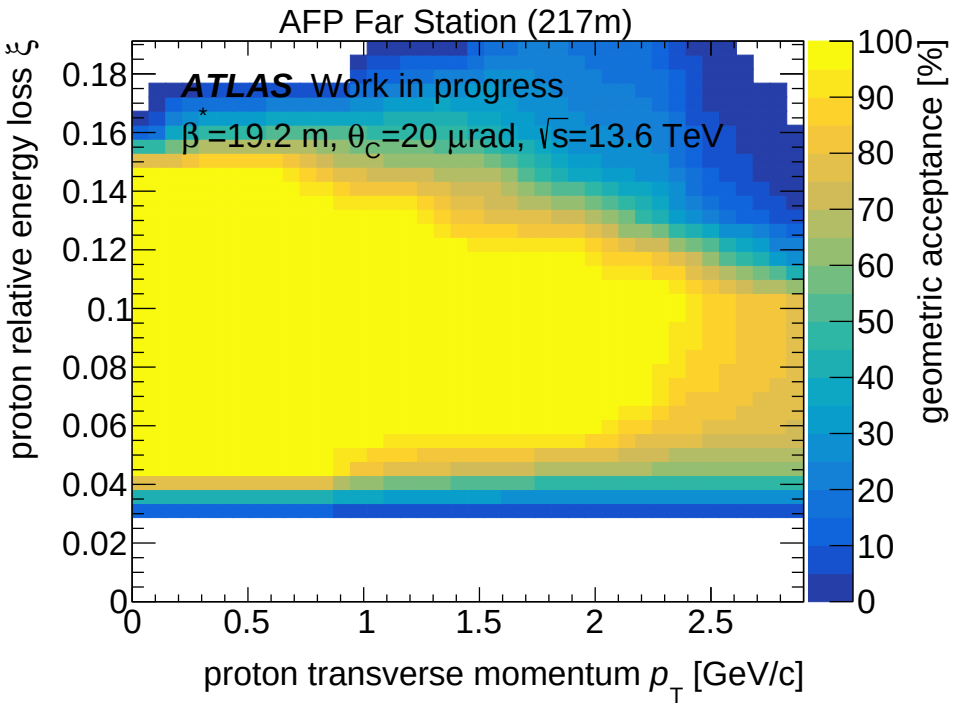

Figure: AFP far Station for crossing angle for 20 muRad

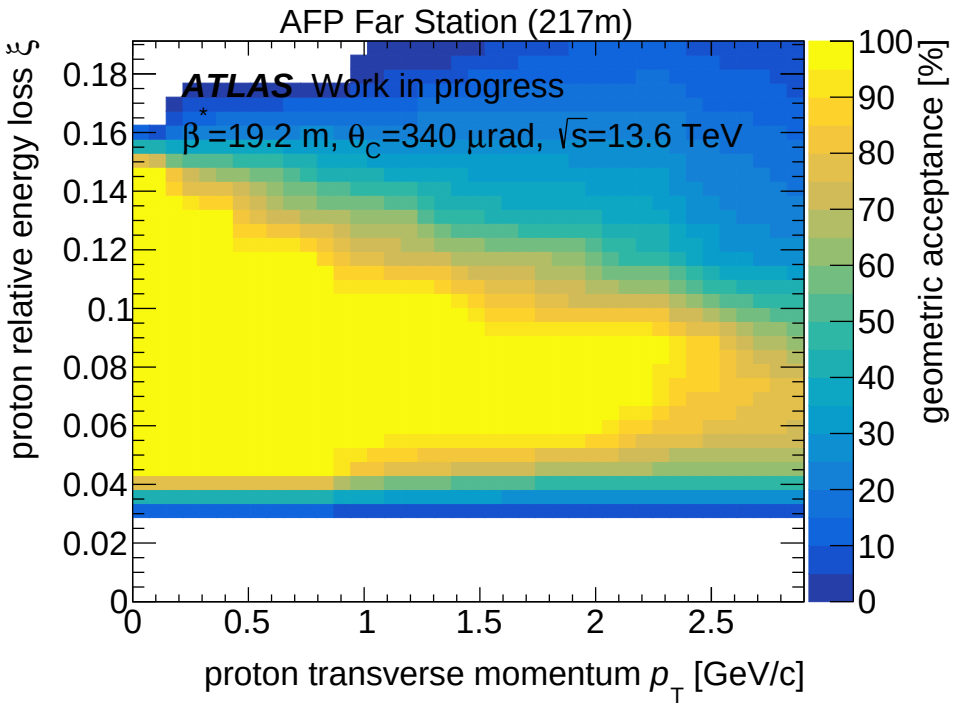

Figure: AFP far Station crossing angle 340 muRad

- difference mostly in not relevant area of pt/energy loss.
- most acceptance for high absolute value of the crossing angle

Acceptance for ALFA

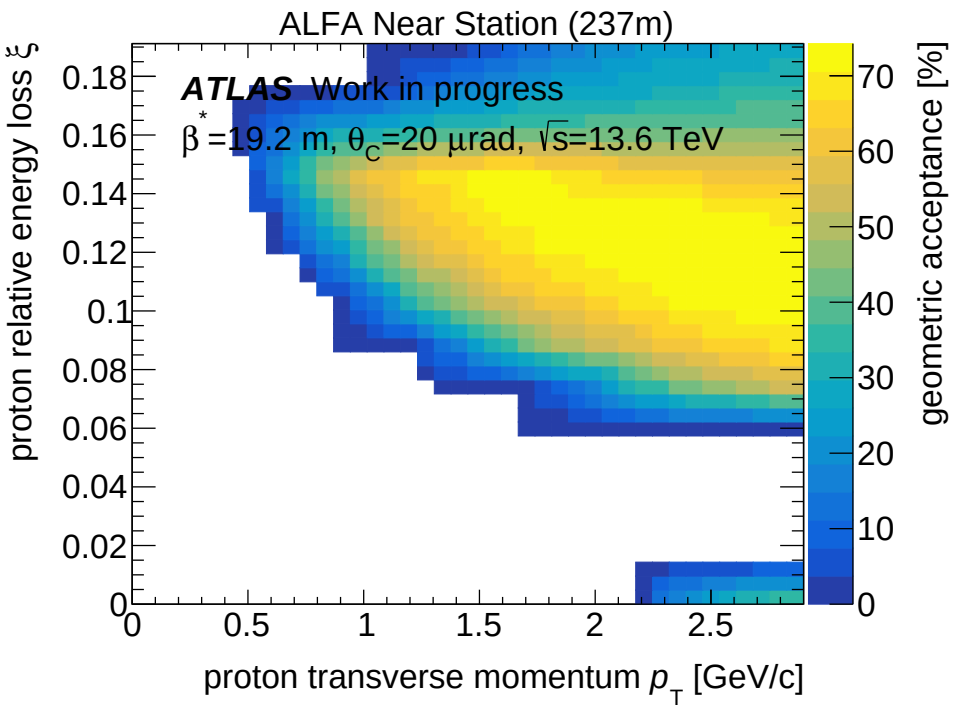

Figure: ALFA near Station for crossing angle for 20 muRad

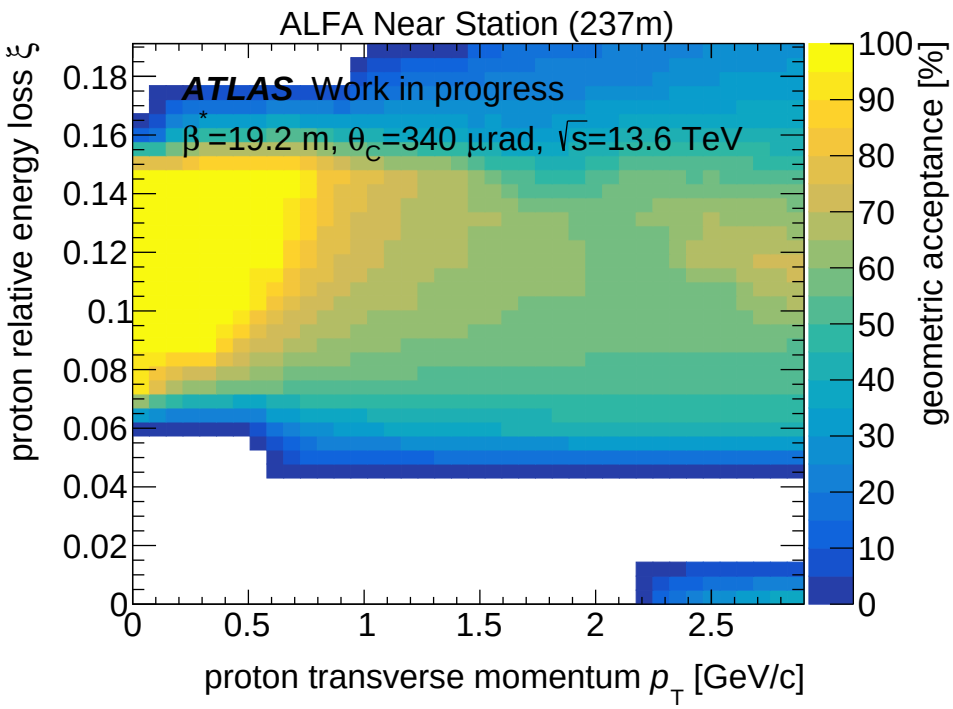

Figure: AFP Far Station crossing angle 340 muRad

- higher crossing angle results in higher acceptance

AFP Event Rate dependancy on crossing angle

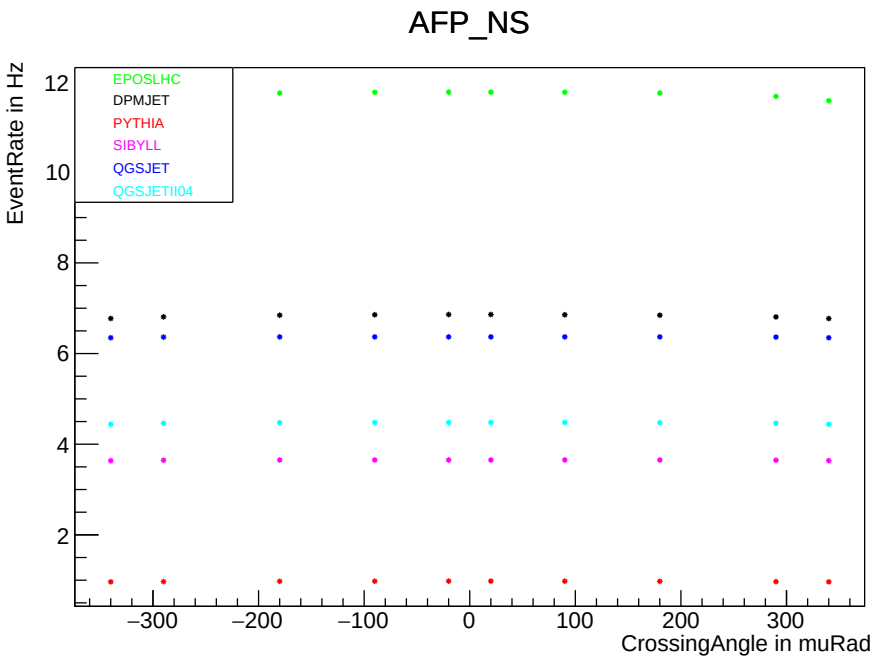

Figure: AFP Near Station

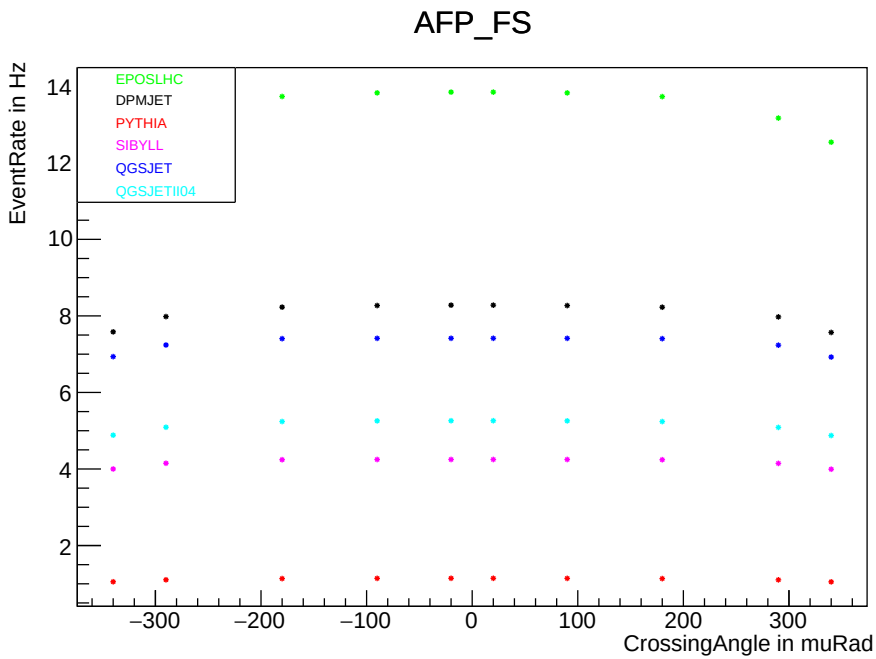

Figure: AFP Far Station

- small correlation between event rate and crossing angle

ALFA Event Rate dependancy on crossing angle

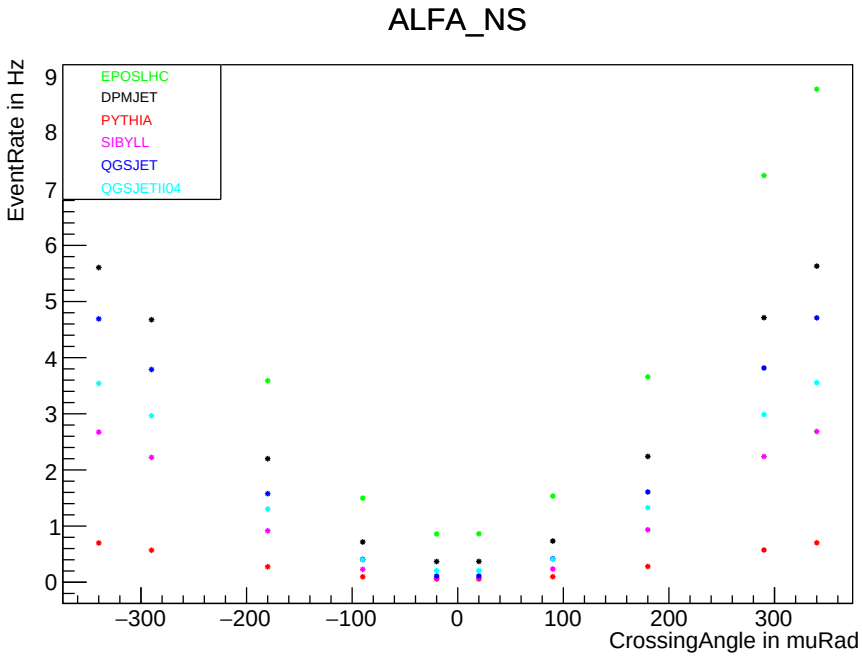

Figure: ALFA Near Station

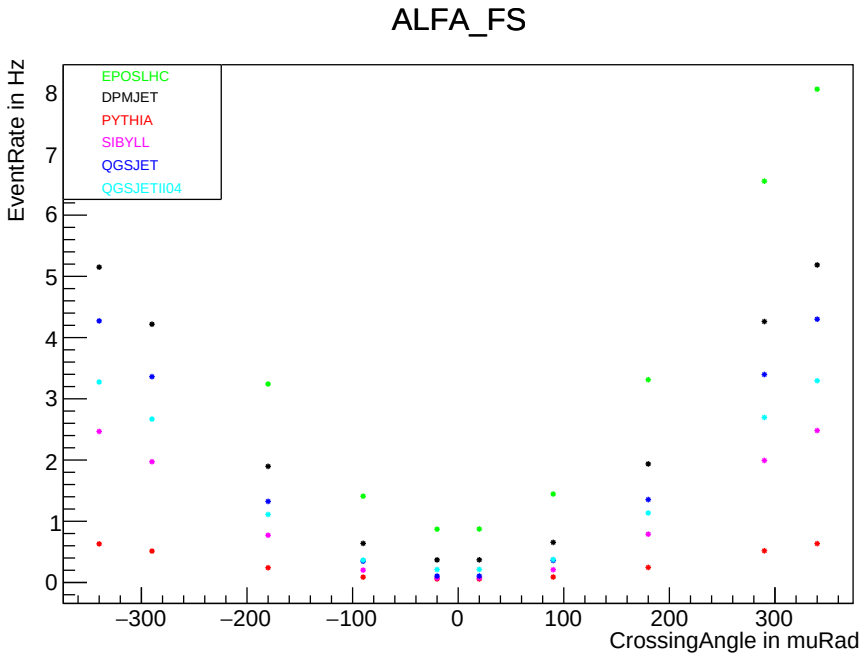

Figure: ALFA Far Station

- higher crossing angle results in higher event rate for all generators