AFP Program

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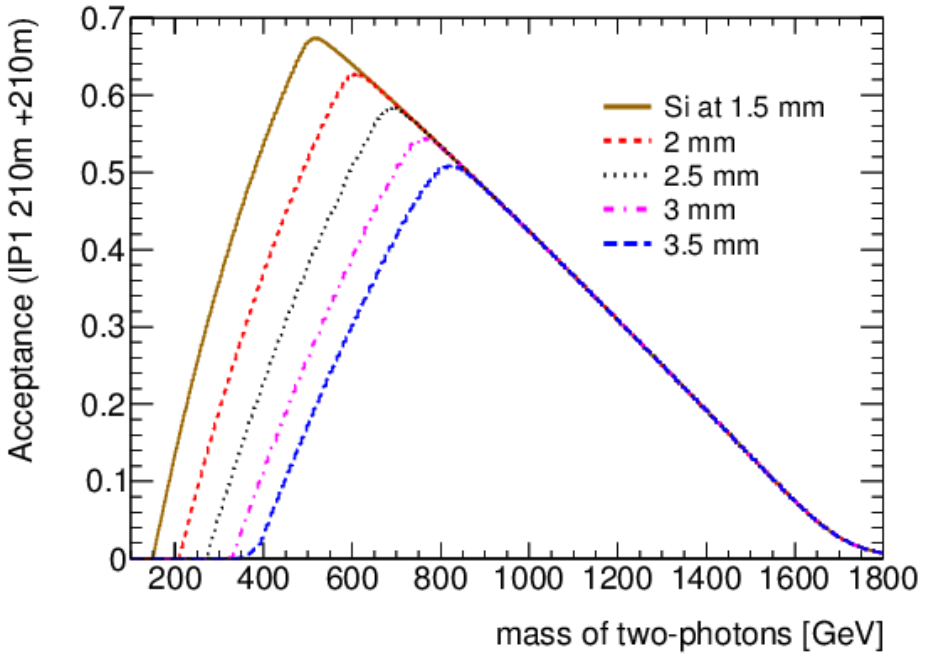
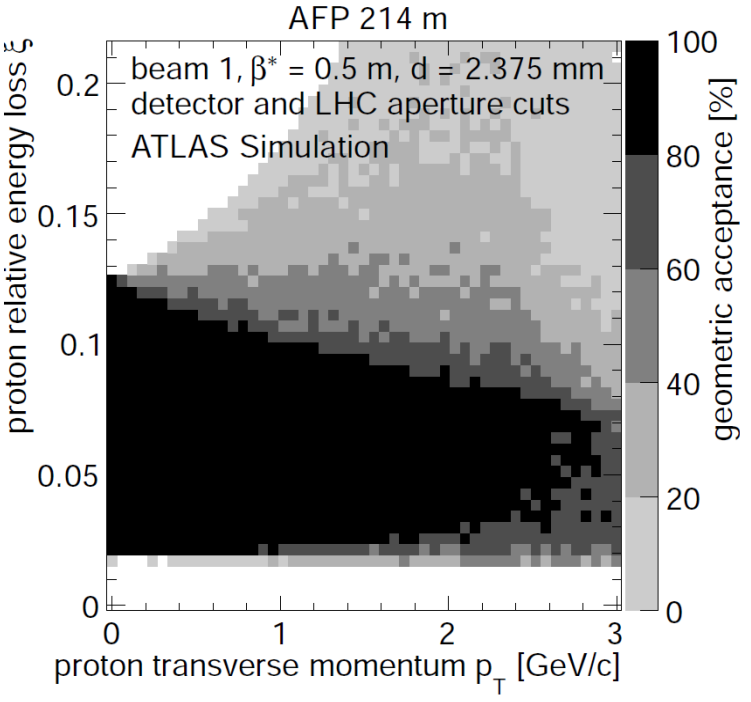
Summary of talks by M. Trzebinski, P. Mermod, O.K.
https://indico.cern.ch/conferenceOtherViews.py?confId=223562

Kinematics

- Acceptance large for $0.012 < \xi < 0.14$
- Good resolution in ξ, not so great resolution in p_T

- Timing detectors, mass trigger at L1 from course timing bars?





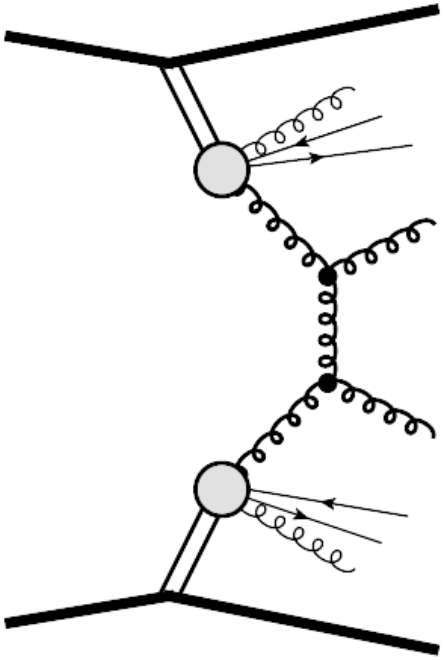
Program

- 1) High luminosity
  - Hundreds of fb^{-1}, interactions / crossing = 50
- 2) Low luminosity
  - Hundreds of pb^{-1} (1-2 weeks of special running), interactions / crossing = 1-5
- 3) Very low luminosities
  - < 1 pb^{-1} (1 day of special running), interactions / crossing < 0.5

- 1) Exclusive production
- 2) Hard diffraction SD/DPE, pomeron structure
- 3) Soft diffraction – particle production, correlation, etc. (never discussied, assuming to join a few runs together with other detectors)

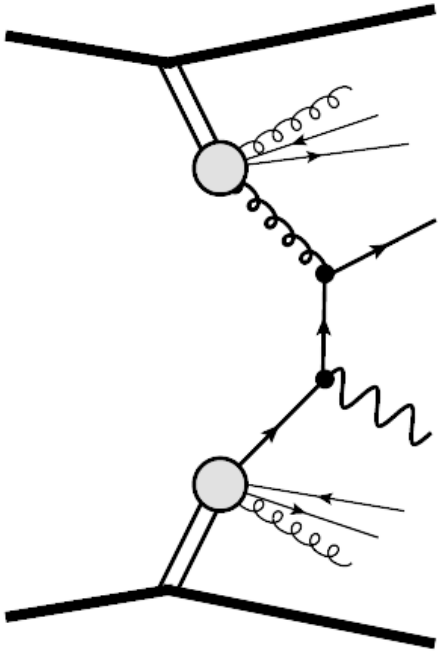
Diffractive Jet Production

Double Pomeron Exchange (DPE)



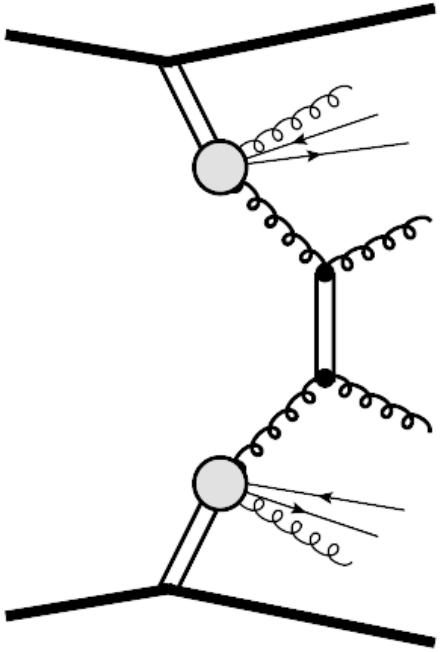
- two intact protons
- two jets

Double Pomeron Exchange (DPE)



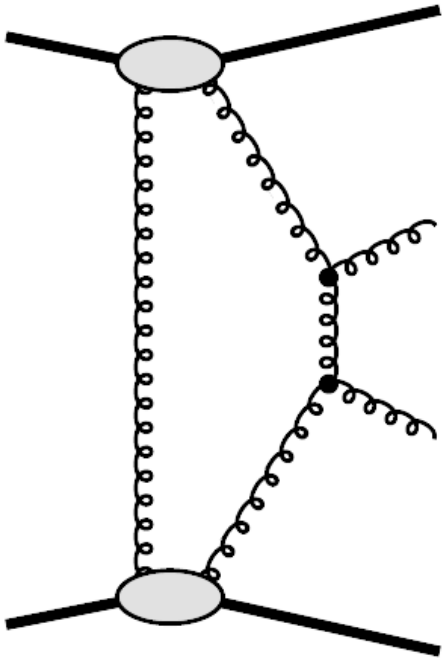
- two intact protons
- photon + jet

DPE Jet-Gap-Jet



- two intact protons
- gap in rapidity between two jets

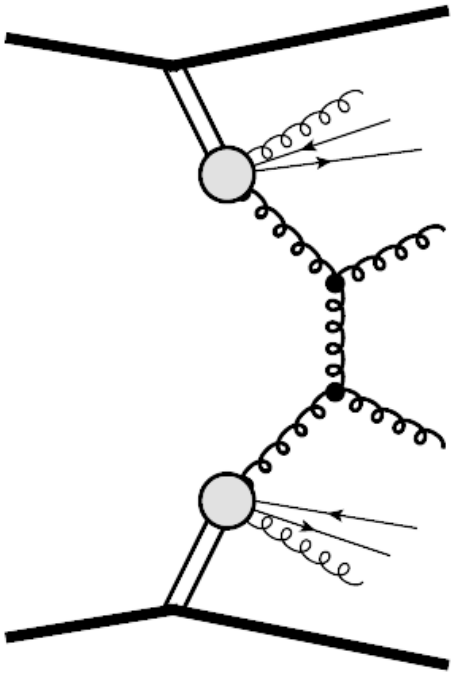
Exclusive



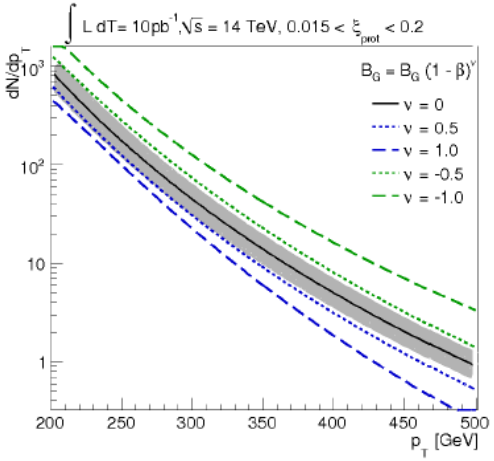
Exclusive Production

- two intact protons
- no remnants
- two jets

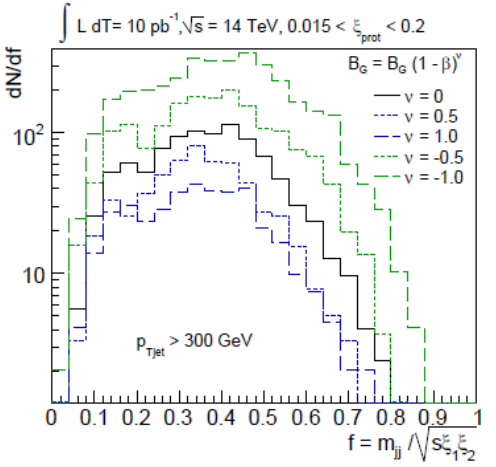
DPE Jet Production



- Probe QCD and diffraction in a new kinematic domain.
- Jet production in DPE events: sensitivity to gluon density in Pomeron (especially at high β) in double tagged events.
- low dependence of production cross section on quark PDF.
- $\int L = 10$ pb^{-1} with low $< \mu >$ is enough to obtain some interesting informations about Pomeron structure when p_T of the leading jet > 200 GeV.



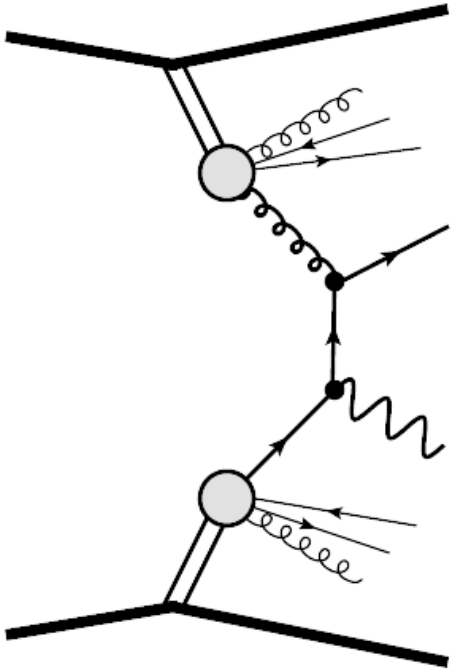
Transverse momentum of the leading jet.



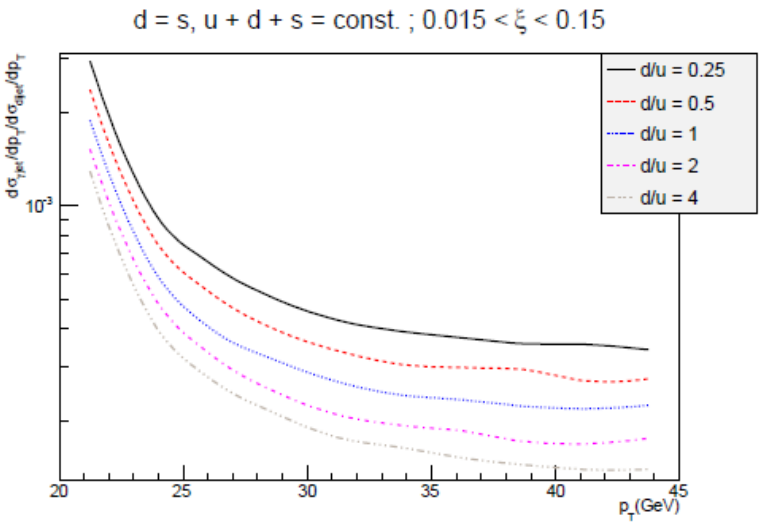
Mass fraction – mass of the jet system / missing mass (calculated from protons).

PRAGUE FZÚ

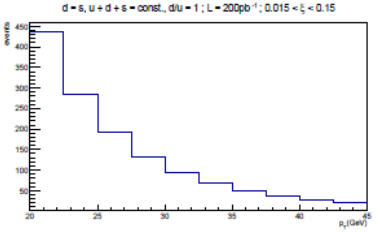
DPE γ + Jet Production



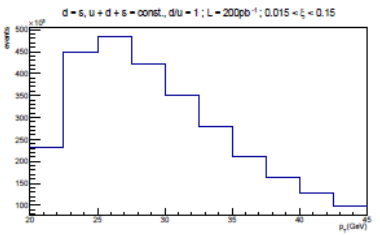
- Probe QCD and diffraction in a new kinematic domain.
- Constraints exist on the sum of quark density and the gluon distribution from F_2^D measurement (HERA) assuming the Pomeron is made of quarks and gluons.
- u=d=s and q=qbar have been assumed so far.
- Production highly depends on quark PDF.
- $\int L = 200$ pb^{-1} with low $< \mu >$ is enough to obtain some interesting informations about Pomeron structure.



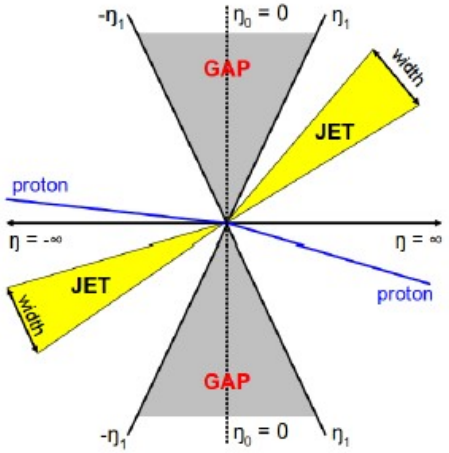
γ + jet:



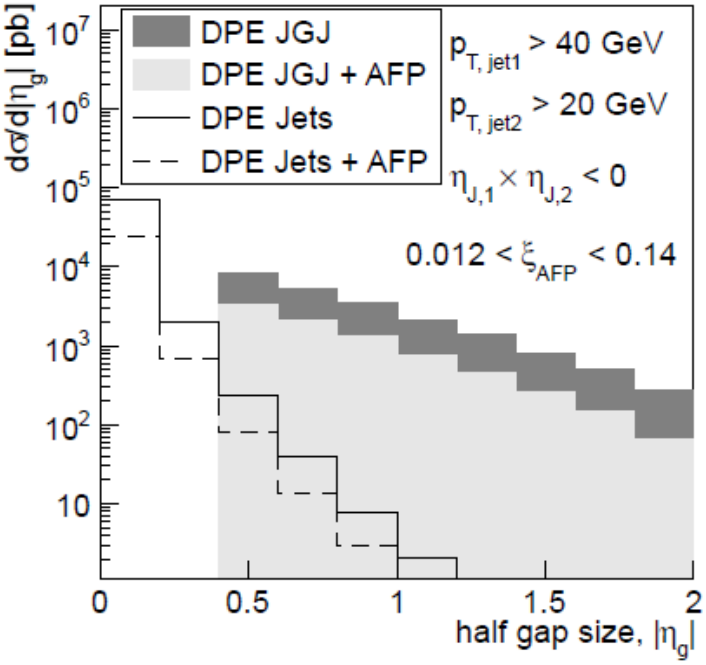
dijets:



Diffractive jet-gap-jet event



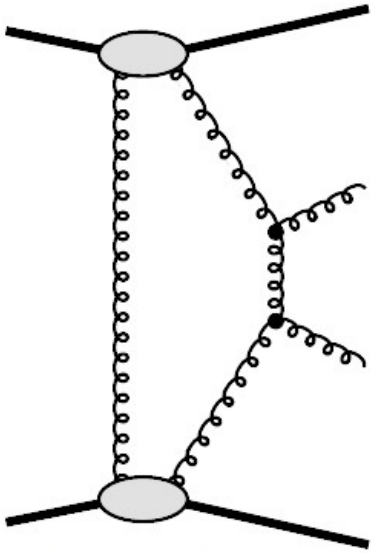
- Cleaner test of BFKL model than usual JGJ measurement (events not polluted by proton remnants).
- Access to larger di-jets with a larger rapidity difference.
- $\int L = 300$ pb^{-1} with low $< \mu >$ is enough to make the test.



The gap size distribution for non-diffractive jets and diffractive jet-gap-jet events.

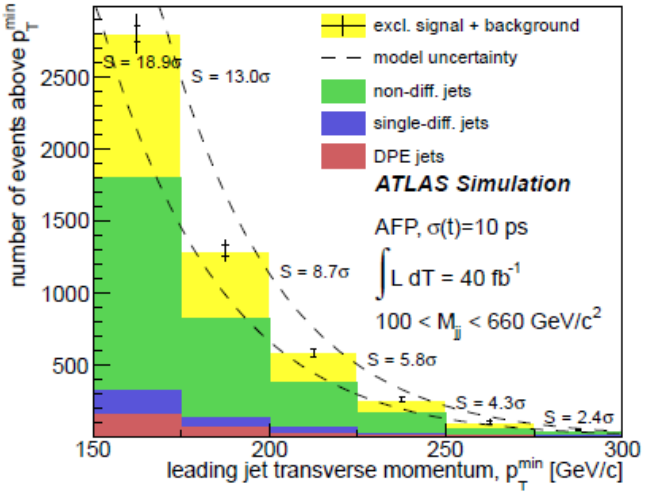
Exclusive Jet Production

Signature: two jets in central region + two intact protons + gap in rapidity between jet and proton (no remnants).

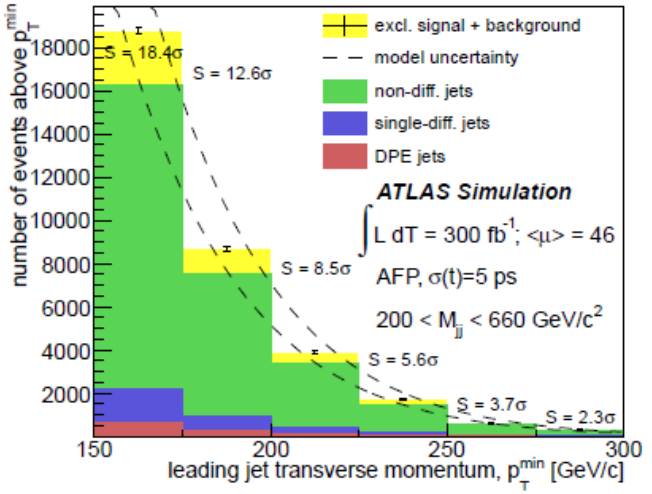


Exclusive Production

- Theoretical description – KMR model.
- No Pomeron remnants.
- Measurement constrain theoretical models.
- Limits on exclusive Higgs production.
- $\int L = 300$ fb^{-1} with high $< \mu > \sim 50$ is enough to make the measurement.



$< \mu >= 23$



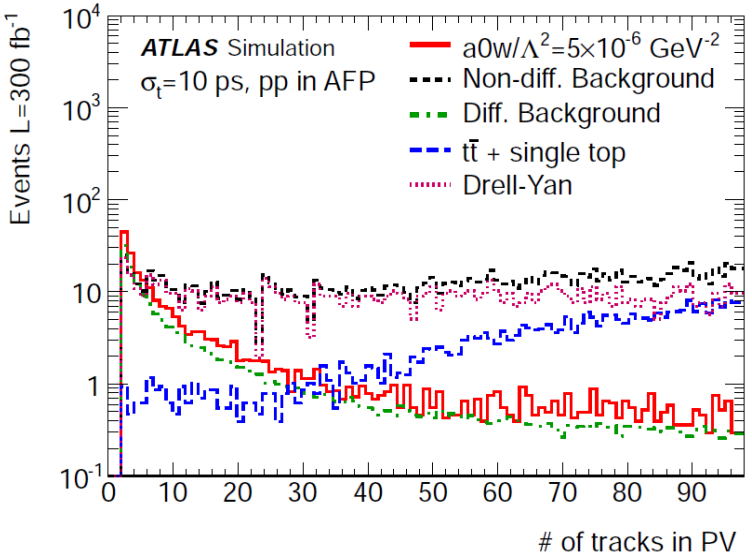
$< \mu >= 46$

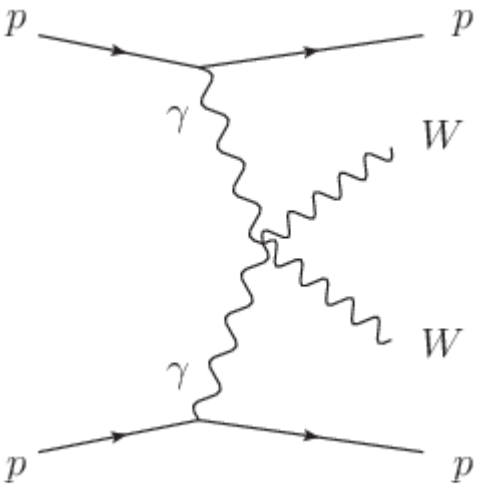
Anomalous coupling

- Stringent test of the electroweak symmetry breaking by proton tagging

  γγWW, γγZZ, γγγγ

- Either dimension 6 operators, or dimensions 8 operators (e.g. generated by KK graviton in extra dimensions)
- If we see signal, we know it is QGC with large certainity (pomeron pomeron contribution at large mass small)





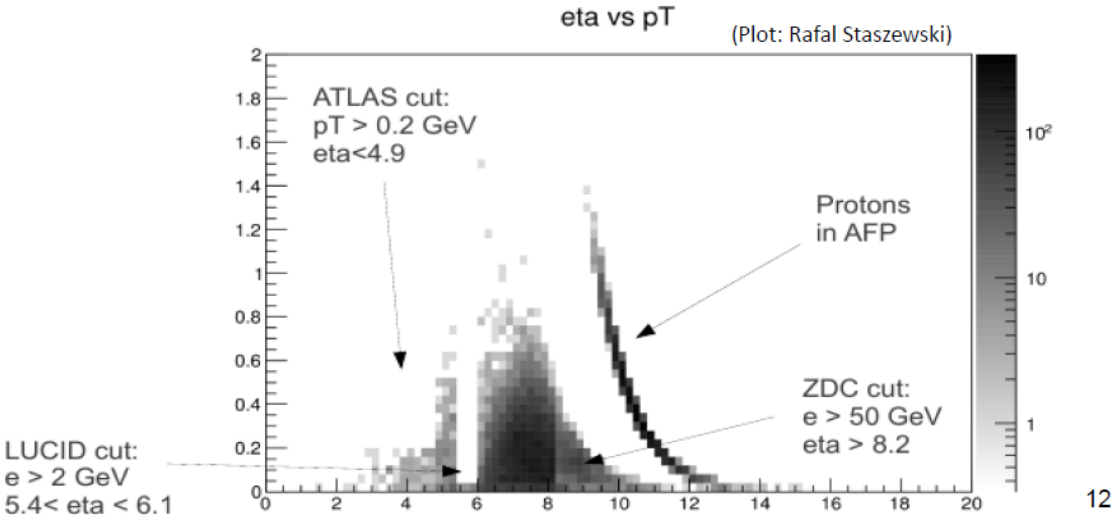
Other potential program …

- Look for invisible particles
  - Trigger and selection is an issue

Expected dominant background in search for invisible particles

Double-diffractive events with protons in AFP

- Cannot be reduced effectively due to lack of vetoing detectors in region η = 7



- AFP in p+Pb
- Proton+pomeron physics