Probing QCD asymptotia with elastic pp scattering

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on behalf of the ATLAS Collaboration

”Standard Model and Beyond”
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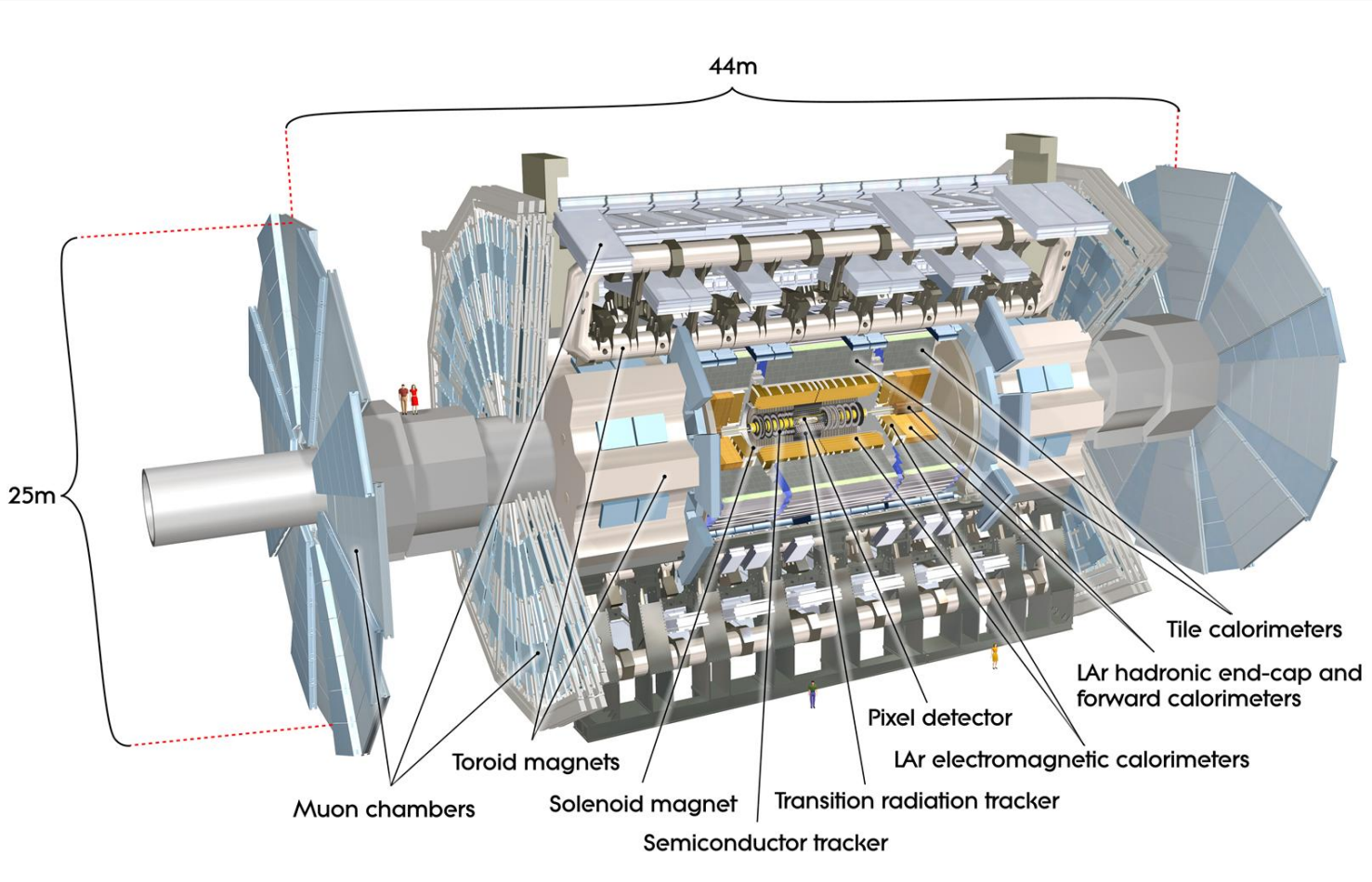
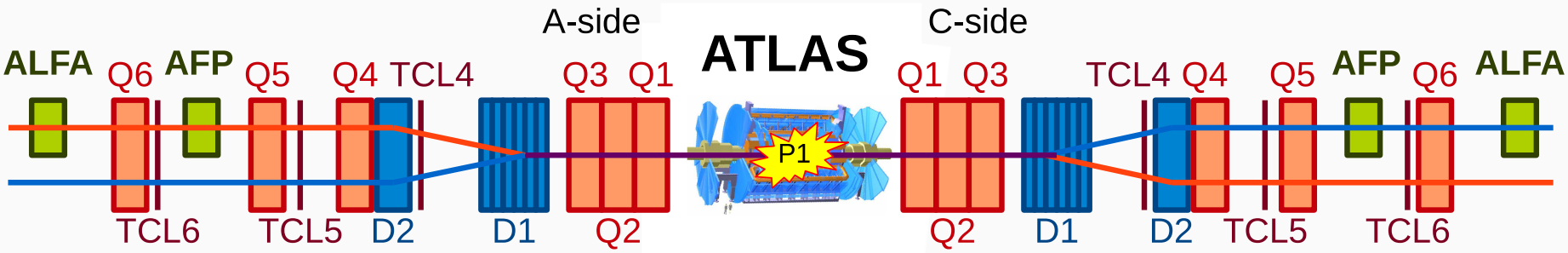
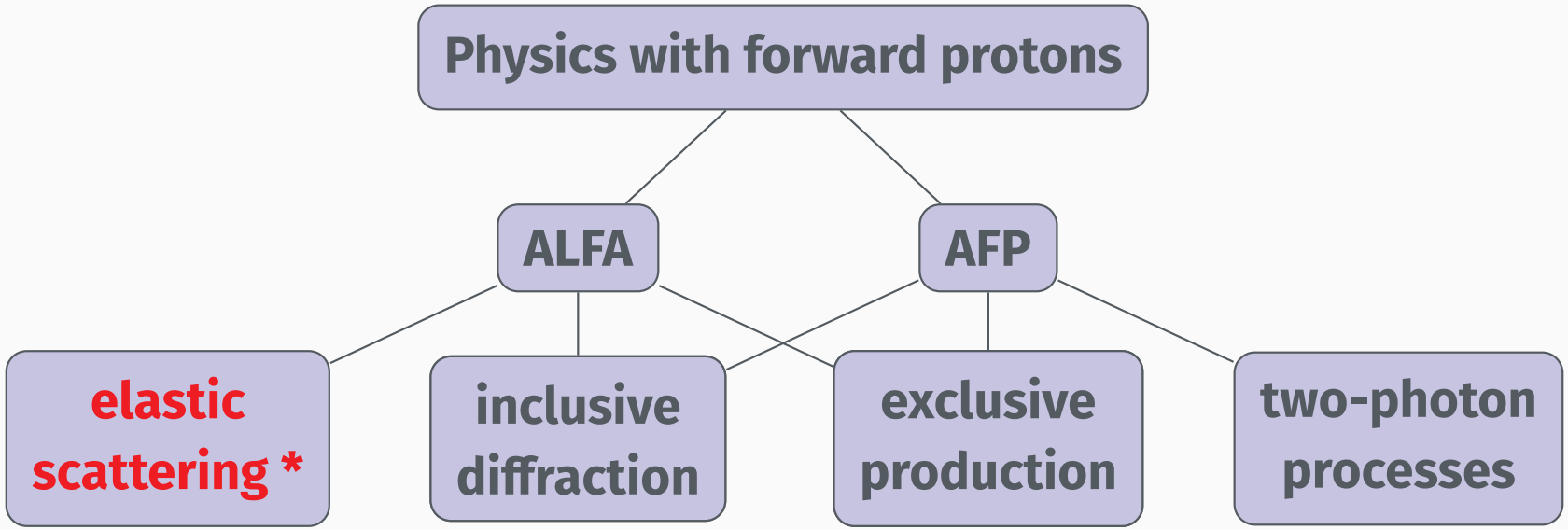
ATLAS Detector



...but also **forward detectors** providing measurements
of forward intact protons: **ALFA** and AFP

Physics with forward detectors in ATLAS





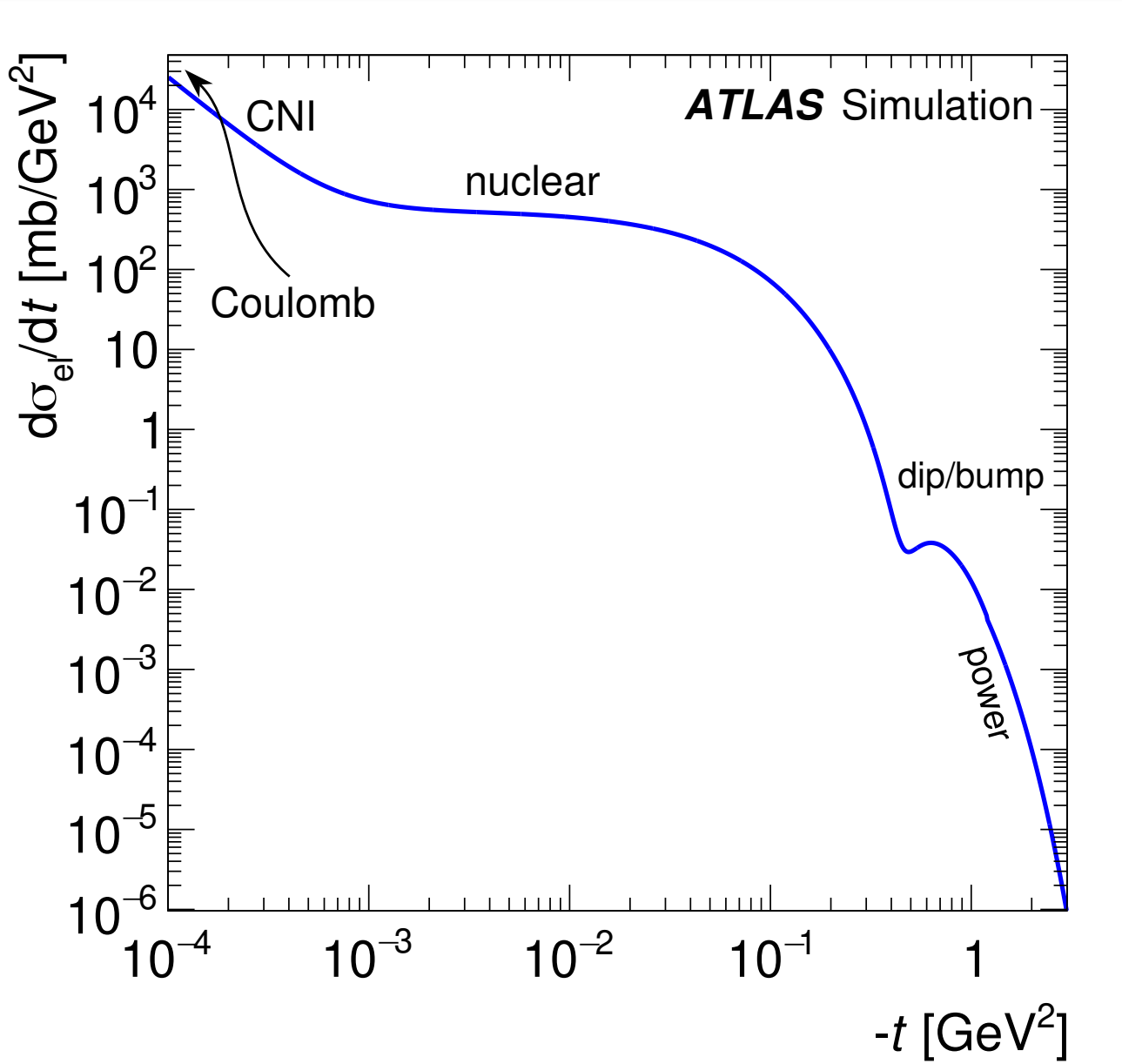
*** covered in this talk**

based on ATLAS Collaboration, arXiv:2207.12246, accepted by EPJC

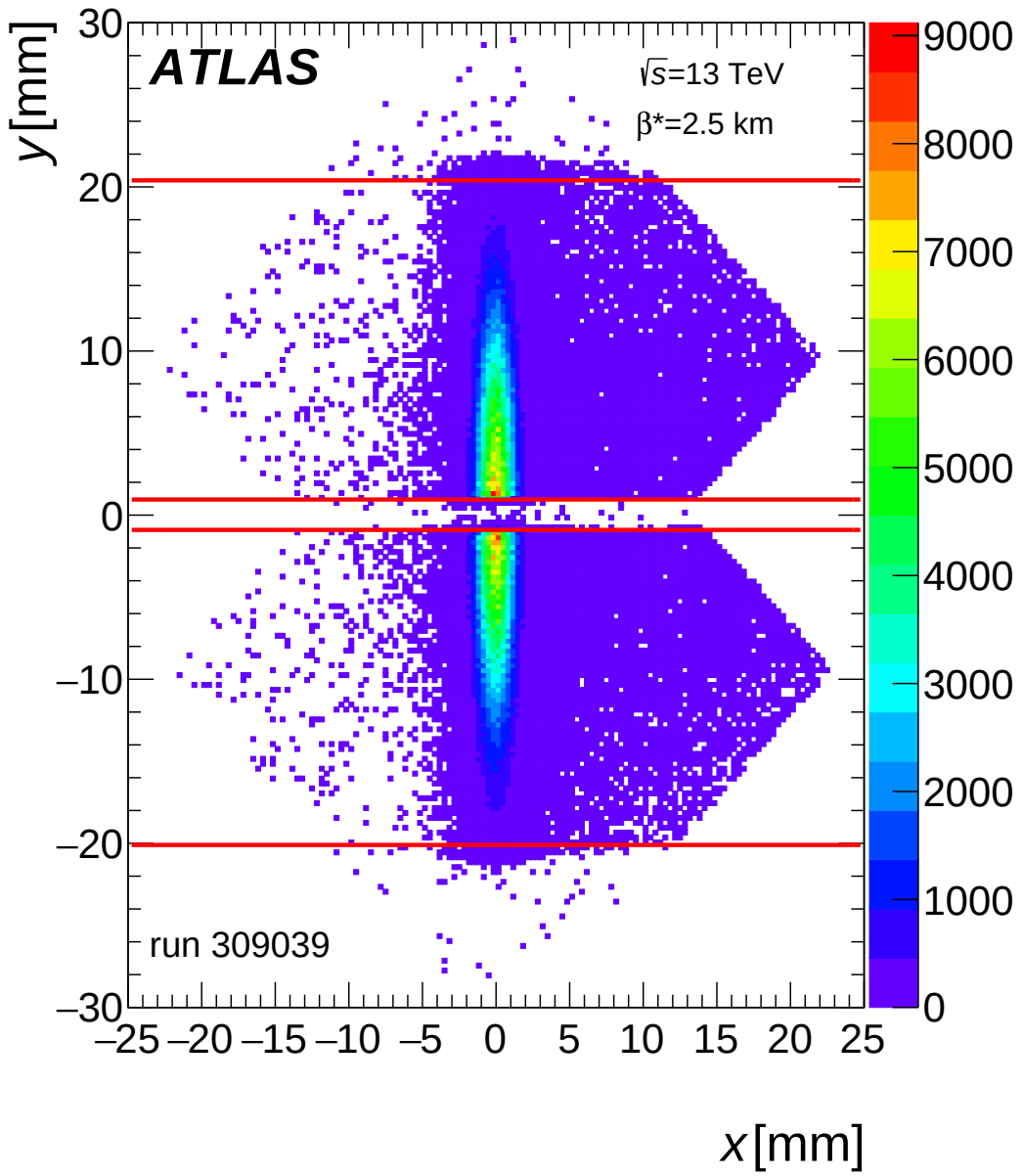
Elastic pp scattering

- Energy and momentum conservation
- 2 kinematic degrees of freedom: φ, θ
- φ – trivial (uniform)
- $t \approx -p^2\theta^2 = -p_T^2$

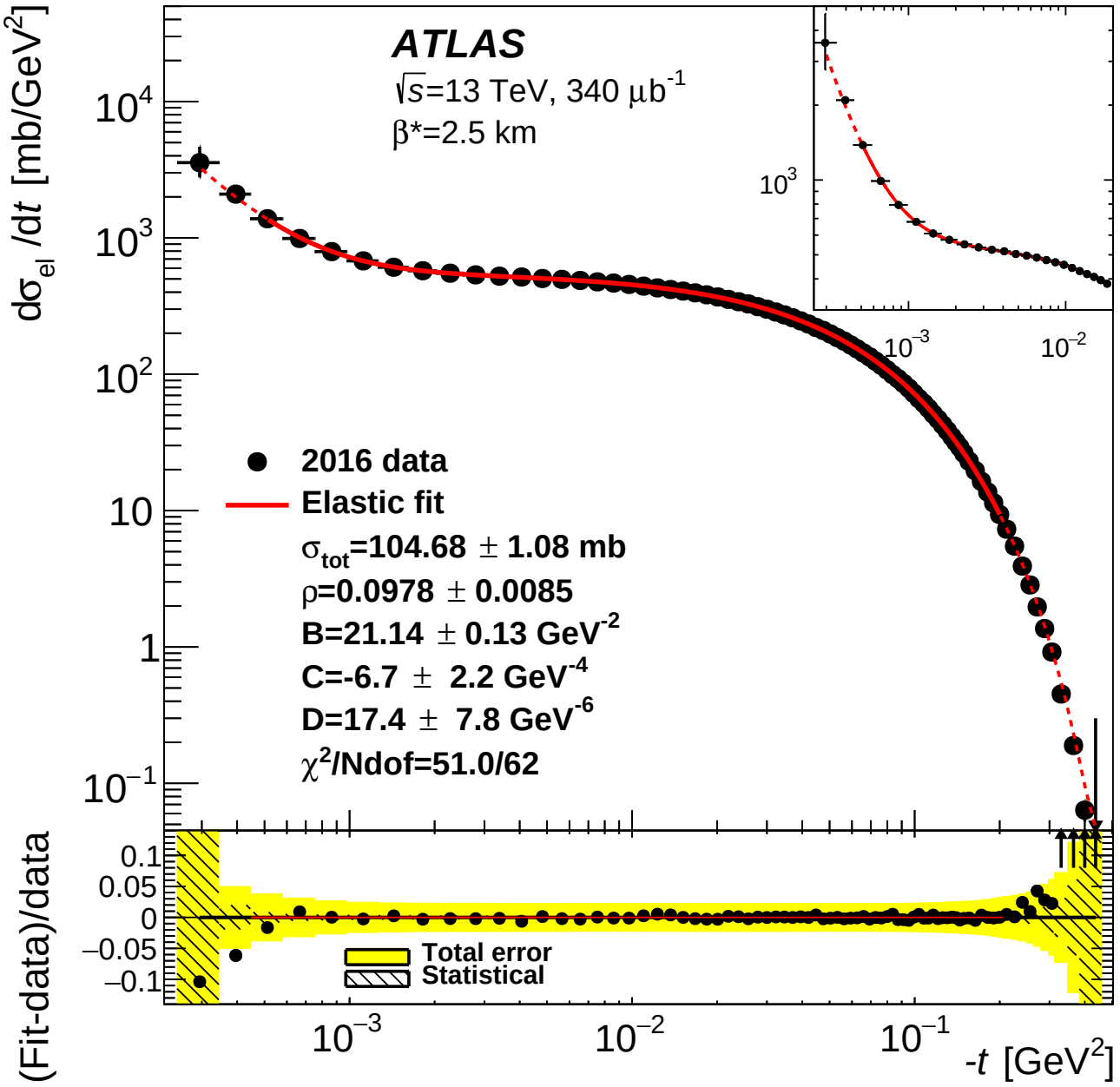
Dynamics of elastic scattering



Data analysis



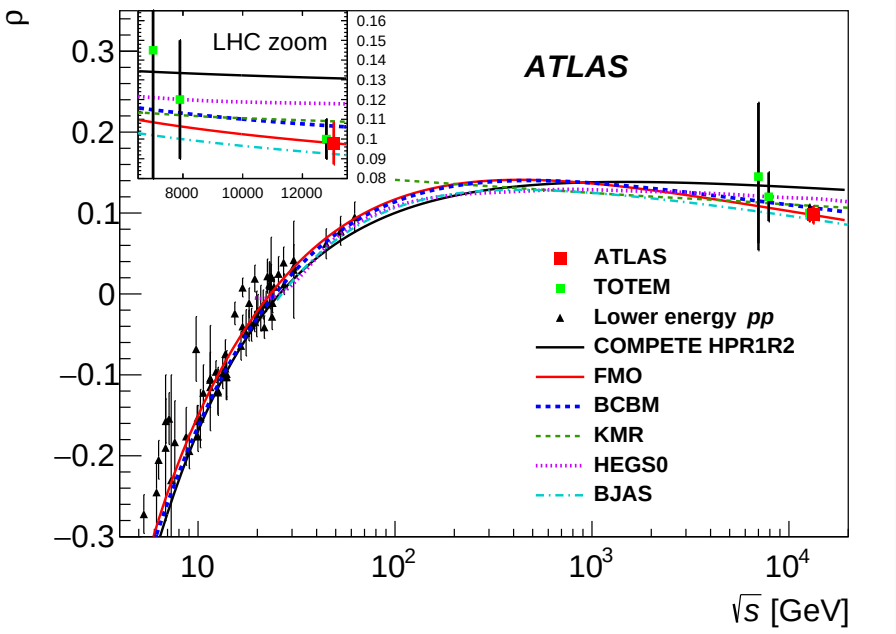
Differential elastic cross section



Physics paramateres

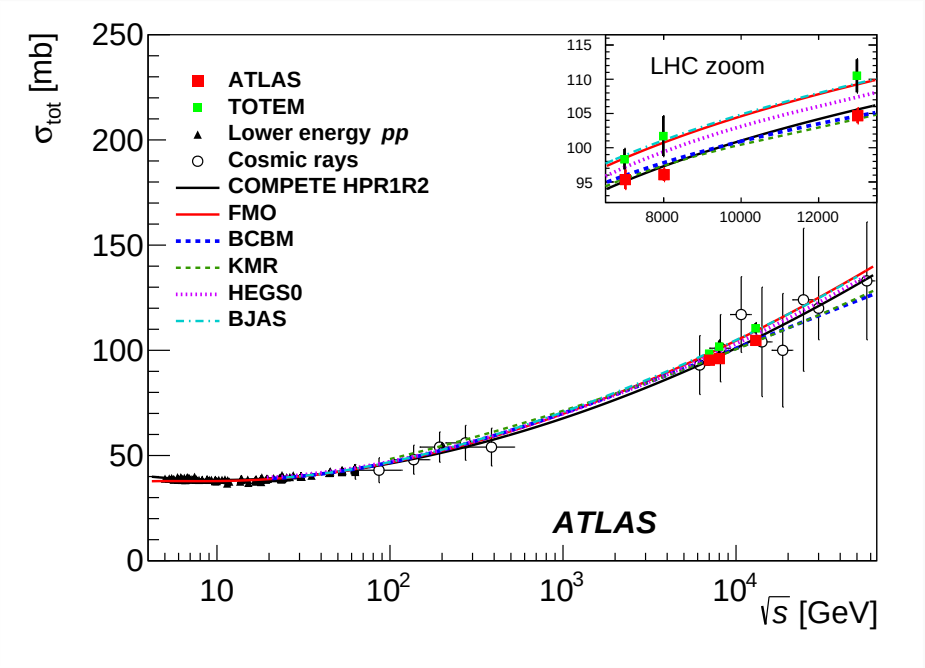
Interference

between electromagnetic and strong interactions



Optical theorem

$$\sigma_{\mathrm{tot}} = 4\pi \,\mathrm{Im}\, f_{\mathrm{el}}(t=0)$$



Sensitivity to energies beyond LHC, possibly asymptotic regime.