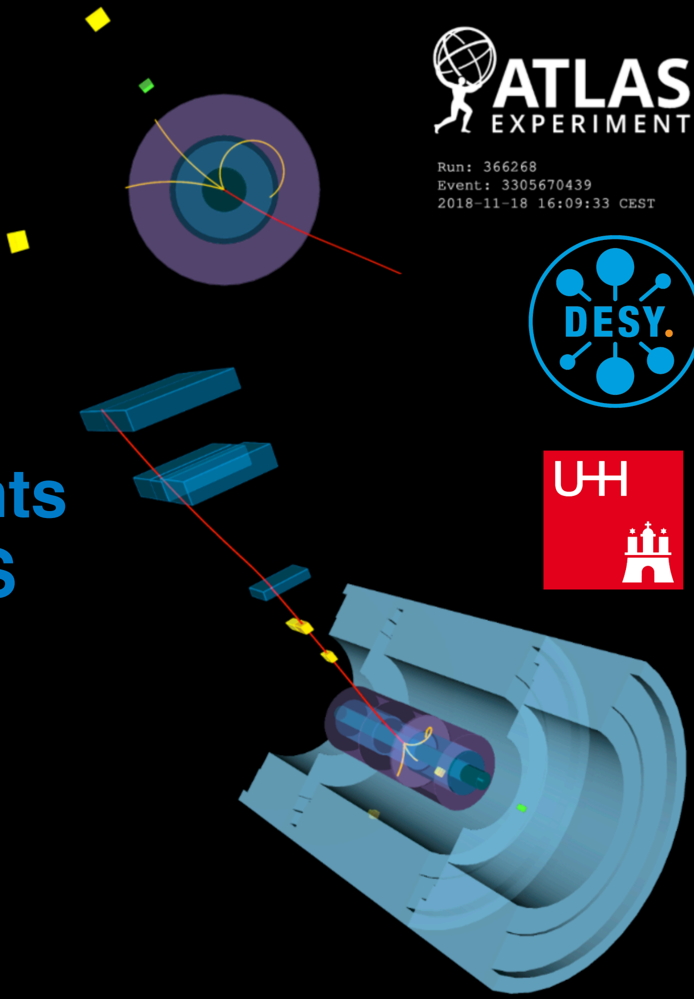
Shedding Light on the Tau Lepton

Testing electromagnetic moments in heavy-ion collisions at ATLAS

Weronika Stanek-Maslouska

16 July 2026



Outline

- Motivation
- Experimental Setup
- Analysis strategy
- Modelling
- Differential cross sections
- Extracting tau electromagnetic moments

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Based on latest ATLAS measurement: arXiv:2605.04584

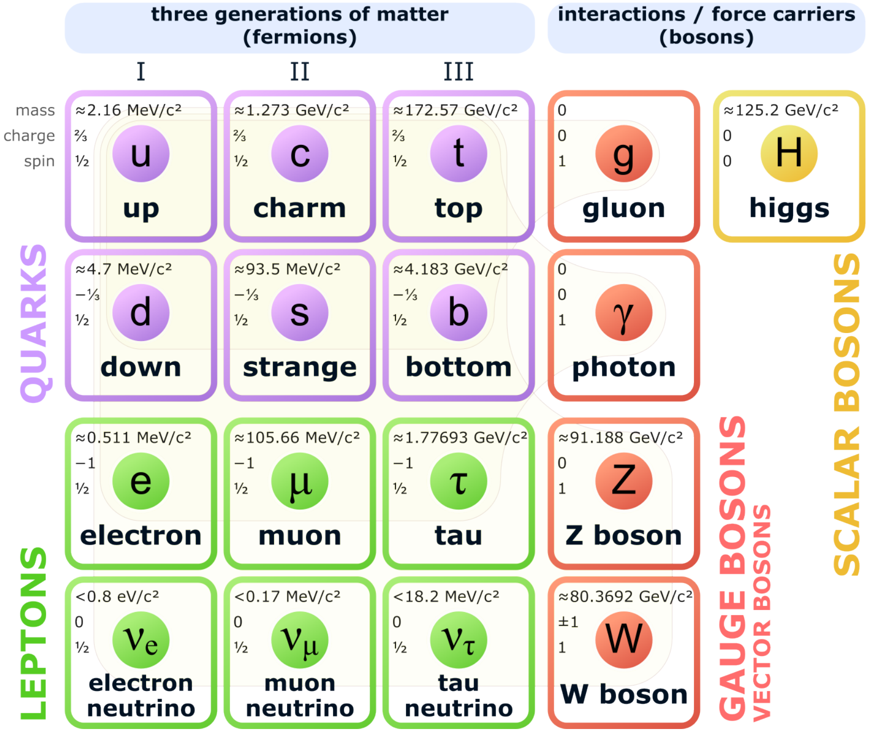
Standard Model of Particle Physics

- Most successful theory
- Describes particles and their interactions

BUT it is not the full story:

- Dark Matter?
- Matter-antimatter asymmetry?
- Gravity?

Keep looking for physics Beyond the Standard Model (BSM)!



How do we look for BSM at LHC?

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Direct searches: The “Brute Force” Approach 🔨

- Assume that new particles are directly produced
- Goal: **Discover a resonance (a peak in an invariant mass spectrum) or a distinct topological signature**
- Example: Look for axion-like particles decaying into SM particles

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Indirect searches: The “Precision” Approach 📏

- Assume that BSM physics affects the SM processes
- <u>Goal</u>: **Measure a Standard Model observable to extreme precision and see if it deviates from the SM prediction**
- <u>Example</u>: Measuring the anomalous magnetic moment of leptons where virtual BSM particles would change the expected value

Why are lepton electromagnetic moments so special?

Measure electromagnetic moments of leptons to test the SM and search for BSM:

Anomalous magnetic moment a_ℓ:

- Measure of how **magnetic** a particle is
- Intrinsic magnetic moment μ :

$$\vec{\mu} = g\frac{q}{2m}\vec{s}$$

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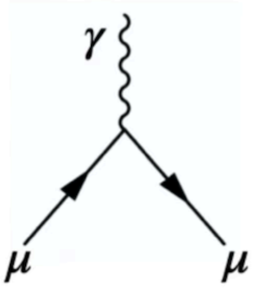

2

Dirac 1928

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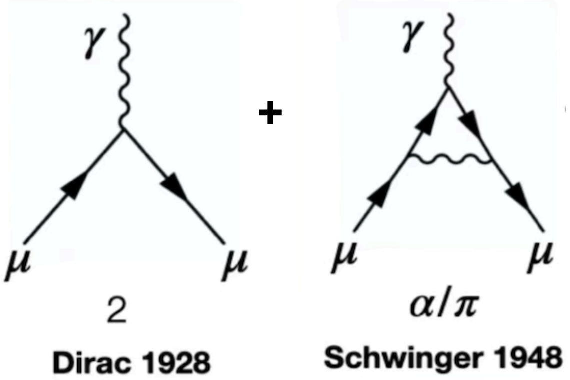

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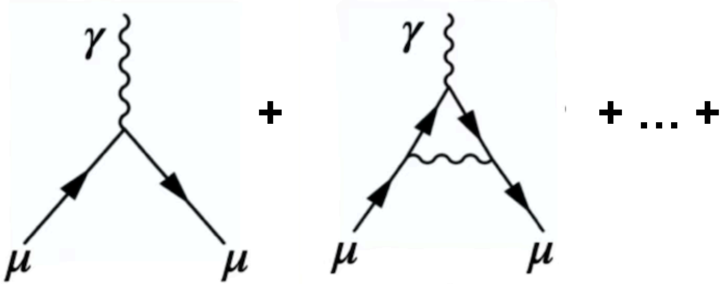

2 — **Dirac 1928**; α/π — **Schwinger 1948**

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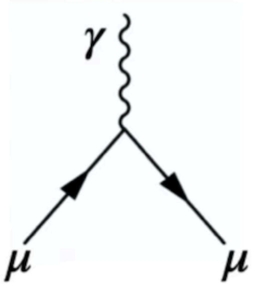

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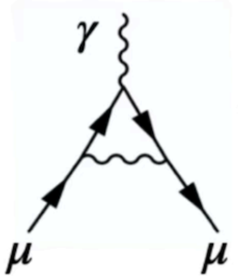
Dirac 1928

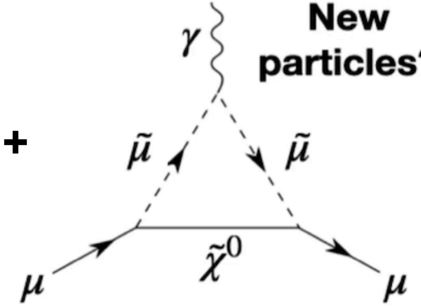
+



α/π

Schwinger 1948

+ … +



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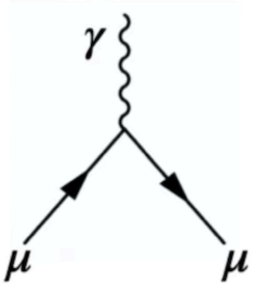

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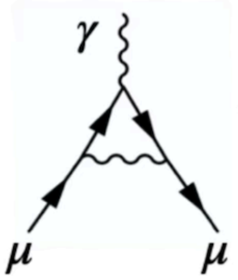

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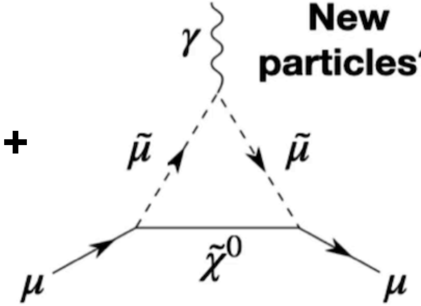


$$a = \frac{g-2}{2}$$

Motivation

Why are lepton electromagnetic moments so special?

Phys. Rev. D 109, 112002

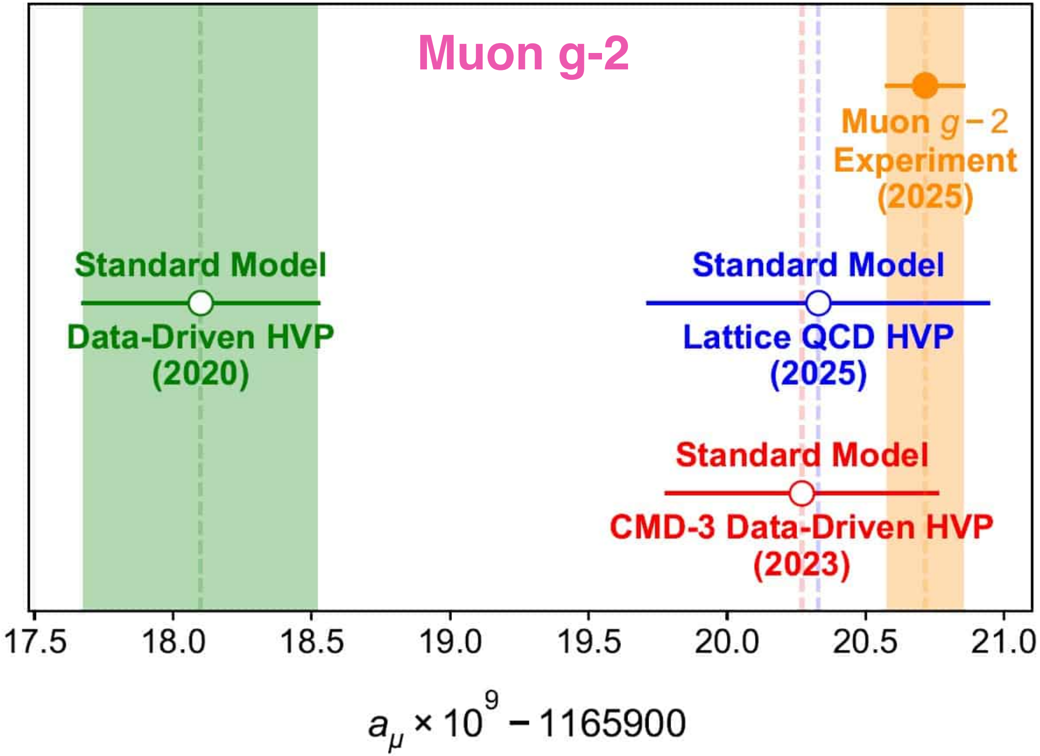
Phys. Rep. 887 (2020) 1-166

Anomalous magnetic moments of electron and muon
measured with extreme precision:

Muon: 10 decimal places
Electron: 13 decimal places

Muon g-2:

- Final result from Muon g-2 experiment → published recently (2025)
- Tension between different theory predictions



Motivation

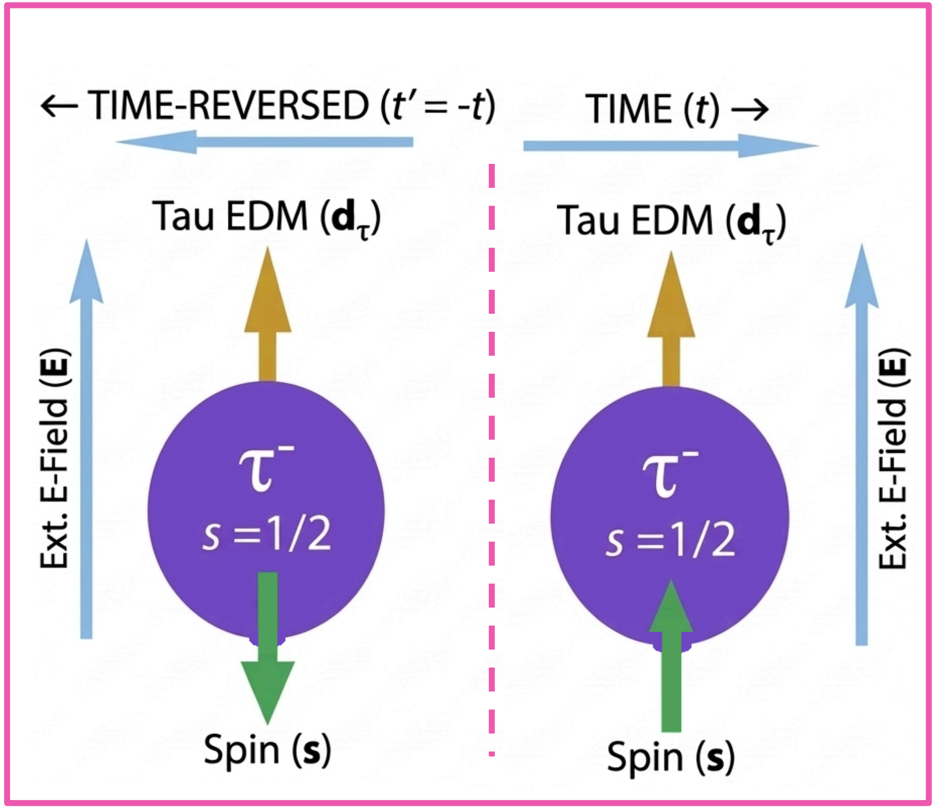
Why are lepton electromagnetic moments so special?

Electric dipole moment d_l :

- Measure of how a particle interacts with an **electric field**
- Defined through the interaction of a spin **S** with an external electric field **E**:

$$H_{\mathrm{EDM}} = -d_\tau \mathbf{S} \cdot \mathbf{E}$$

- Any deviation from zero would indicate **CP violation** in lepton sector (assuming CPT is conserved)



Motivation

Current status of measurements for the tau lepton

- Measuring tau-leptons is difficult → **extremely short lifetime** (0.3 ps)
- SM predicts a_τ and d_τ close to 0:

a_τ^{th}= 0.001177171 ± 0.000000039

- measured in **e+e-, pp, PbPb** collisions→ **DELPHI, CMS, ATLAS**…

$|d_\tau^{th}| \lesssim 10^{-37}$ecm

- measured in **e+e-** and **pp** collisions→ DELPHI, CMS…

- Predicted values are **beyond sensitivity** of current measurements
- Measuring a_τ and d_τ with improved precision can be **sensitive to BSM**

Introduction

Extracting tau electromagnetic moments

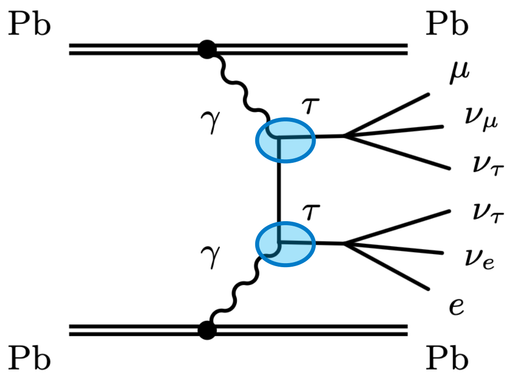
- $\gamma\gamma \rightarrow \tau\tau$ **process: presence of photon-tau vertices**
- Photon-lepton vertex function depends on the momentum transfer q:

$$i\Gamma_{\mu}^{(\gamma\tau\tau)}(q) =$$

$$-ie\left[\gamma_{\mu}F_1(q^2) + \frac{i}{2m_{\tau}}\sigma_{\mu\nu}q^{\nu}F_2(q^2) + \frac{1}{2m_{\tau}}\gamma^5\sigma_{\mu\nu}q^{\nu}F_3(q^2)\right]$$

At $q^2 \rightarrow 0$:

$$F_1(0) = 1 \quad F_2(0) = a_{\tau} \quad F_3(0) = d_{\tau}\frac{2m_{\tau}}{e}$$



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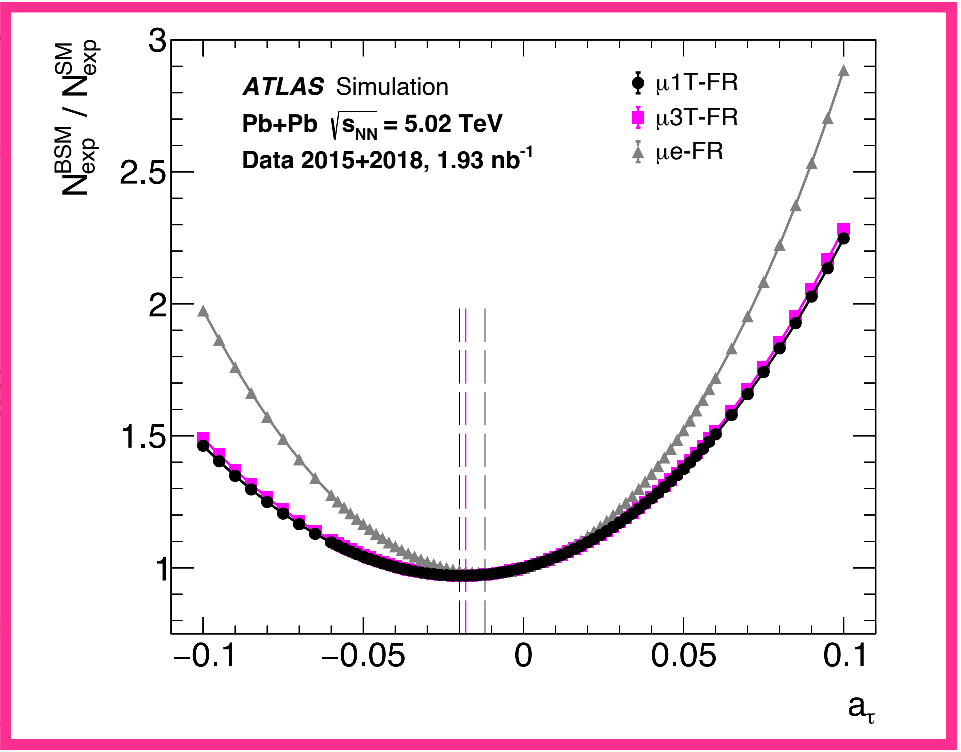

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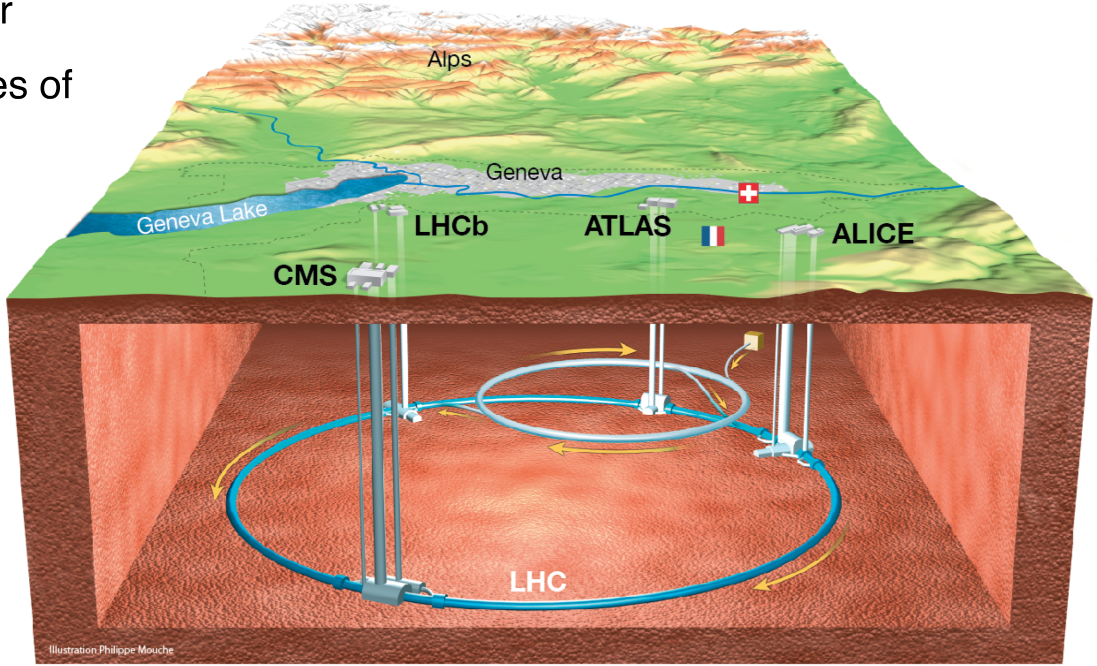
Large Hadron Collider at CERN

- Two-ring accelerator and collider
- Centre-of-mass collision energies of protons of up to **13.6 TeV**

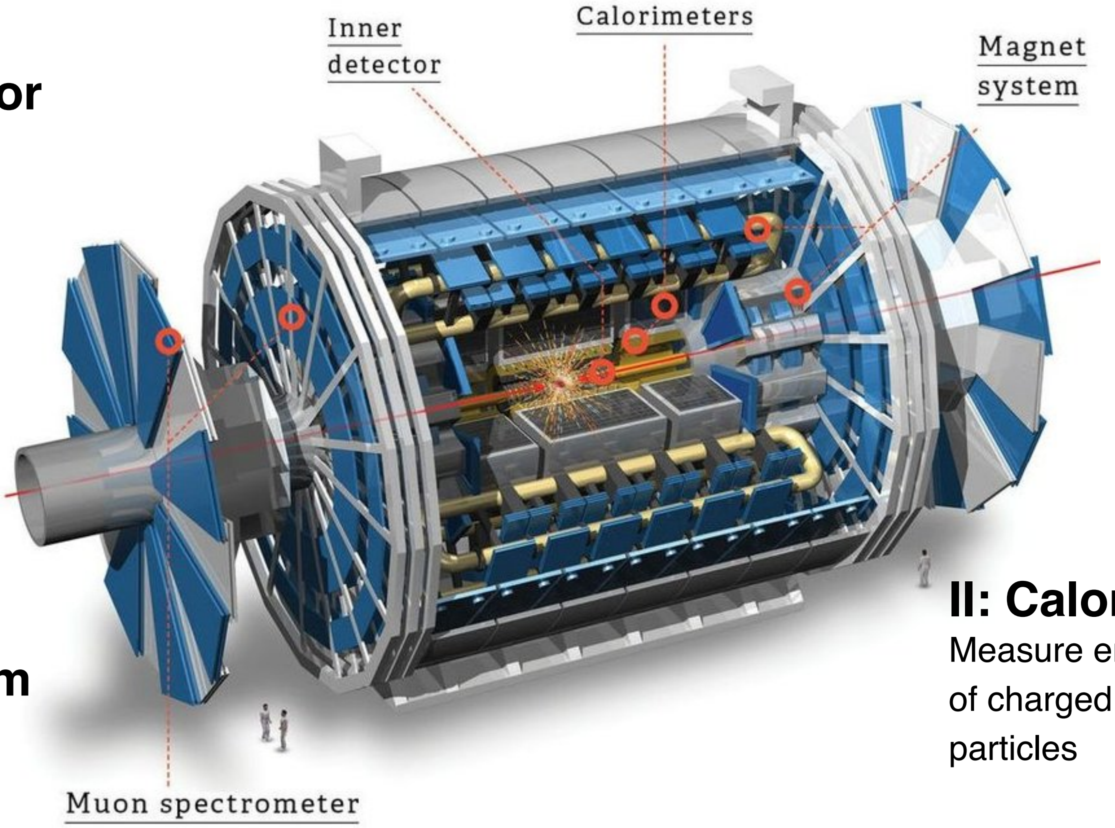
LHC as an ion collider:

- Heavy-ion program included in the design of LHC
- Ion beams provided for all four major experiments
- Centre-of-mass collision energies of lead ions of up to **5.36 TeV per nucleon pair**



ATLAS Experiment

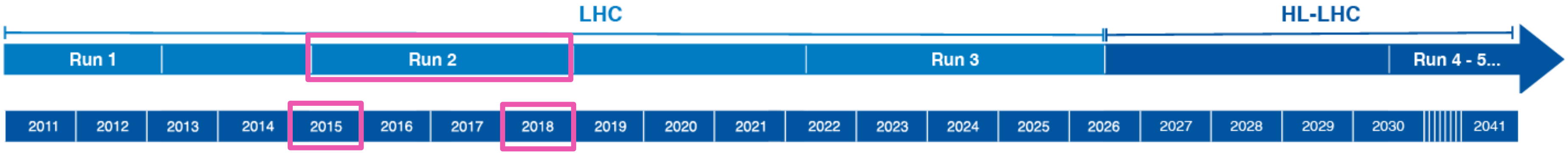
I: Inner detector
Measure charged particle tracks



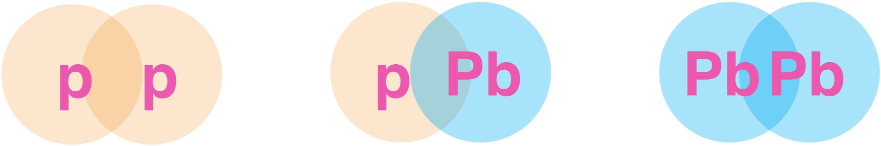
II: Calorimeters
Measure energy deposits of charged and neutral particles

III: Muon System
Measure muon tracks

LHC collisions and ATLAS data



- **ATLAS Data** recorded in LHC Run 2:

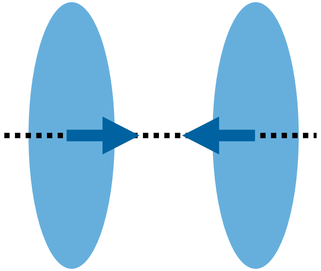


	pp	pPb	PbPb
$\sqrt{s}$	13 TeV	8.16 TeV	5.02 TeV
L	~ 140 fb^{-1}	~ 170 nb^{-1}	~ 2 nb^{-1}

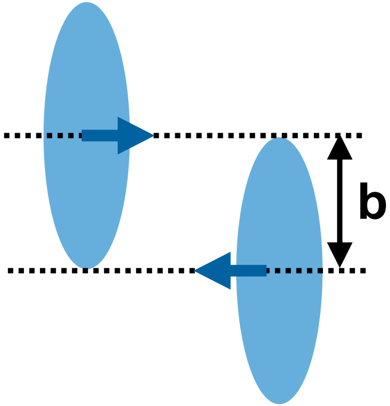
- **This talk: Full LHC Run 2 PbPb data recorded by ATLAS (from year 2015 & 2018)**

Heavy Ion collisions

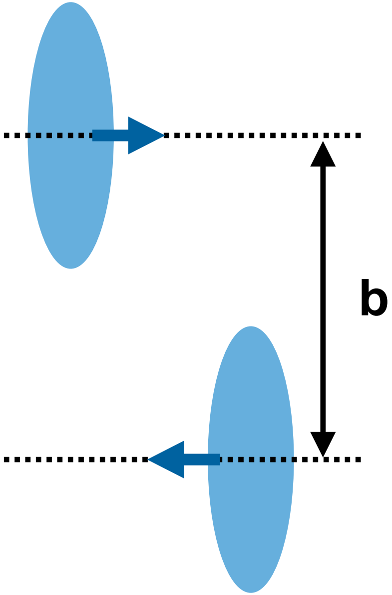
Centrality - describes spatial overlap between colliding nuclei



Central Collision



Semi-central\Peripheral Collision



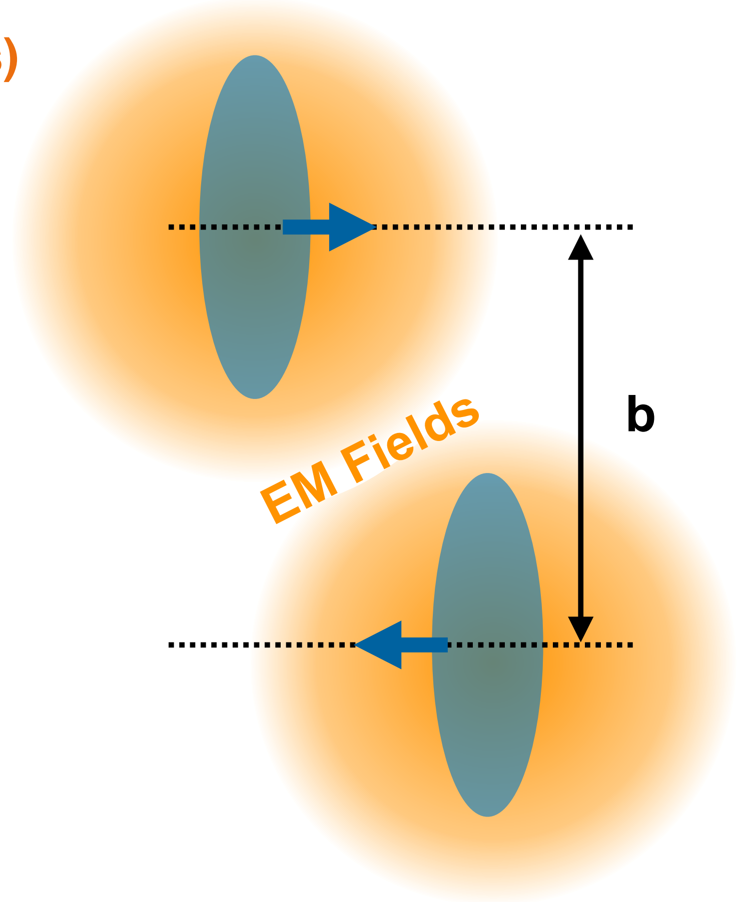
Ultra-peripheral (UPC) Collision

Heavy Ion collisions

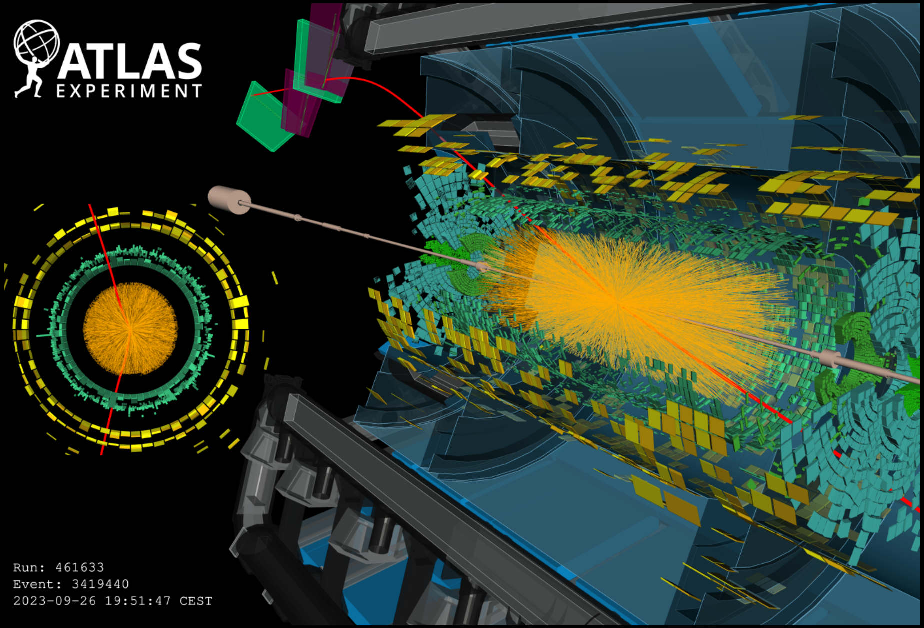
Ultraperipheral Heavy-Ion Collisions (UPCs)

- UPC occurs when the impact parameter is larger than twice the radius of the ions (b>2R)
- Strong electromagnetic fields surrounding nuclei → **flux of photons**

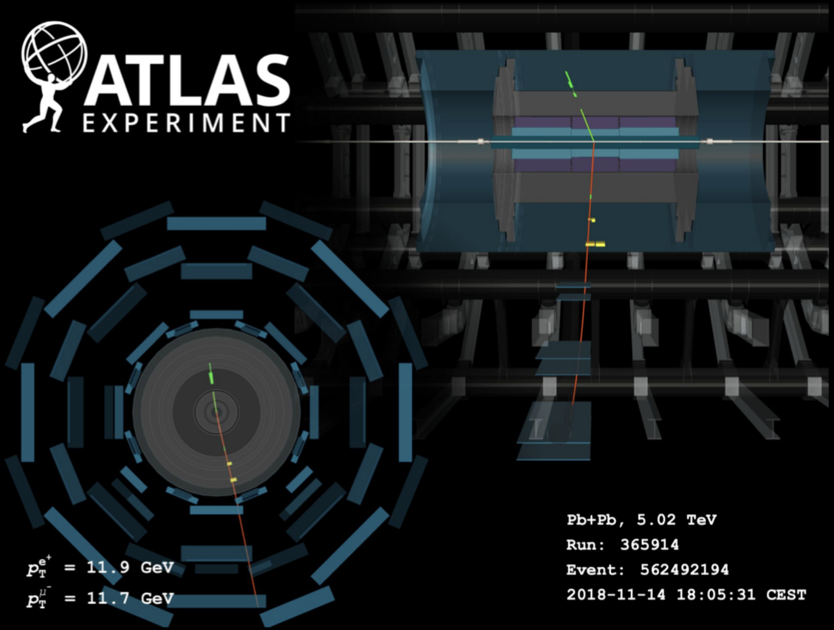
- Huge photon fluxes → Z^4 cross-section enhancement:
  (for Pb: 82^4 = 45 212 176)
- Super clean with ~0 pile-up



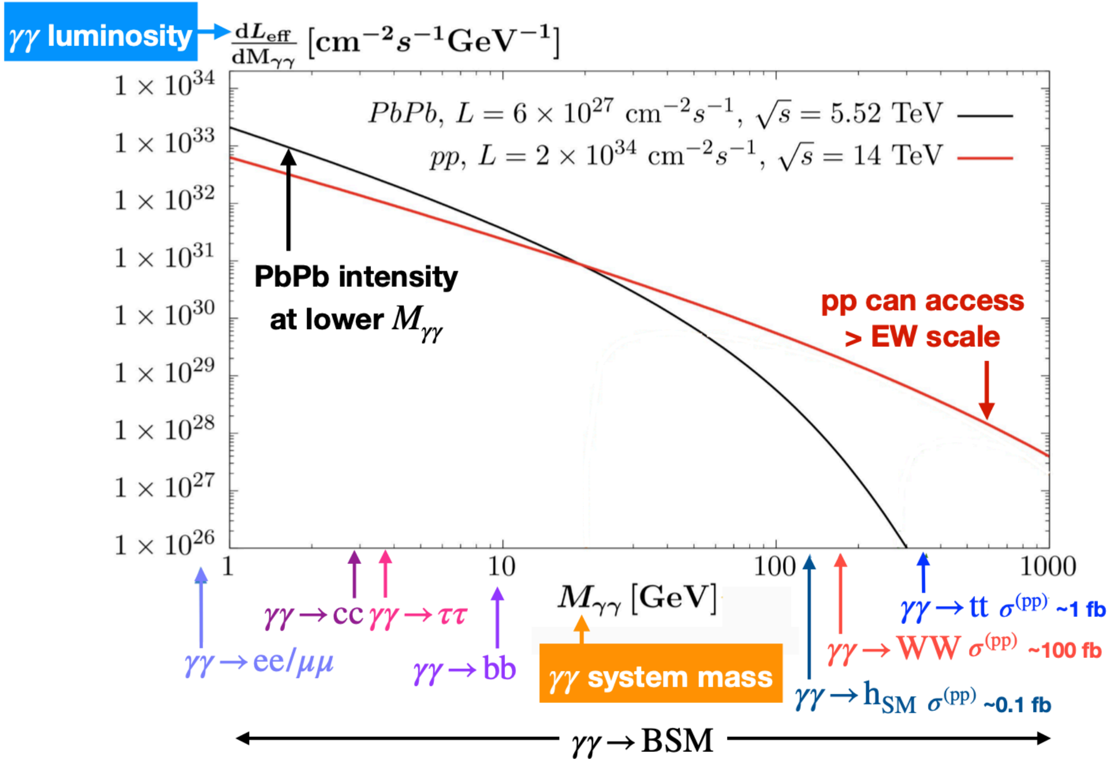
Head-on Pb+Pb collision



UPC Pb+Pb collision



Photon flux
LHC as a photon collider



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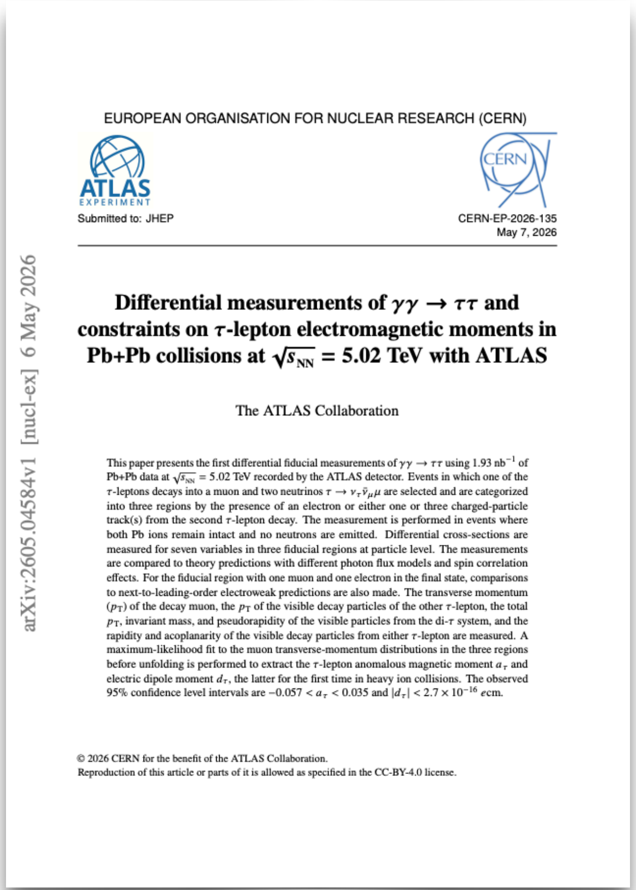
Latest ATLAS measurement

arXiv:2605.04584

✅ **Measure first differential $\gamma\gamma \to \tau\tau$ cross sections in Pb+Pb**

✅ **Set constraints on τ-lepton electromagnetic moments: first ATLAS constraint on electric dipole moment d_τ**


EUROPEAN ORGANISATION FOR NUCLEAR RESEARCH (CERN)

Submitted to: JHEP

CERN-EP-2026-135
May 7, 2026

arXiv:2605.04584v1 [nucl-ex] 6 May 2026

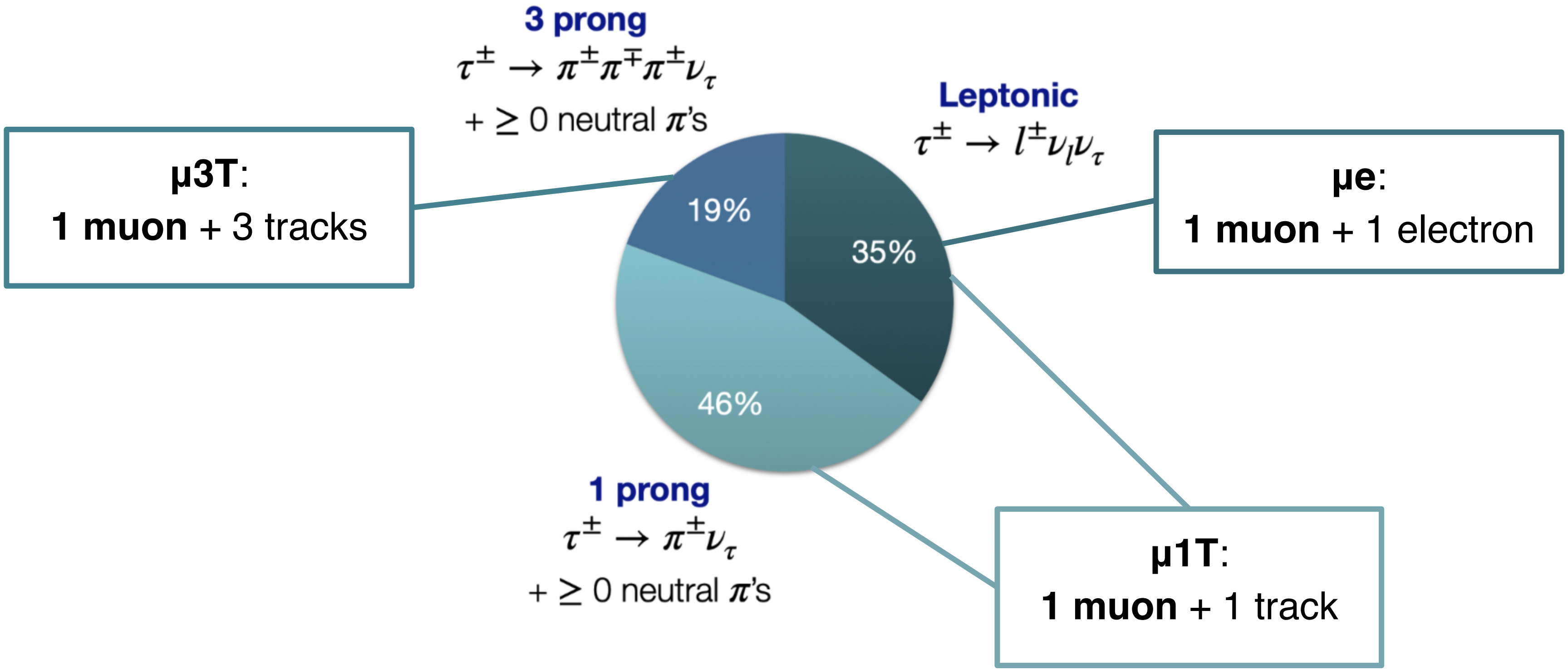
Differential measurements of $\gamma\gamma \to \tau\tau$ and constraints on τ-lepton electromagnetic moments in Pb+Pb collisions at $\sqrt{s_{\text{NN}}}$ = 5.02 TeV with ATLAS

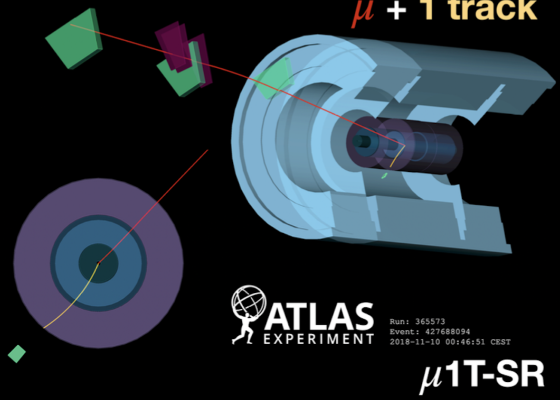
The ATLAS Collaboration

This paper presents the first differential fiducial measurements of $\gamma\gamma \to \tau\tau$ using 1.93 nb^{-1} of Pb+Pb data at $\sqrt{s_{\text{NN}}}$ = 5.02 TeV recorded by the ATLAS detector. Events in which one of the τ-leptons decays into a muon and two neutrinos $\tau \to \nu_\tau \bar{\nu}_\mu \mu$ are selected and are categorized into three regions by the presence of an electron or either one or three charged-particle track(s) from the second τ-lepton decay. The measurement is performed in events where both Pb ions remain intact and no neutrons are emitted. Differential cross-sections are measured for seven variables in three fiducial regions at particle level. The measurements are compared to theory predictions with different photon flux models and spin correlation effects. For the fiducial region with one muon and one electron in the final state, comparisons to next-to-leading-order electroweak predictions are also made. The transverse momentum (p_{T}) of the decay muon, the p_{T} of the visible decay particles of the other τ-lepton, the total p_{T}, invariant mass, and pseudorapidity of the visible particles from the di-τ system, and the rapidity and acoplanarity of the visible decay particles from either τ-lepton are measured. A maximum-likelihood fit to the muon transverse-momentum distributions in the three regions before unfolding is performed to extract the τ-lepton anomalous magnetic moment a_τ and electric dipole moment d_τ, the latter for the first time in heavy ion collisions. The observed 95% confidence level intervals are $-0.057 < a_\tau < 0.035$ and $|d_\tau| < 2.7 \times 10^{-16}$ $e$cm.

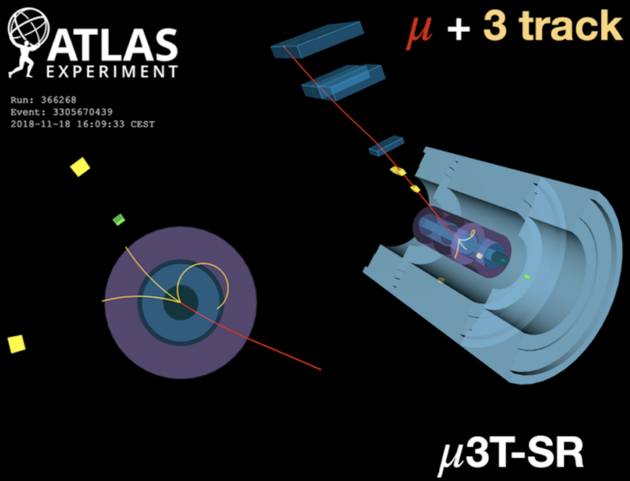
Analysis strategy

- **Investigate 3 Signal Regions based on tau decays:**

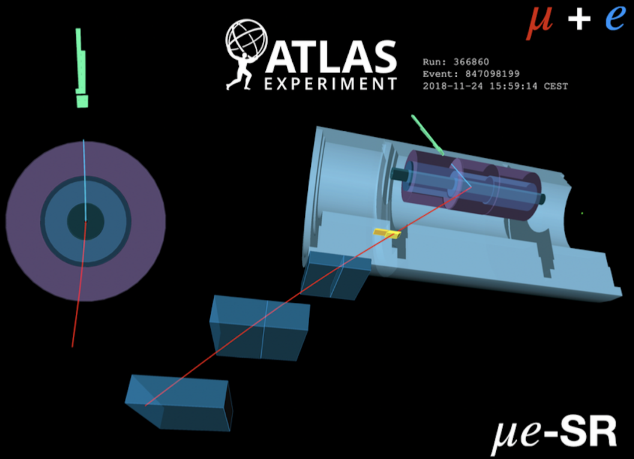




μ + 1 track
ATLAS EXPERIMENT
Run: 365573
Event: 427688094
2018-11-10 00:46:51 CEST
μ1T-SR



μ + 3 track
ATLAS EXPERIMENT
Run: 366268
Event: 3305670439
2018-11-18 16:09:33 CEST
μ3T-SR



μ + e
ATLAS EXPERIMENT
Run: 366860
Event: 847098199
2018-11-24 15:59:14 CEST
μe-SR

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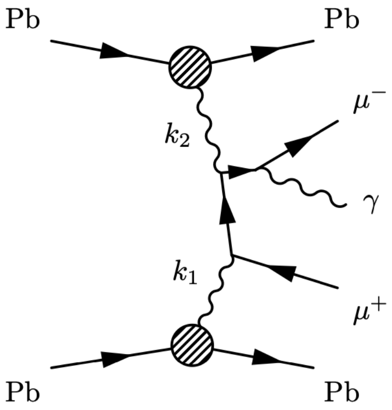
Background modelling

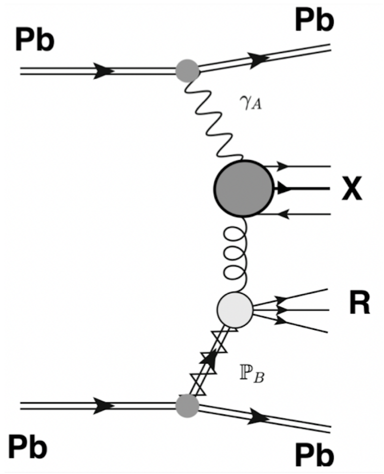
Two sources of background after event selection

Exclusive dimuon production $\gamma\gamma \to \mu\mu(\gamma)$



Estimated using MC +data-driven correction

Diffractive photonuclear particle production

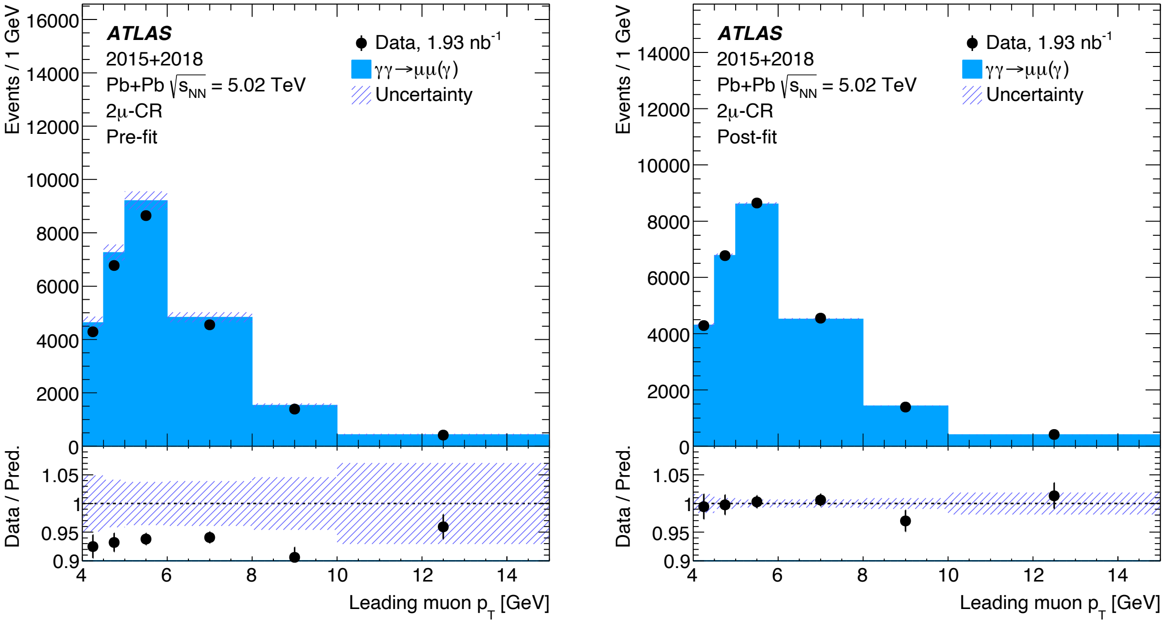


Estimated using fully data-driven method

Photon flux modelling

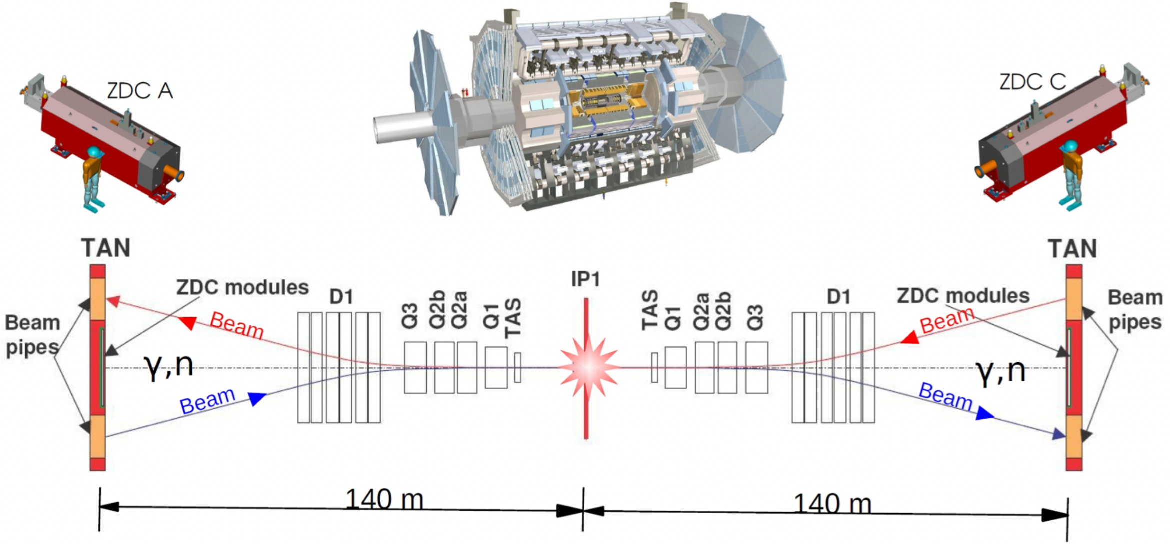
Using dimuon control region

- **Dedicated dimuon control region** → can be used to improve photon flux modelling
- Correct for small discrepancy between data and predictions (~5%) → **Derive additional flat normalisation factor (Global Residual Flux Factor)**



Forward neutrons veto

- **Pb nuclei may break-up** (e.g. Electromagnetic dissociation) → **forward neutrons**
- Use Zero-Degree Calorimeter (ZDC) to detect forward neutrons:

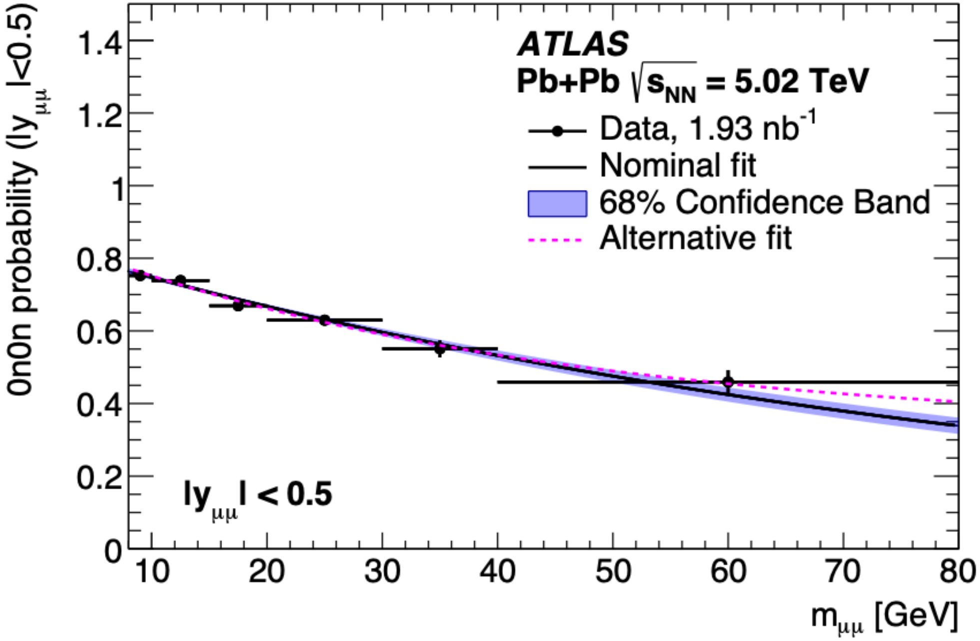


0n0n topology = no forward neutrons detected on the both sides of the ZDC →
Large suppression of photonuclear background!

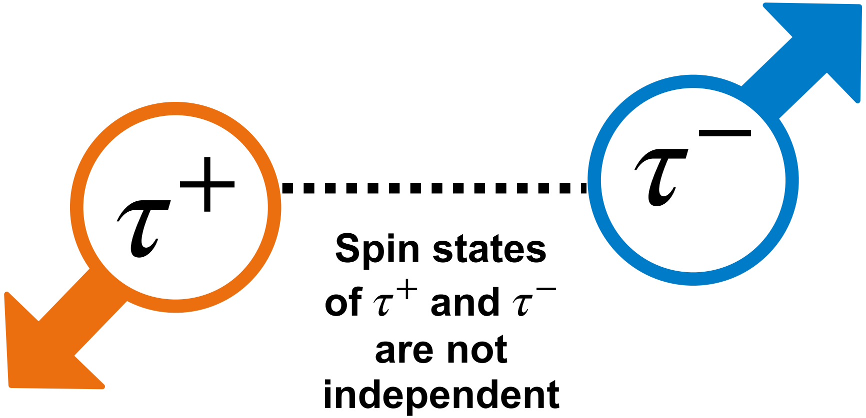
Forward neutrons veto

- **Data:** Zero Degree Calorimeter Energy $E_{ZDC} < 1$ TeV on side A & C
- **MC:** Generated inclusively in neutron topology & ZDC not simulated → **need extra reweighting to emulate 0n0n topology**
- **0n0n fraction:** Data-driven extraction probability using photon-induced dimuon events:

$$\text{0n0n weight} = \frac{(E_{ZDC} < 1\ \text{TeV})}{\text{All events}}$$



Spin Correlations



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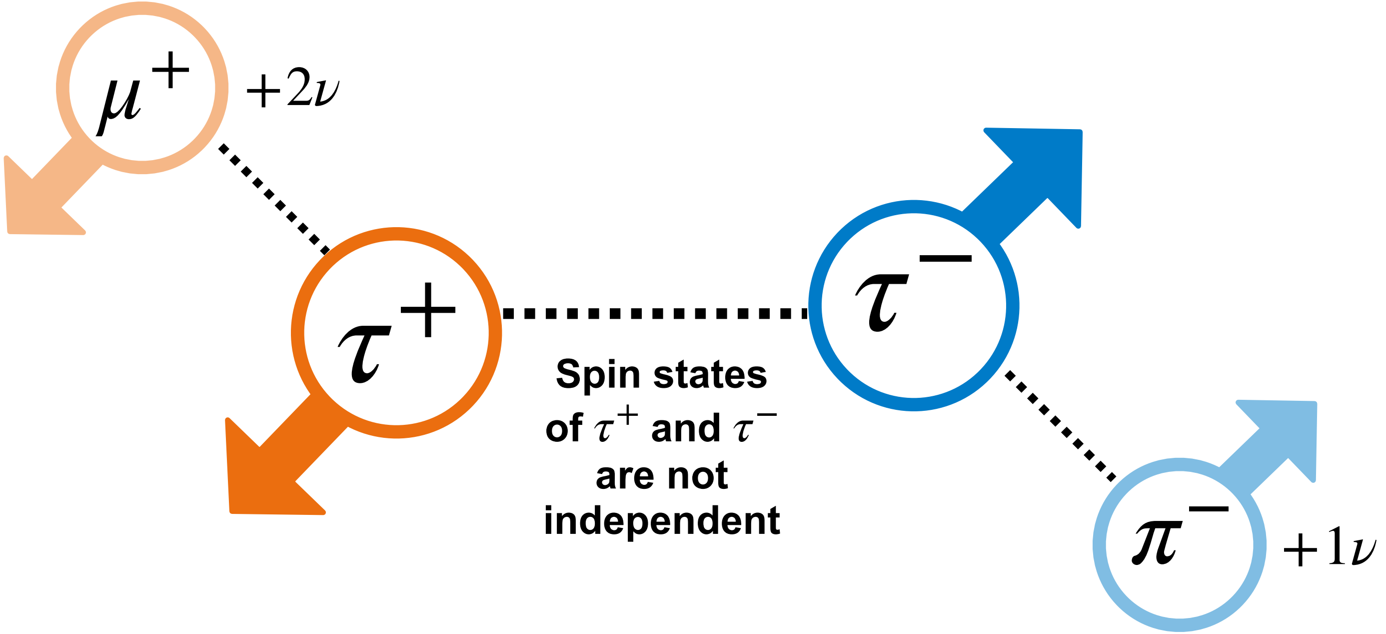
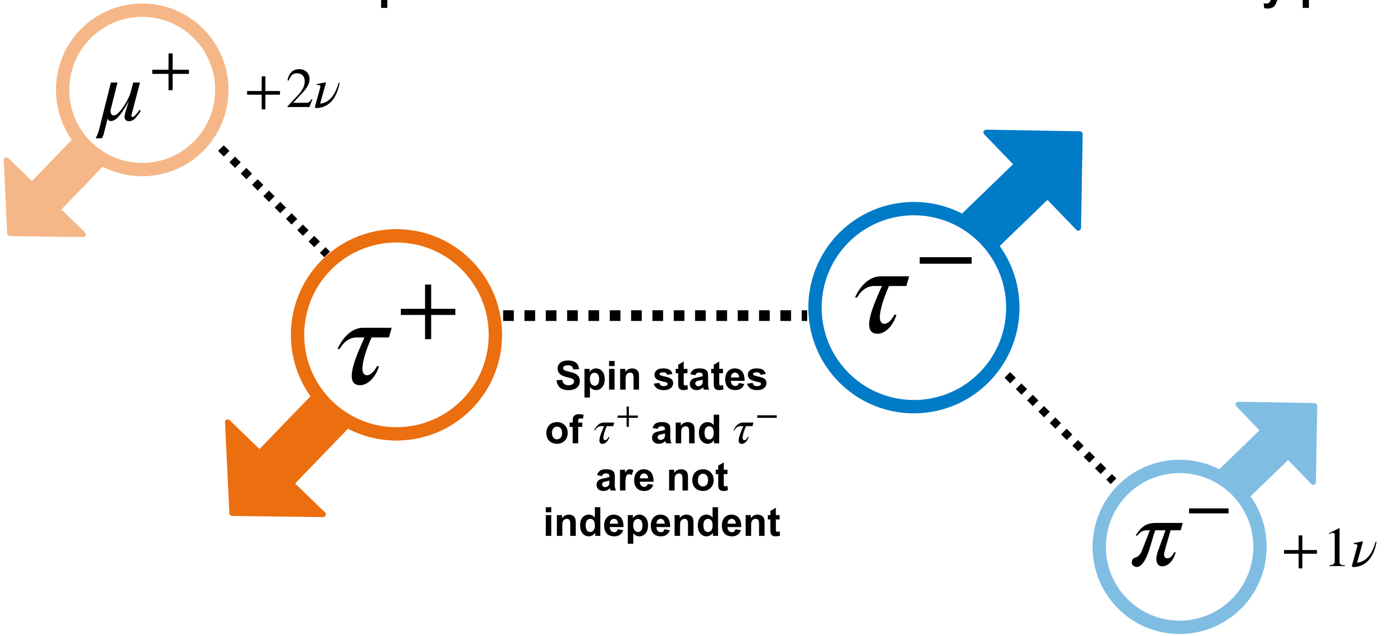


Spin states of τ^+ and τ^- are not independent

Spin Correlations

Spin information is transferred to the decay products



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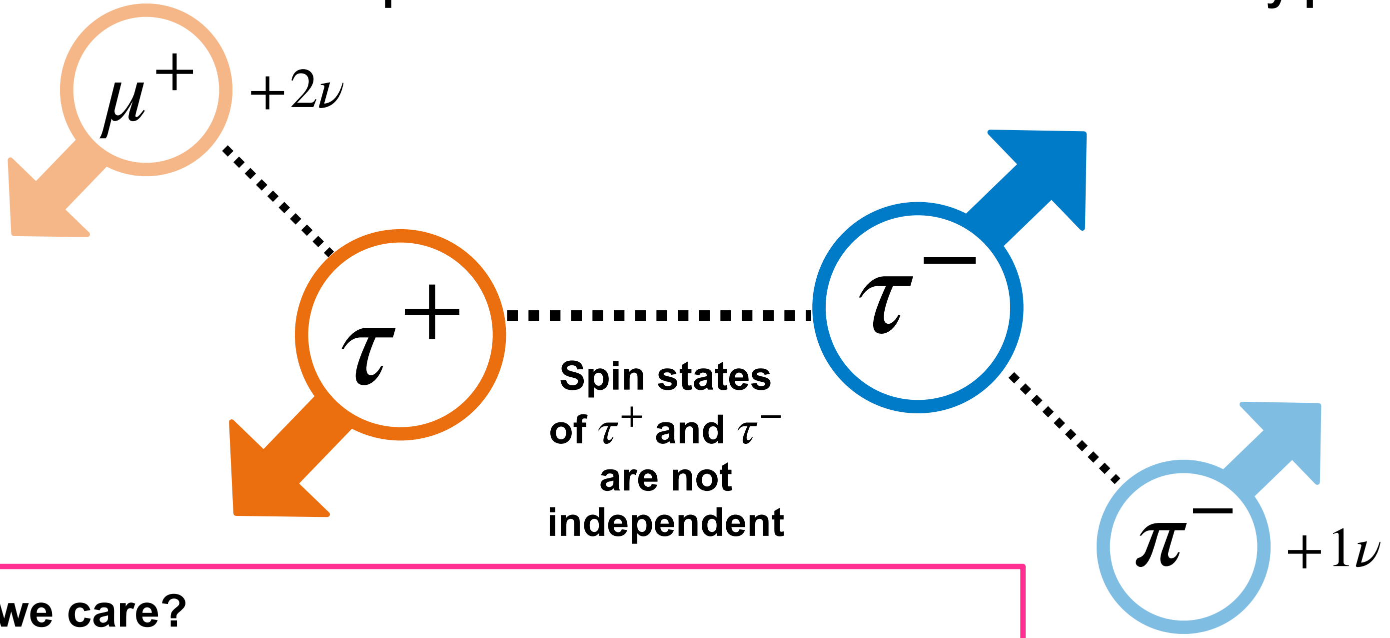


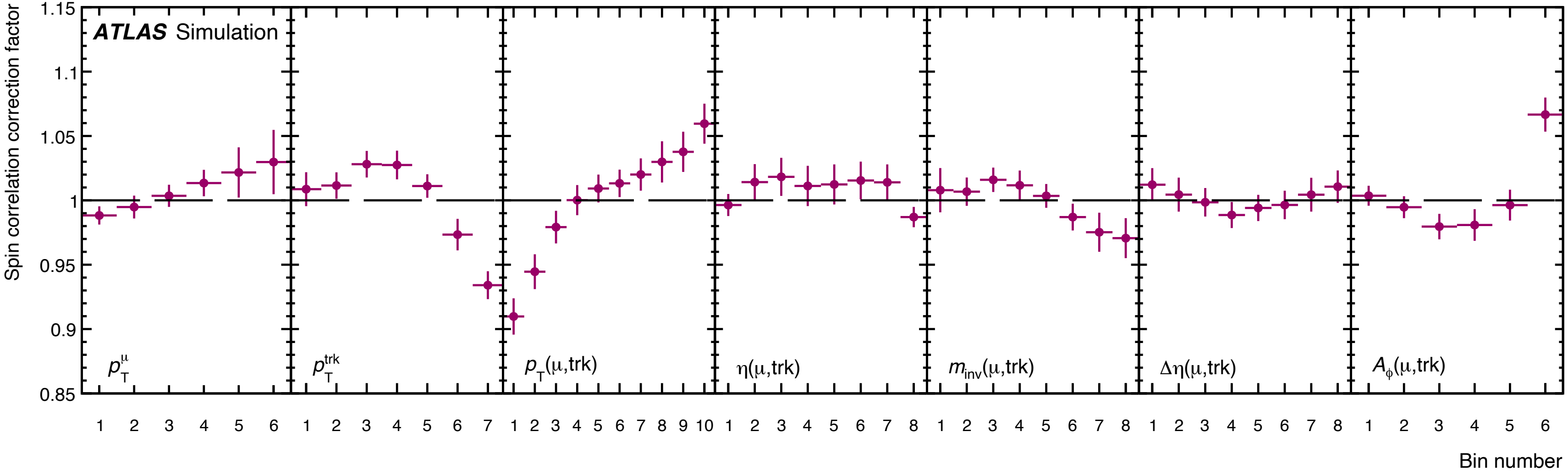
Why do we care?

Affects the kinematic distributions of the decay products

If modelled incorrectly/omitted in MC → bias in the measurement

Spin Correlations

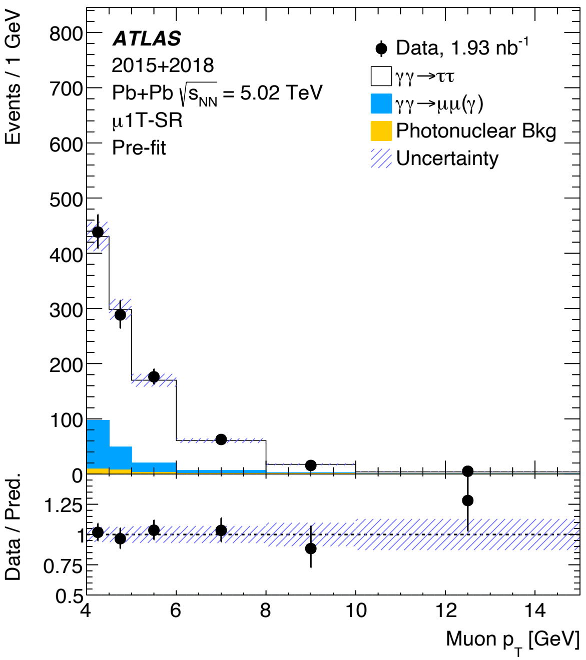
- Found small evidence for spin correlations
- Use MC to investigate the effect on spin correlations across all variables
- Largest impact of 5-10% found in **μ1T-SR for SM predictions → apply corrections**



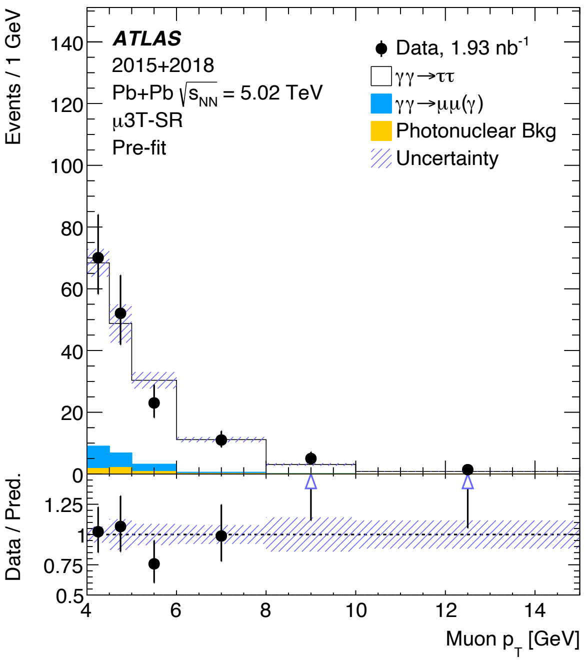
Detector-level distributions

Muon transverse momentum

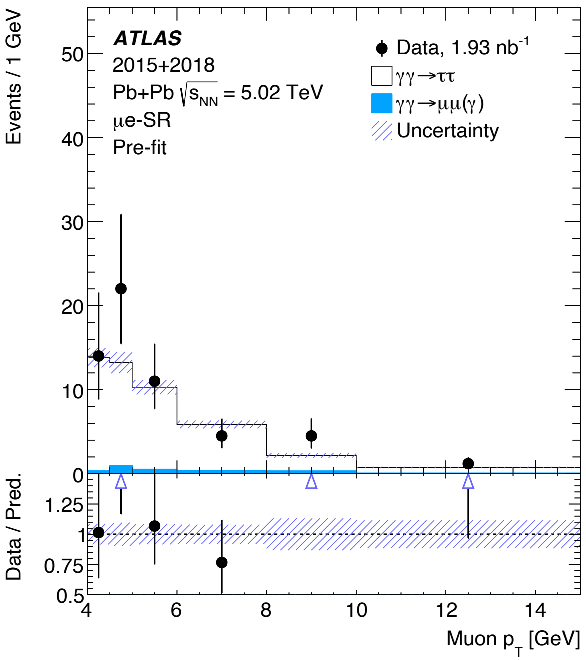
μ1T-SR



μ3T-SR



μe-SR



Outline

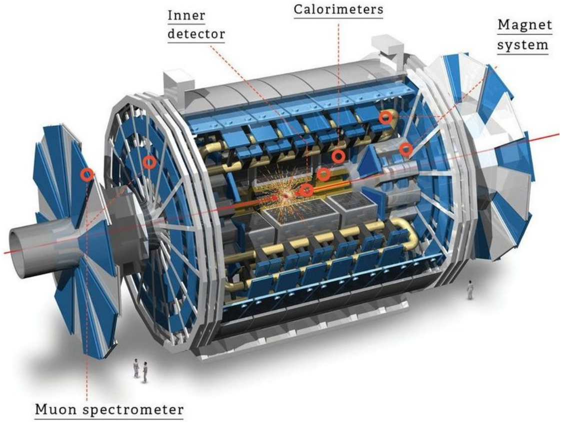
- Motivation
- Experimental Setup
- Analysis strategy
- Modelling
- Differential cross sections
- Extracting tau electromagnetic moments

Unfolding

Correct measured data for detector effects

Detector-level objects
Particles as we measured them.

=



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Truth-level objects
Particles produced in a collision as predicted by a MC generator (**before** any interaction with detector material).

- **Fiducial region**: restricted phase space defined at the **truth level** using kinematic cuts that closely mimic the actual geometric and kinematic reach of the detector
- Use **Bayesian Iterative Unfolding: Uses Bayes' theorem to iteratively improve the estimate of the truth distribution**

Unfolding

Measured variables

- **Use three categories of objects at truth level**
  (truth muons, truth electrons and *truth track particles*)

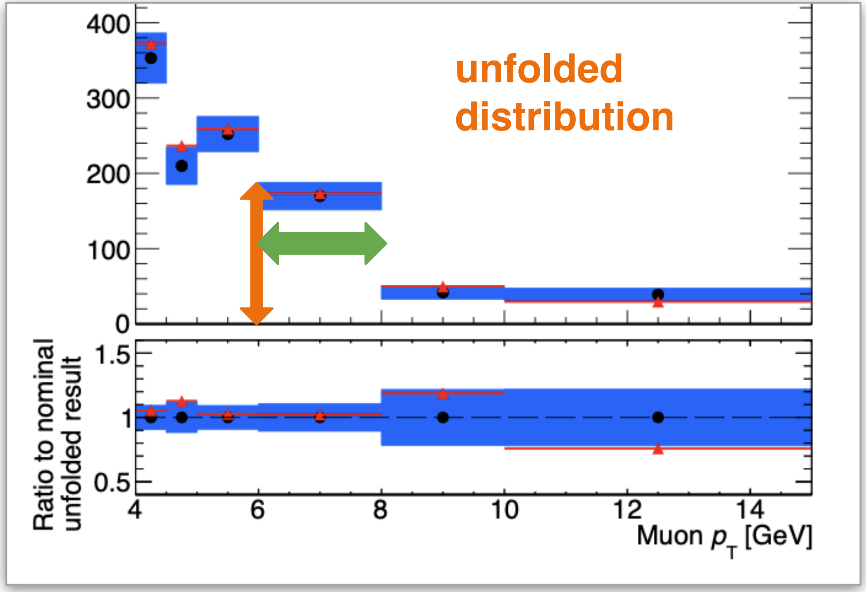
- Unfold 7 variables in each region: **measure 21 differential cross sections!**

Muon p_{T}	p_{T}^{μ}
Track(s)/Electron p_{T}	$p_{\mathrm{T}}^{\mathrm{trk}}$
$p_{\mathrm{T}}\,(\mu, \mathrm{trk(s)}/e)$	$p_{\mathrm{T}}(\mathbf{p}_{\mu} + \mathbf{p}_{\mathrm{trk}})$
$m(\mu, \mathrm{trk(s)}/e)$	$m(\mathbf{p}_{\mu} + \mathbf{p}_{\mathrm{trk}})$
$\eta(\mu, \mathrm{trk(s)}/e)$	$\eta(\mathbf{p}_{\mu} + \mathbf{p}_{\mathrm{trk}})$
$\Delta\eta\,(\mu, \mathrm{trk(s)}/e)$	$\eta_{\mu} - \eta_{\mathrm{trk}}$
$A_{\phi}^{\mu,\mathrm{trk(s)}/e}$	$1 - \left\|\phi_{\mu} - \phi_{\mathrm{trk}}\right\| / \pi$

Differential cross sections

How to calculate it?

Cross-section: measure how likely a certain interaction is to happen
Differential cross-section: how that likelihood changes depending on some variable



The differential cross section with respect to muon transverse momentum:

$$\frac{d\sigma}{dp_T^{\mu}} \approx \frac{1}{\mathcal{L}} \cdot \frac{N_i}{\Delta p_T^i}$$

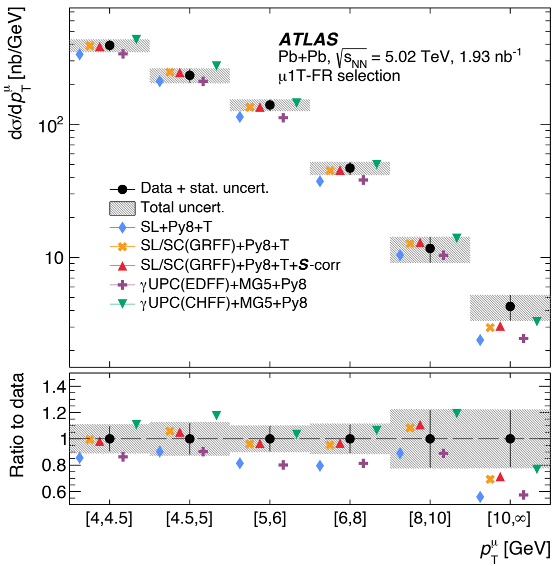
where:

- N - number of events in the p_T bin
- Δp_T - width of the p_T bin
- L - integrated luminosity

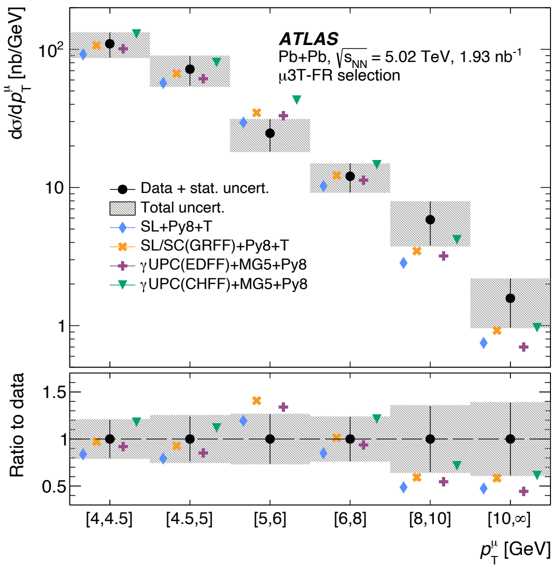
Differential cross sections

Muon transverse momentum

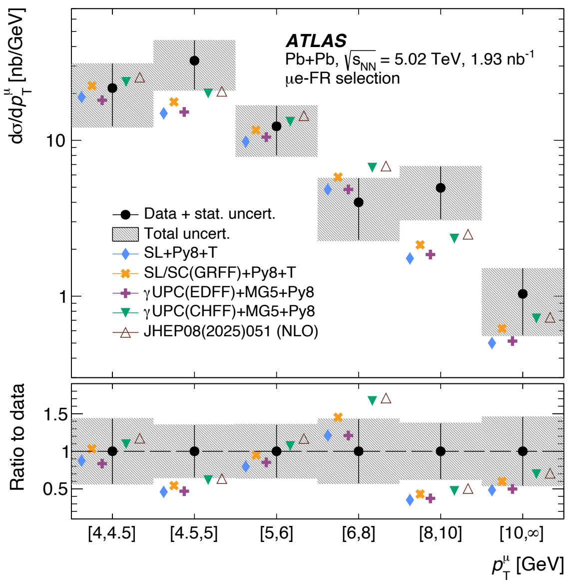
μ1T-FR



μ3T-FR



μe-FR

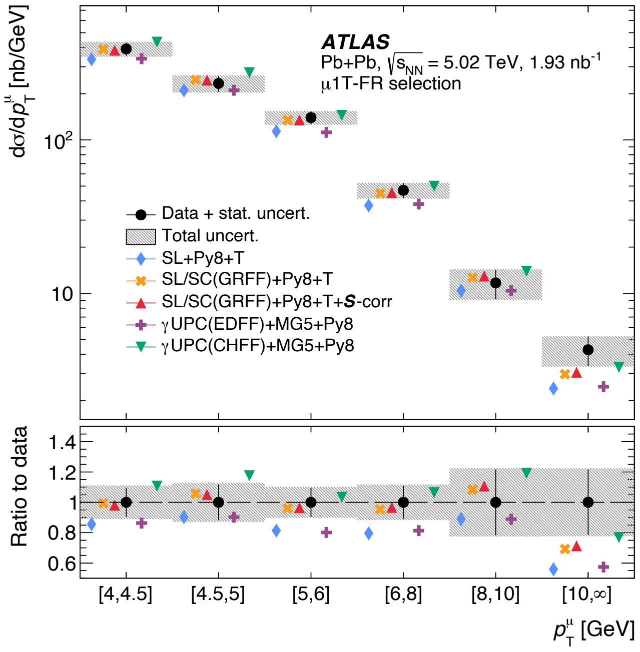


- Statistical uncertainty: ~**10-50%** per bin
- Total systematic uncertainty: ~**5-10%** per bin

- **Reasonable agreement with predictions**

Differential cross sections

Muon transverse momentum

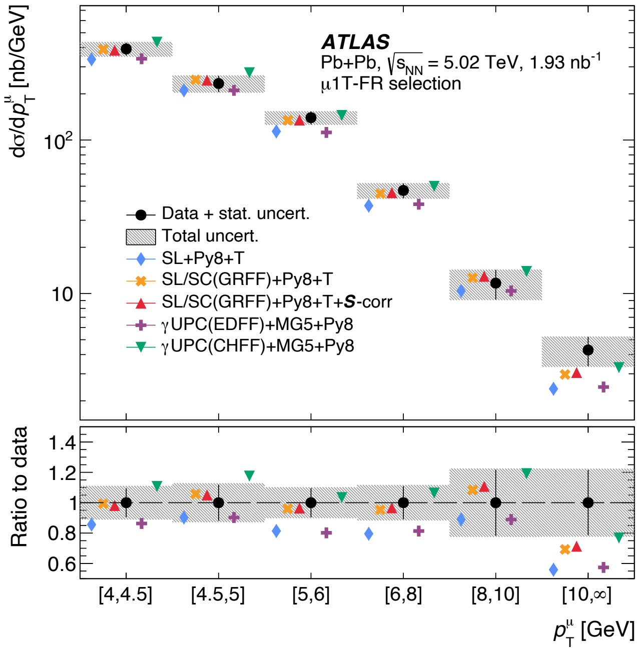


Detailed study of different approaches to photon flux modelling

Differential cross sections

Muon transverse momentum

Data



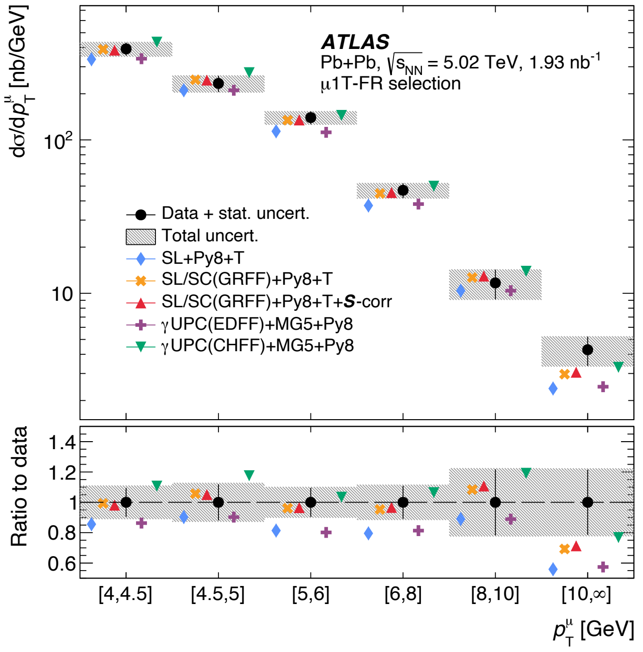
Detailed study of different approaches to photon flux modelling

Differential cross sections

Muon transverse momentum

Data

STARlight + Pythia8 + Tauola
→ Without photon flux reweighting



Detailed study of different approaches to photon flux modelling

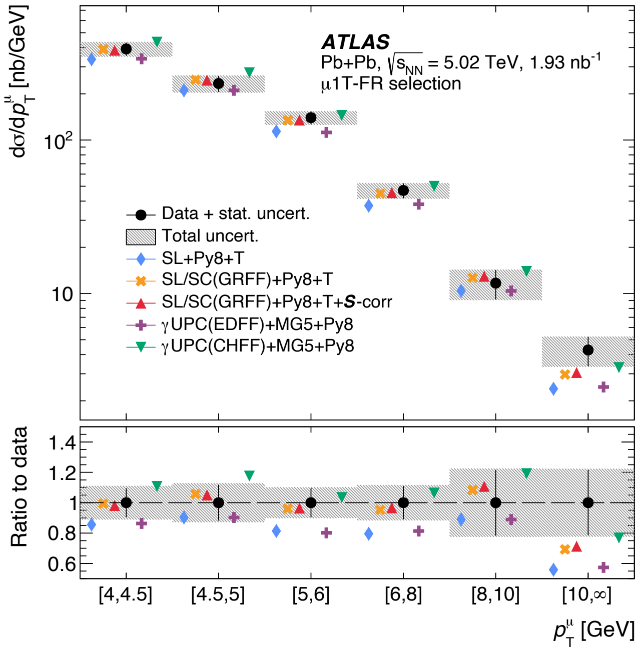
Differential cross sections

Muon transverse momentum

Data

STARlight + Pythia8 + Tauola
→ Without photon flux reweighting

STARlight (SuperChic photon-flux) + Photon Flux Normalisation Factor (GRFF) + Pythia8 + Tauola



Detailed study of different approaches to photon flux modelling

Differential cross sections

Muon transverse momentum

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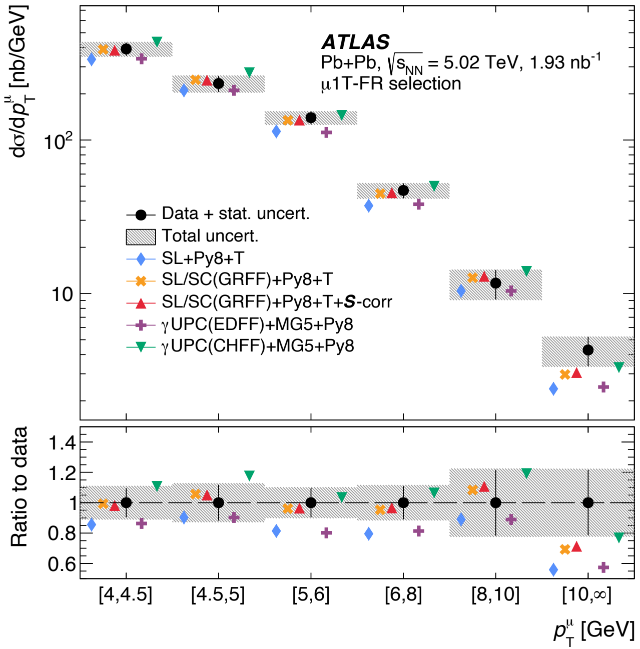
STARlight (SuperChic photon-flux) + Photon Flux Normalisation Factor (GRFF) + Pythia8 + Tauola

STARlight (SuperChic photon-flux) + Photon Flux Normalisation Factor (GRFF) +Pythia8 + Tauola + spin corr correction → Nominal prediction



Detailed study of different approaches to photon flux modelling

Differential cross sections

Muon transverse momentum

Data

STARlight + Pythia8 + Tauola
→ Without photon flux reweighting

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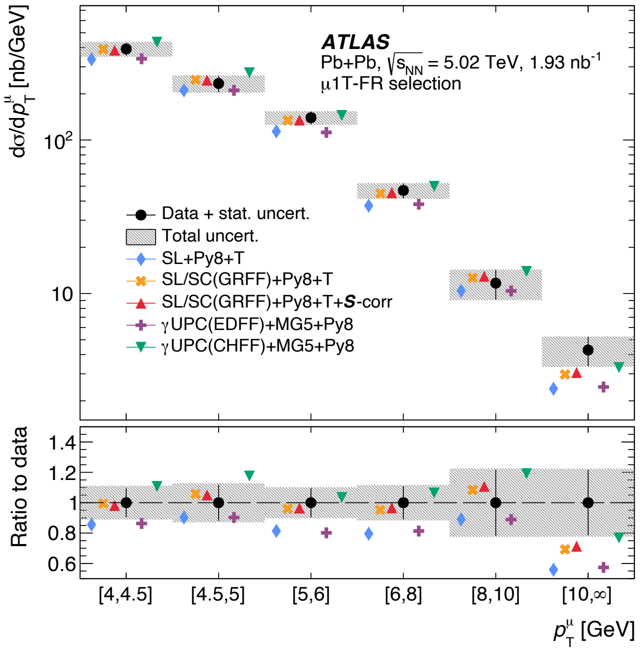
STARlight (SuperChic photon-flux) + Photon Flux Normalisation Factor (GRFF) +Pythia8 + Tauola + spin corr correction → Nominal prediction

gammaUPC (Electric Dipole Form Factor) + Madgraph5 + Pythia8

gammaUPC (Charged Form Factor) + Madgraph5 + Pythia8



Detailed study of different approaches to photon flux modelling

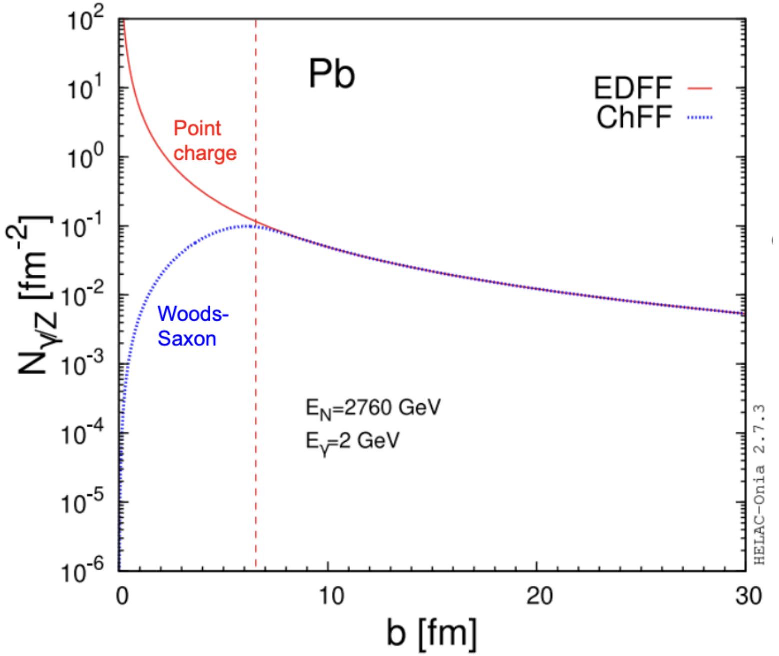
Differential cross sections

Modelling of the photon flux

Photon flux depends on choice of nuclear charge distribution:

- **STARlight**: point-like charge (not physical)
- **SuperChic**: Wood-Saxon distribution

SuperChic is expected to provide more accurate description of the photon flux:



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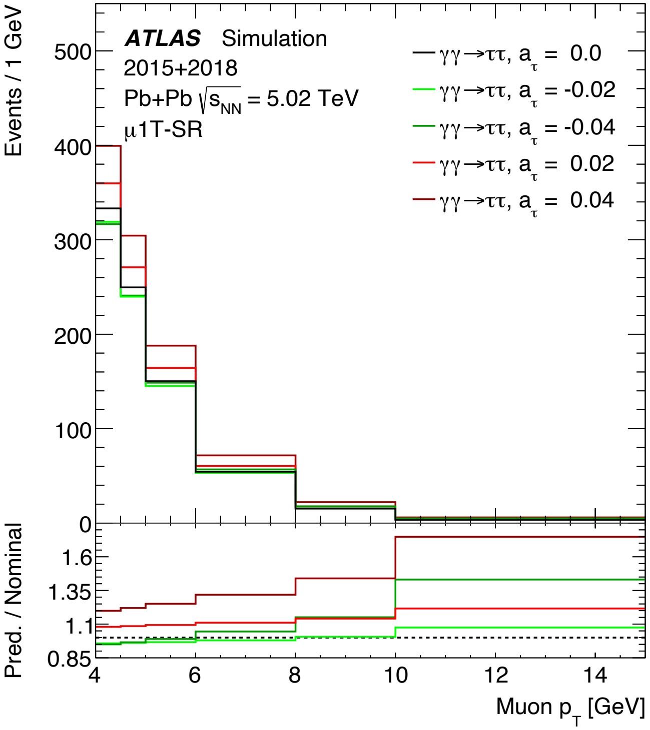
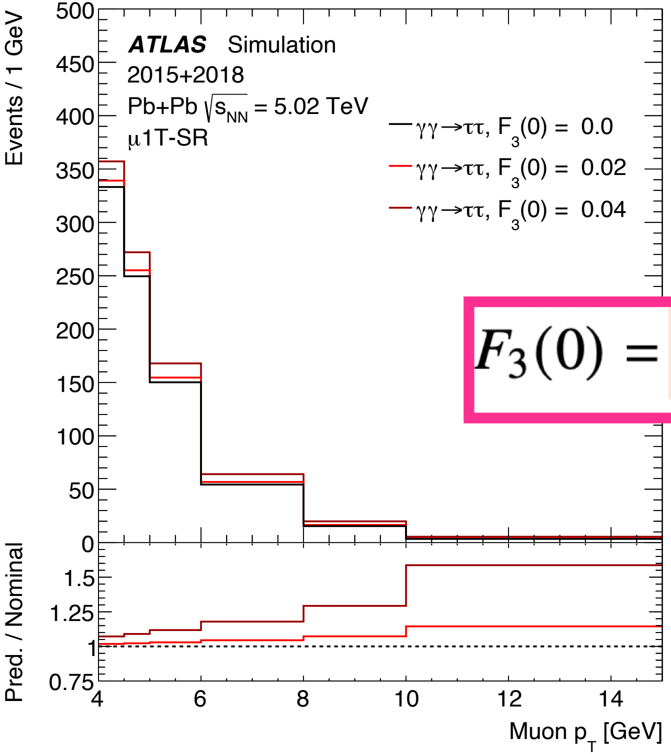
Extracting tau electromagnetic moments

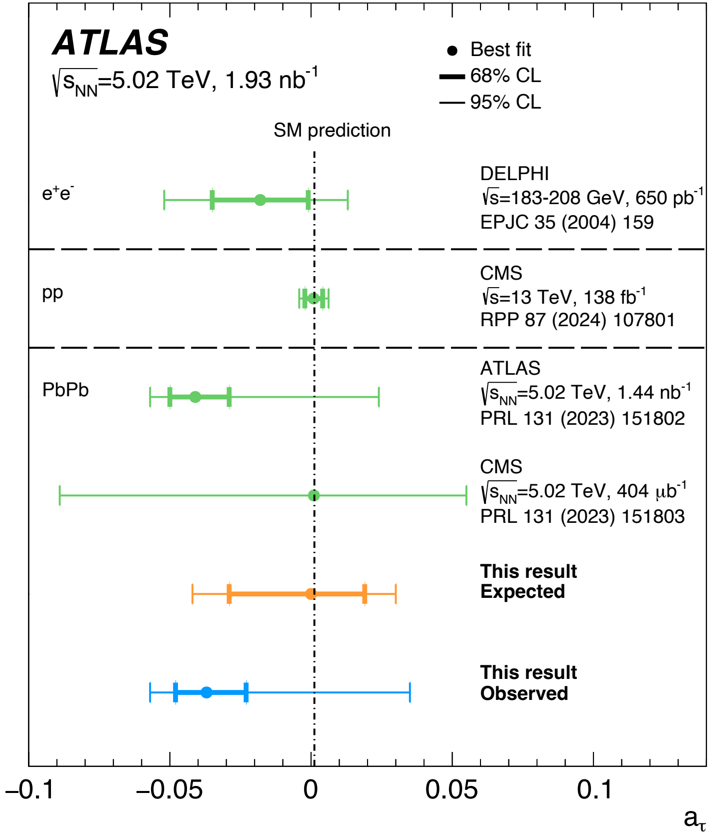
Impact on kinematic distributions





$$F_3(0) = d_\tau \frac{2m_\tau}{e}$$

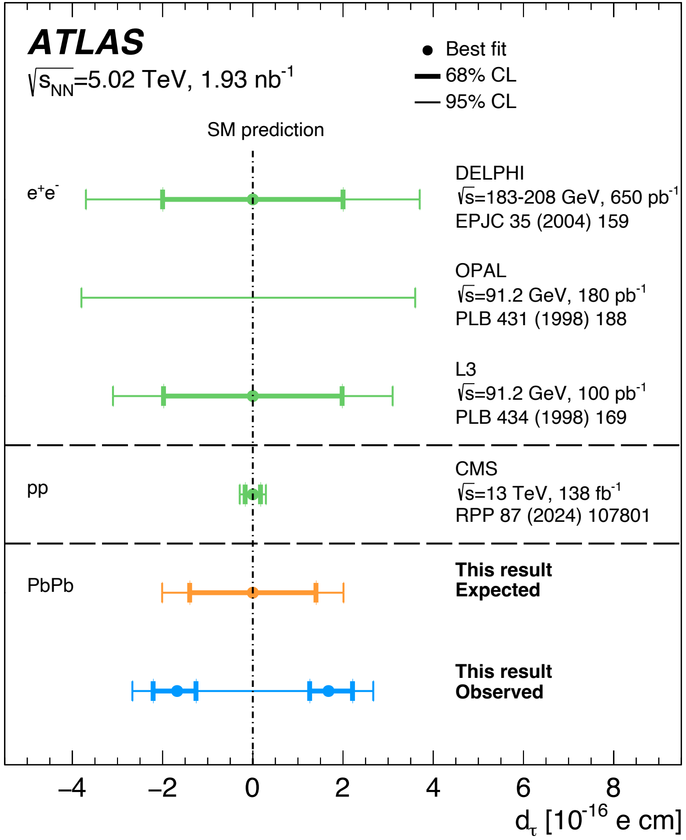
Constraints on a_τ



- Results competitive to previous **ATLAS and CMS measurements in Pb+Pb**
- Surpass the precision of **DELPHI**
- **CMS measurement in p+p** remains the most stringent constraint to date

p+p and Pb+Pb probe complementary phase space
→ p+p probes high-mass region and Pb+Pb probes low-mass region

Constraints on d_τ



- First ATLAS measurement of d_τ
- Improvement comparing to **DELPHI**
- **CMS measurement in p+p** remains the most stringent constraint to date

p+p and Pb+Pb probe complementary phase space
→ p+p probes high-mass region and Pb+Pb probes low-mass region

Summary

- **First differential cross-section measurements of $\gamma\gamma \rightarrow \tau\tau$ in UPC Pb+Pb**
- Measured **21 differential cross sections**: 7 variables in 3 Fiducial Regions
- **a_τ limits are competitive** with previous Pb+Pb measurements
- **First d_τ measurement in ATLAS**
- **Probe complementary phase space** to p+p and independent dataset→ possible future combinations

Thank you!

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Take-home messages

Thank you!

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Take-home messages

1. **Electromagnetic moments of leptons are great tools to test the SM and look for BSM**

Thank you!

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1. **Electromagnetic moments of leptons are great tools to test the SM and look for BSM**
2. **Tau lepton can be more sensitive to BSM due to its higher mass**

Thank you!

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Take-home messages

1. **Electromagnetic moments of leptons are great tools to test the SM and look for BSM**
2. **Tau lepton can be more sensitive to BSM due to its higher mass**
3. **Ultra-peripheral collisions: observe two-photon interactions**

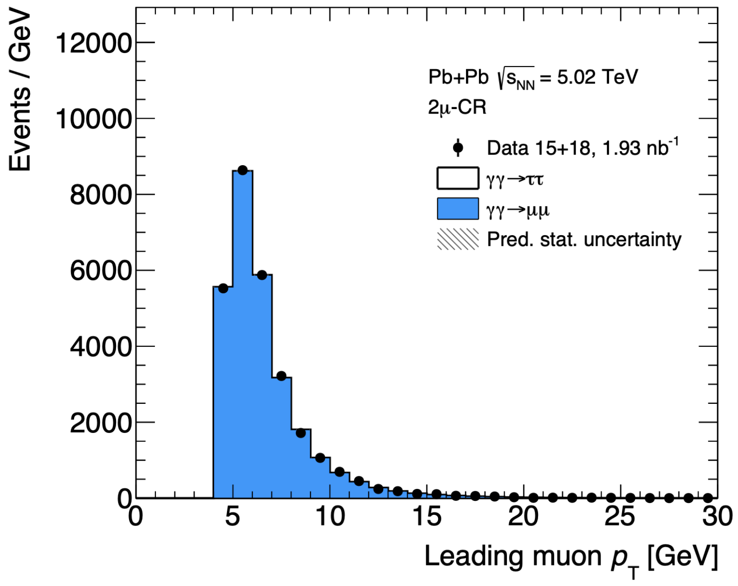
Thank you!

Backup

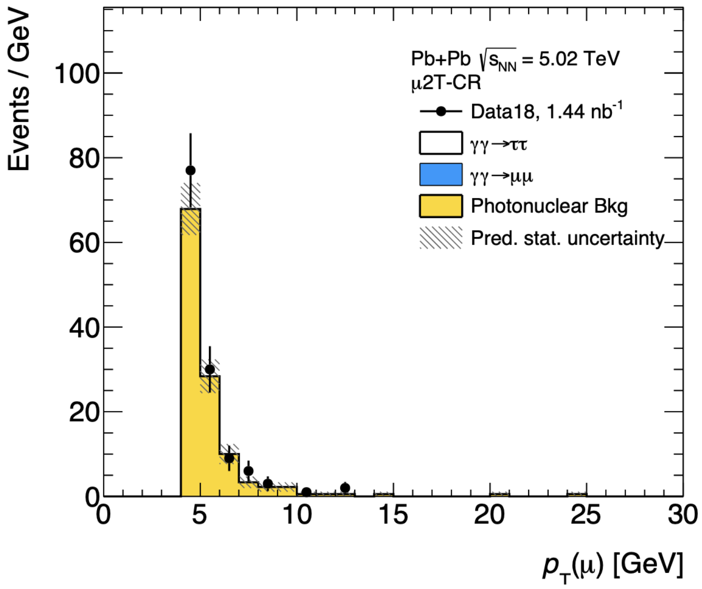
Background modelling

Detector-level distributions in dedicated control regions

Dimuon background

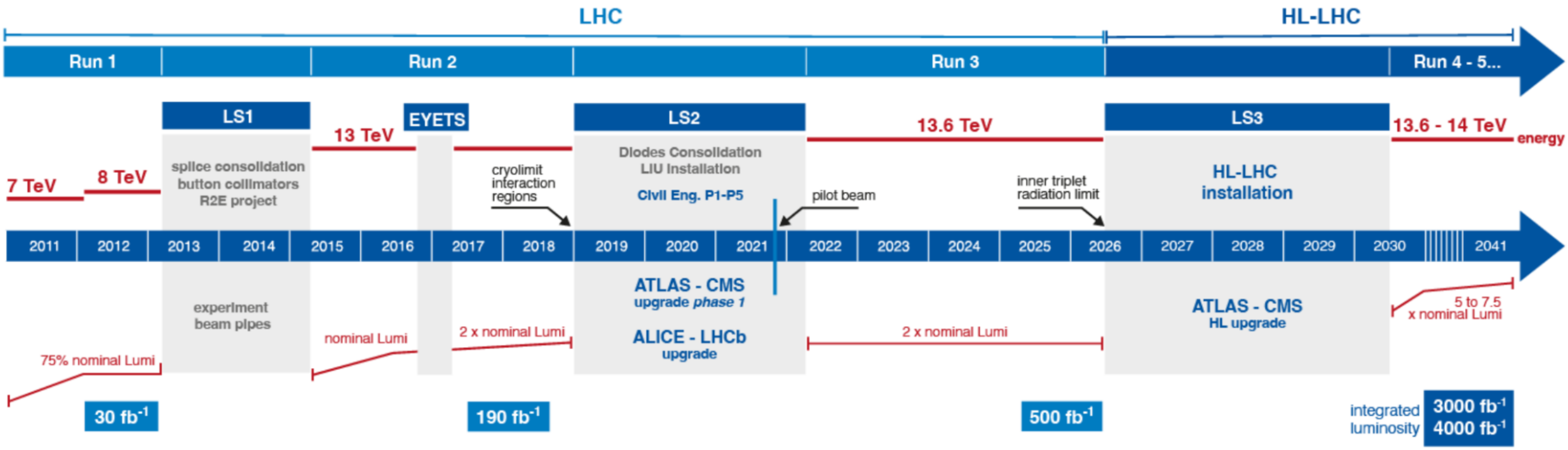


Diffractive photonuclear background

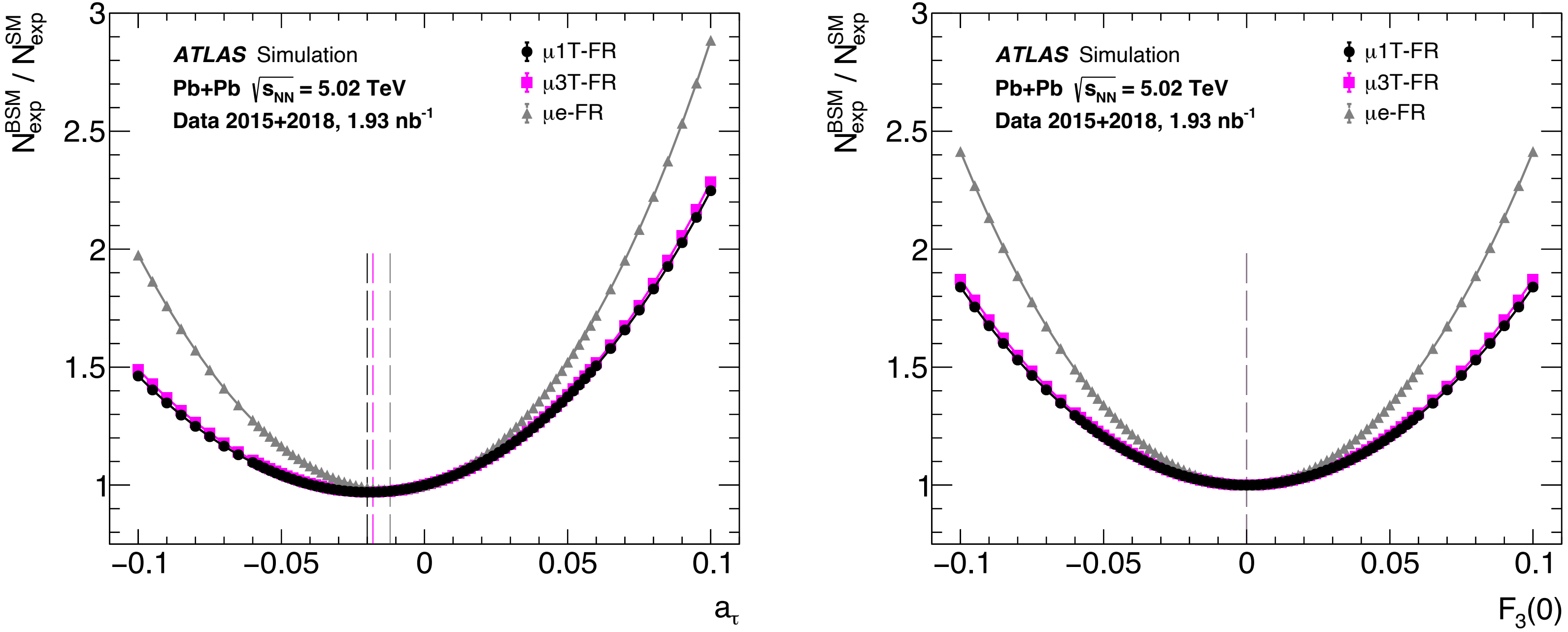


- Good control of each of these backgrounds

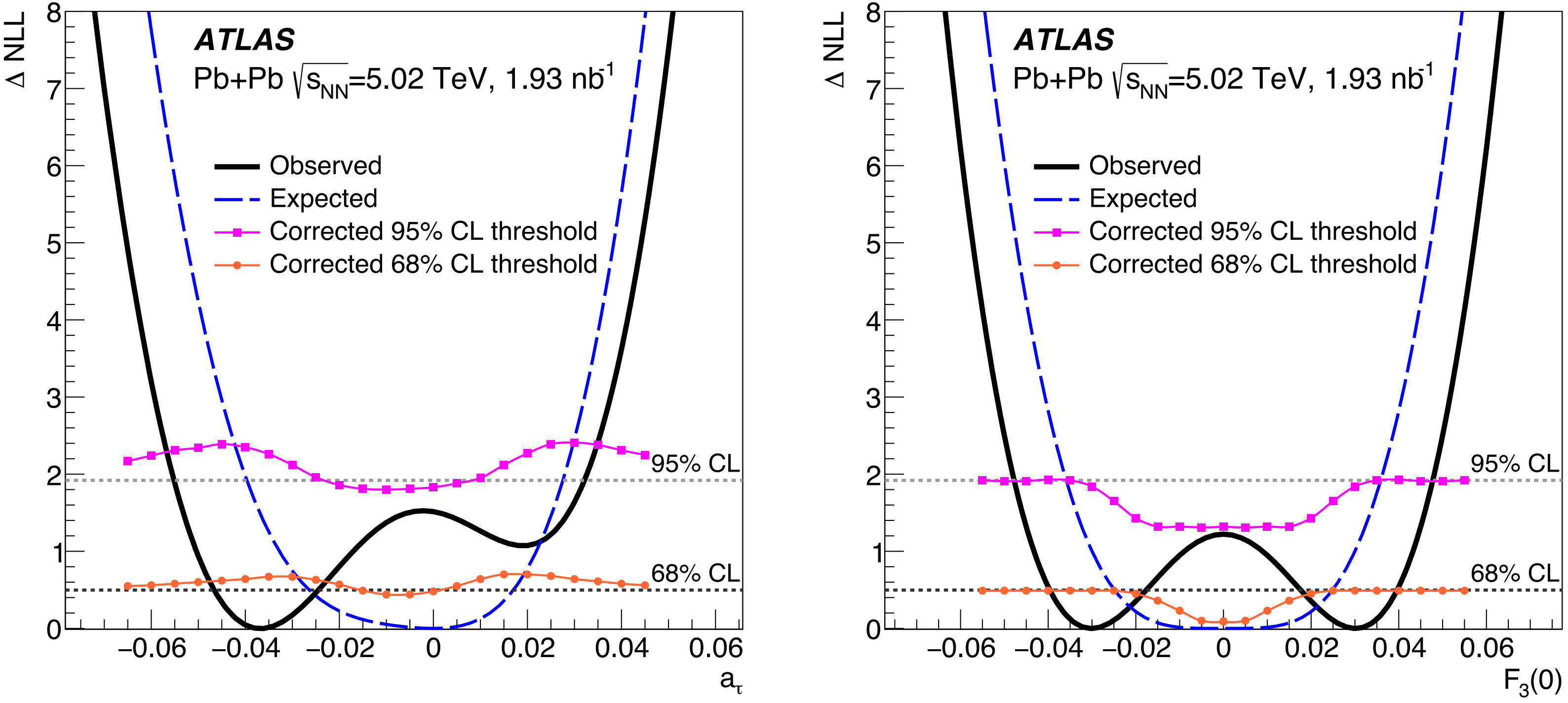
LHC collisions



Yields vs atau and dtau



Fit details



ATLAS
Pb+Pb $\sqrt{s_{NN}}$=5.02 TeV, 1.93 nb^{-1}
Observed
Expected
Corrected 95% CL threshold
Corrected 68% CL threshold
95% CL
68% CL
Δ NLL
a_τ
$F_3(0)$

Object selection

Property	Signal	Baseline
Muons		
Kinematic	$p_T > 4$ GeV, $\lvert\eta\rvert < 2.4$	$p_T > 2$ GeV, $\lvert\eta\rvert < 2.5$
Identification	LowPt	—
Impact parameter	$\lvert d_0\rvert < 0.3$ mm	—
Electrons		
Kinematic	$p_T > 4$ GeV, $\lvert\eta\rvert < 2.47$ (excluding $1.37 < \lvert\eta\rvert < 1.52$)	—
Identification	LHLoose	—
Object Quality (OQ)	Good	—
Impact parameter	$\lvert d_0\rvert < 0.5$ mm	—
Tracks		
Kinematic	$p_T > 100$ MeV, $\lvert\eta\rvert < 2.5$	—
Reconstruction	Loose Primary	—
Impact parameter	$\lvert d_0\rvert < 1.5$ mm	—
Photons		
Kinematic	$p_T > 1.5$ GeV, $\lvert\eta\rvert < 2.37$ (excluding $1.37 < \lvert\eta\rvert < 1.52$)	—
Identification	Author, NN_PID	—
Object Quality (OQ) and Cleaning	Good	—
Cleaning	pass OQ quality	—
TopoClusters		
Kinematic	$p_T > 1$ GeV for $\lvert\eta\rvert < 2.5$ $p_T > 0.1$ GeV for $2.5 < \lvert\eta\rvert < 4.9$	—
Quality	pass TopoSigCut pass HotspotCleaning	—

Event selection

Observable	Preselection
GRL	Pass
$E_{\mathrm{ZDC}}^{A,C}$	< 1 TeV
Trigger	HLT_mb_sptrk_vetombts2in_L1MU0_VTE50 for 2015 data or HLT_mu4_hi_upc_FgapAC3_L1MU4_VTE50 for 2018 data

Region	1M1T SR	1M3T SR	1M1E SR	2M CR
$N_{\mu}^{\mathrm{baseline}}$	$= 1$	$= 1$	—	—
N_{μ}^{sig}	$= 1$	$= 1$	$= 1$	$= 2$
N_{e}^{sig}	$= 0$	$= 0$	$= 1$	—
N_{trk} ($\Delta R > 0.1$ from μ^{sig})	$= 1$	$= 3$	—	—
N_{trk} ($\Delta R > 0.1$ from ℓ^{sig})	—	—	$= 0$	$= 0$
$N_{\mathrm{clust}}^{\mathrm{unmatched}}$	$= 0$	$= 0$	—	—
$\sum_i q_i$	$= 0$	$= 0$	$= 0$	—
$p_{\mathrm{T}}^{(\mu,\mathrm{trk})}$	> 1 GeV	—	—	—
$p_{\mathrm{T}}^{(\mu,\mathrm{trk},\gamma)}$	> 1 GeV	—	—	—
$p_{\mathrm{T}}^{(\mu,\mathrm{trk},\mathrm{cluster})}$	> 1 GeV	—	—	—
m_{trks}	—	< 1.7 GeV	—	—
$A_{\phi}^{\mu,\mathrm{trk(s)}}$	< 0.4	< 0.2	—	—
$m_{\mu\mu}$	—	—	—	> 11 GeV

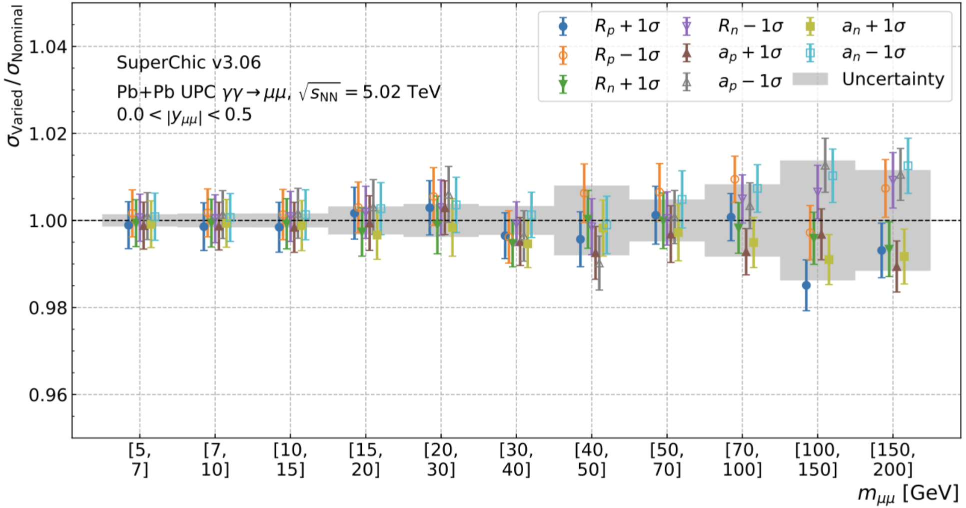
Photon flux modelling

Improved photon flux systematic uncertainty

- Use STARlight photon flux reweighted to SuperChic
- Vary relevant Woods-Saxon density parameters in SuperChic to define photon flux modelling uncertainty

Look at change in yy→dimuon cross section as a function of invariant mass in bins of rapidity.

Additionally: Add a separate **flat 2.5%** on the total cross section for dimuon, dielectron & ditau due to survival factor modelling.



Unfolding

Truth Objects and Fiducial Region definition

- **Unfolding:** procedure used to correct measured data for detector effects
- **Use three categories of objects at truth level** (truth muons, truth electrons and *truth track particles*)
- **Define Fiducial Region**: similar to object & signal region selections at reconstructed level
- Use **Bayesian Iterative Unfolding**

Object	Truth Muons	Truth Electrons	Truth Hadrons	Truth Low-p_T Leptons
Kinematic cuts	$p_T > 4$ GeV $\|\eta\| < 2.5$	$p_T > 4$ GeV $\|\eta\| < 2.5$	$p_T > 100$ MeV $\|\eta\| < 2.5$	100 MeV $< p_T <$ 4 GeV $\|\eta\| < 2.5$

Region	μ1T-FR	μ3T-FR	μe-FR
N_{μ}^{sig}	$= 1$	$= 1$	$= 1$
N_{e}^{sig}	$= 0$	$= 0$	$= 1$
$N_{trk}(\Delta R > 0.1 \text{ from } \mu^{sig})$	$= 1$	$= 3$	—
$N_{trk}(\Delta R > 0.1 \text{ from } \ell^{sig})$	—	—	$= 0$
$\sum_i q_i$	$= 0$	$= 0$	$= 0$
$p_T^{(\mu,trk)}$	> 1 GeV	—	—
m_{trks}	—	< 1.7 GeV	—
$A_{\phi}^{\mu,trk(s)}$	< 0.4	< 0.2	—

Unfolding procedure

- remove detector effects (resolution, smearing etc.) from the observed data
- determination of particle-level differential cross sections

We use Iterative Bayesian Unfolding (IBU) as the unfolding method

- formulate migration matrix using cause (C) and effect (E):

$$\begin{array}{c} S_i = \sum_j R_{ij} T_j \\ U_i = \sum_j \left(R^{-1}\right)_{ij} D_j \end{array} \rightarrow \begin{array}{c} S_i = \sum_j P\left(E_i | C_j\right) T_j \\ U_i = \sum_j P\left(C_i | E_j\right) D_j \end{array}$$

i,j - bin indices, **S** - signal reco, **T** - signal truth, **D** - data, **U** - unfolded distributions, **R** - migration matrix

- **$P(C_i|E_j)$** - unknown, determined using Bayes theorem:

$$P\left(C_i | E_j\right) = \frac{P\left(E_j | C_i\right) \Pr\left(C_i\right)}{\sum_k P\left(E_j | C_k\right) \Pr\left(C_k\right)}$$

Pr() - prior, initial prior = MC truth distribution, iterated priors = unfolding result from previous unfolding iteration

Differential cross sections

Muon-track transverse momentum