PARTONS project and predictions for future GPD programme at COMPASS

Paweł Sznajder (on behalf of PARTONS Collaboration)

Institut de Physique Nucléaire, Orsay
National Centre for Nuclear Research, Warsaw

IWHSS'16 Workshop, Seeon

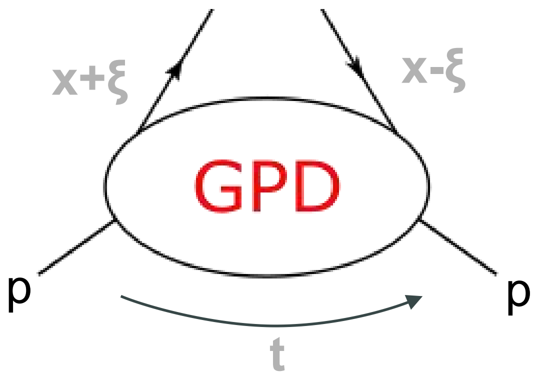
OUTLINE

- Motivation
- Introduction to PARTONS project
- Content and performance
- Predictions for future GPD programme at COMPASS
- Summary

GPDs (Generalized Parton Distributions)

- 3D functions describing partonic structure of nucleon
- Each one defined for specific parton and specific helicity configuration
- Studied in various experimental channels
- pQCD involved

handbag diagram:

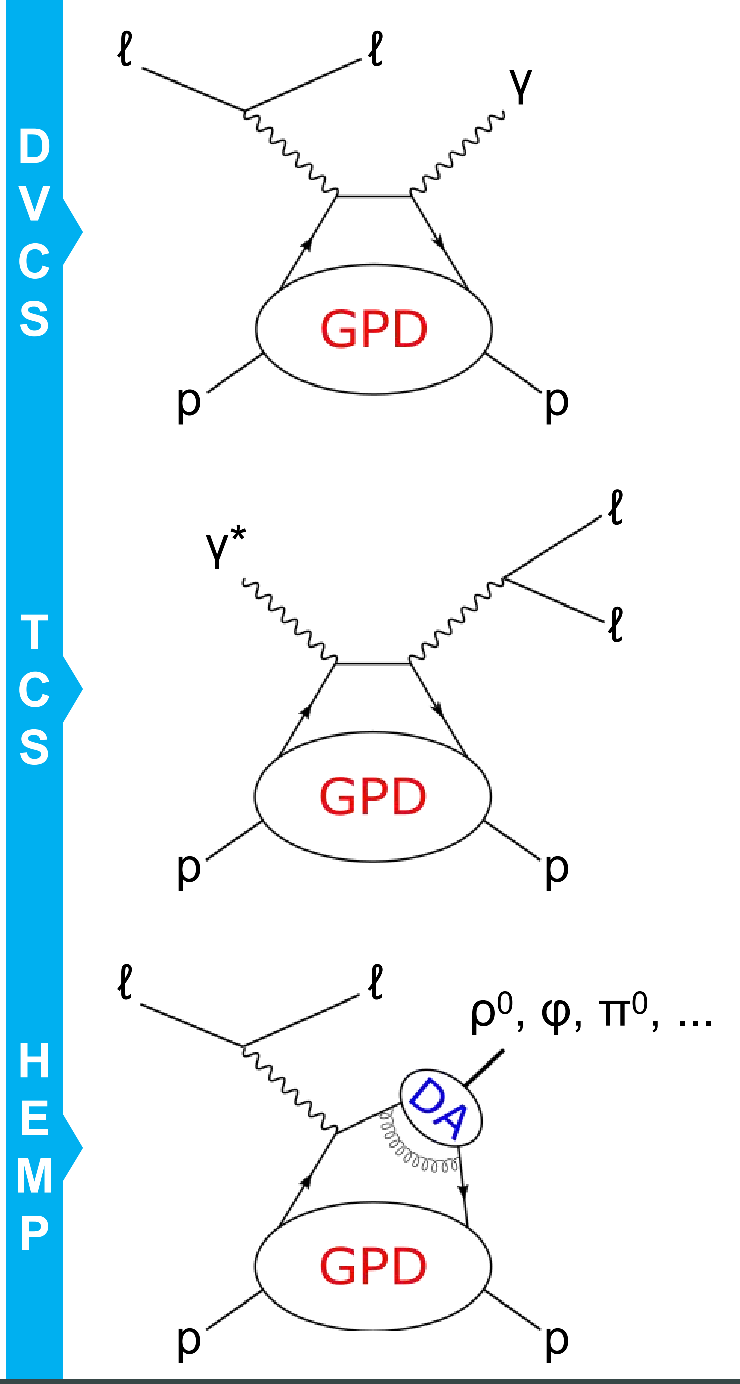


chiral-even GPDs:

$H^{g,q}(x, \xi, t)$	$E^{g,q}(x, \xi, t)$	*for sum over parton helicities*
$\widetilde{H}^{g,q}(x, \xi, t)$	$\widetilde{E}^{g,q}(x, \xi, t)$	*for difference over parton helicities*
nucleon helicity conserved	*nucleon helicity changed*	

GPDs (Generalized Parton Distributions)

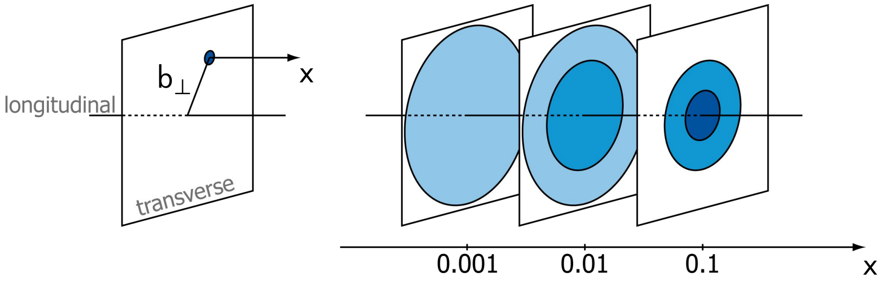
- 3D functions describing partonic structure of nucleon
- Each one defined for specific parton and specific helicity configuration
- Studied in various experimental channels
- pQCD involved



GPDs (Generalized Parton Distributions)

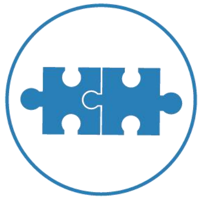
- Nucleon tomography

$$q(x, \mathbf{b}_\perp^2) = \int \frac{d^2\mathbf{\Delta}}{4\pi^2} e^{-i\mathbf{b}_\perp \cdot \mathbf{\Delta}} H^q(x, 0, t = -\mathbf{\Delta}^2)$$

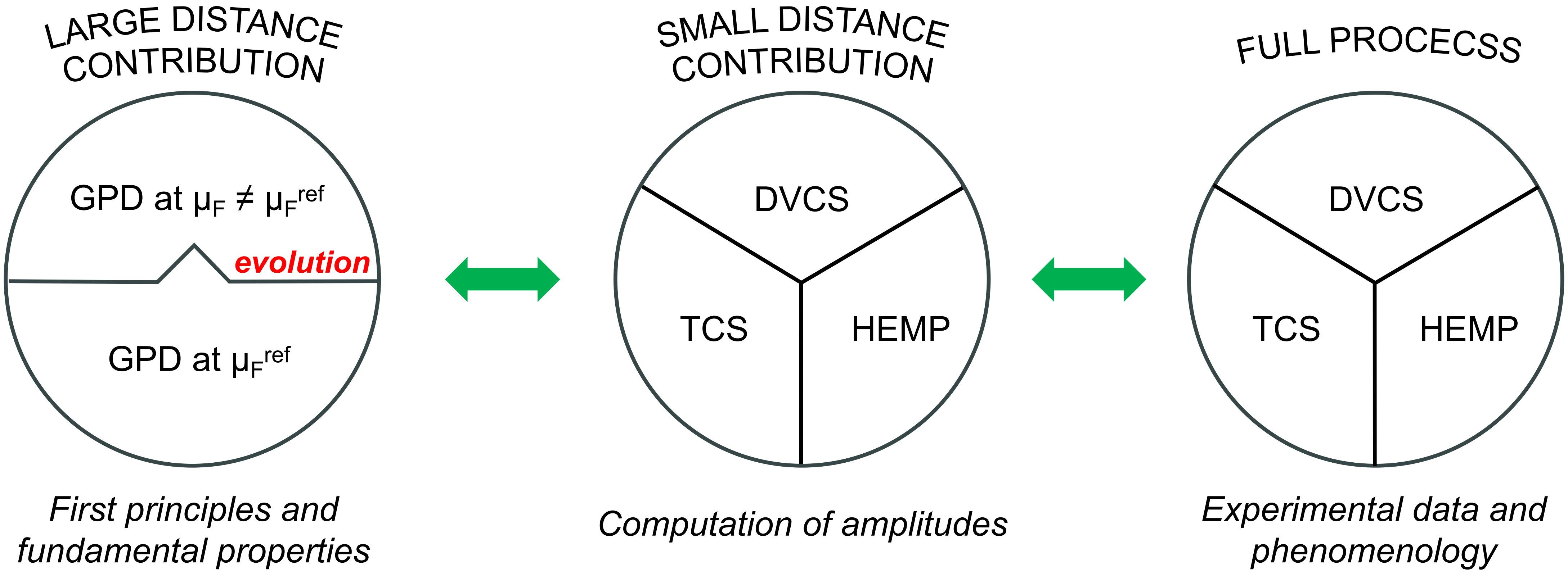


- Total angular momentum

$$\int_{-1}^{1} dx \; x \left[H^q(x, \xi, 0) + E^q(x, \xi, 0)\right] = 2J_q$$



$S_p = 1/2$



Tasks and challenges:

- Physical models
- Perturbative approximations
- Many observables
- Numerical methods
- Accuracy and speed
- Fits

PARTONS (PARtonic Tomography Of Nucleon Software)

B. Berthou (Irfu), D. Binosi(ECT*), N. Chouika (Irfu), L. Colaneri (IPNO/U.Conn.), M. Guidal (IPNO), K. Joo (U. Conn), P. Lafitte (ECP), C. Mezrag (Argonne), H. Moutarde (Irfu), F. Sabatie (Irfu), P. Sznajder (IPNO), P. Rodríguez Quintero (UHU), J. Wagner (NCBJ Warsaw)

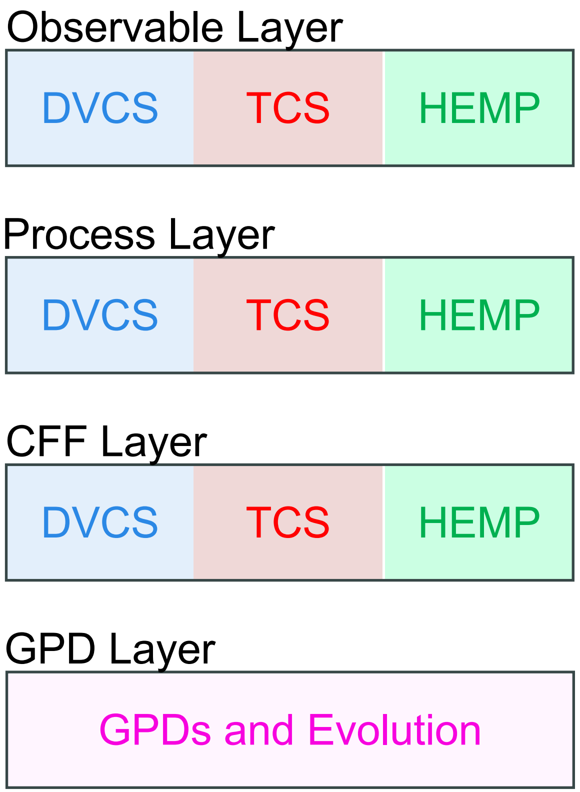
Layered structure:

- one layer = collection of objects designed for common purpose
- one module = one physical development
- operations on modules provided by Services, e.g. for GPD Layer

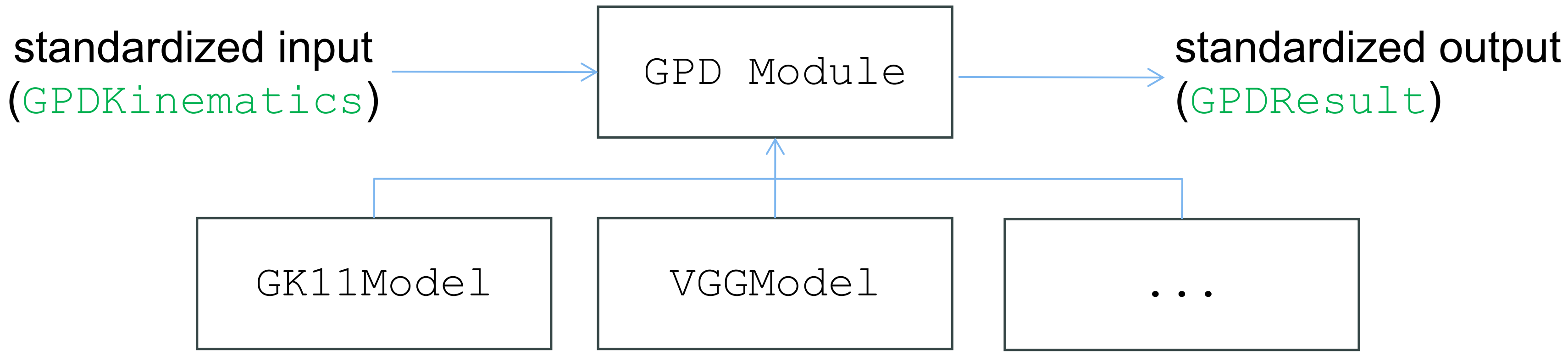
```
GPDResult computeGPDModel
        (const GPDKinematic& gpdKinematic, GPDModule* pGPDModule) const;
GPDResult computeGPDModelRestrictedByGPDType
        (const GPDKinematic& gpdKinematic, GPDModule* pGPDModule,
        GPDType::Type gpdType) const;
GPDResult computeGPDModelWithEvolution
        (const GPDKinematic& gpdKinematic, GPDModule* pGPDModule,
        GPDEvolutionModule* pEvolQCDModule) const;
...
```

- what can be automated is automated
- features improving calculation speed

  e.g. CFF Layer Service stores the last calculated values



Standardized objects:



- benefiting from C++ inheritance and polymorphism mechanisms
- reduction of mistake probability
- adding new modules as easy as possible

C++ interface or ...

```
// Retrieve GPD service
GPDService* pGPDService =
        Partons::getInstance()->getServiceObjectRegistry()->getGPDService();

// Load GPD module with BaseModuleFactory
GPDModule* pGPDModel =
        Partons::getInstance()->getModuleObjectFactory()->newGPDModule(
                GK11Model::classId);

// Create GPDKinematic(x, xi, t, MuF2, MuR2) to compute
GPDKinematic gpdKinematic(1.E-1, 1.E-2, -0.4, 2., 2.);

// Perform the calculation
GPDResult gpdResult = pGPDService->computeGPDModelRestrictedByGPDType(
        gpdKinematic, pGPDModel, GPDType::H);

// Print result
std::cout << gpdResult.toString() << std::endl;
```

```
> GPD_H
GluonDistribution = 0.47903750855896859
u = 2.75476      u(+) = 3.13425    u(-) = 2.37528
d = 1.66197      d(+) = 2.04145    d(-) = 1.28248
s = 0.183929     s(+) = 0.367857   s(-) = 0
```

XML interface (the best way to manage your computations)

```
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>

<scenario date="2016-03-25" description="Example: computation of one GPD model without evolution">

    <task service="GPDService" method="computeGPDModel" storeInDB="0">

        <kinematics type="GPDKinematic">
            <param name="x" value="1.E-1" />
            <param name="xi" value="1.E-2" />
            <param name="t" value="-0.4" />
            <param name="MuF2" value="2." />
            <param name="MuR2" value="2." />
        </kinematics>

        <computation_configuration>
            <module type="GPDModule">
                <param name="className" value="GK11Model" />
            </module>
        </computation_configuration>

    </task>

</scenario>
```

Database

- Result computed by each layer can be stored/retrieved from database

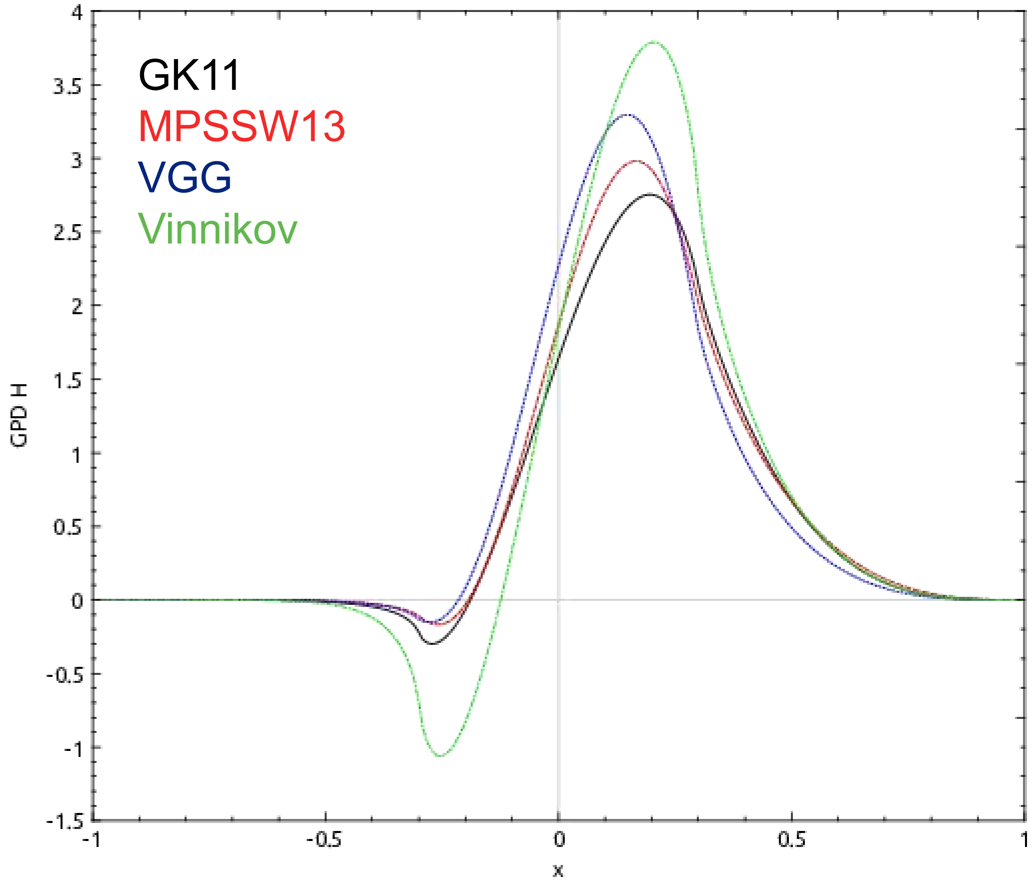
```
// Retrieve GPD DAO service
GPDResultDaoService gpdResultDaoService;

// Insert
int computationId = gpdResultDaoService.insert(gpdResult);

// Retrieve
List<GPDResult> gpdList = resultService.getGPDResultListByComputationId(computationId);
```

- MySQL and SQLite support
- Optimized for large transactions
- Database also to store experimental data → Fits

Threads

- To speed up calculation
- Used for instance by Logger

H^u @ $x = 0.2$, $t = -0.1\ GeV^2$, $\mu_F^2 = \mu_R^2 = 2\ GeV^2$



Existing modules:

- GPD: GK11, VGG, Vinnikov, MPSSW13, MMS13
- Evolution: Vinnikov code
- CFF (DVCS only): LO, NLO (gluons and light or light + heavy quarks)
- Cross Section (DVCS only): VGG, BMJ, GV
- Running coupling: 4-loop PDG expression, constant value

Last but not least:

- Good development practice
- Robustness and accuracy
- Non-regression tools

PARTONS - not only computing project:

- Fits - existing data for physics output and foreseen data to check impact of new experiments
- New GPD models and CFF parameterizations
- EIC predictions
- Dyson-Schwinger equations
- ...

PREDICTIONS FOR COMPASS

Input list

- GK [1] and VGG [2] GPD models
- LO and NLO [3] CFFs
- GV expressions for DVCS process [4]
- Angles defined in Trento convention
- Average values of kinematic variables:

  $x_B = 0.02$

  $Q^2 = 2\ \mathrm{GeV}^2$

  $t = -0.2\ \mathrm{GeV}^2$

  $E_b = 160\ \mathrm{GeV}$

- Preliminary results

Partonic content of GK and VGG GPD models:

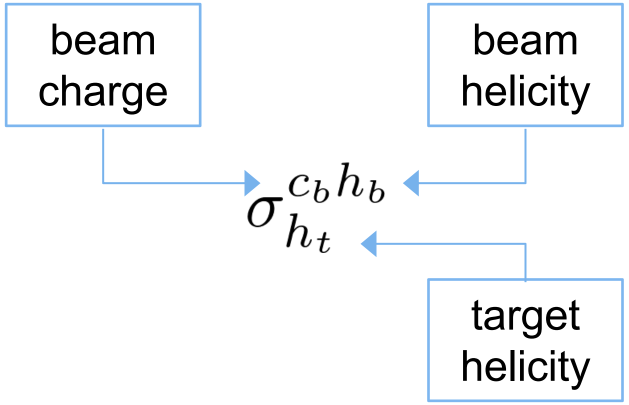
	uVal	uSea	dVal	dSea	s	g
H	GK VGG	GK VGG	GK VGG	GK VGG	GK –	GK –
E	GK VGG	GK –	GK VGG	GK –	GK –	GK –
$\widetilde{H}$	GK VGG	– VGG	GK VGG	– VGG	– VGG	GK –
$\widetilde{E}$	GK VGG	– –	GK VGG	– –	– –	– –

References:

[1] Eur. Phys. J. C42, 281 (2005), Eur. Phys. J. C53, 367 (2008), Eur. Phys. J. C65, 137 (2010)
[2] Phys. Rev. Lett. 80, 5064 (1998), Phys. Rev. D60, 094017 (1999), Phys. Rev. D72, 054013 (2005)
[3] Phys. Rev. D87(5), 054029 (2013)
[4] *Analytic ee'γ cross section*, in Atelier DVCS, Laboratoire de Physique Corpusculaire, Clermont-Ferrand, June 30 - July 01, 2008

Accessible cross sections:

$$\sigma_{\uparrow}^{+\downarrow} \quad \sigma_{\downarrow}^{+\downarrow} \quad \sigma_{\uparrow}^{-\uparrow} \quad \sigma_{\downarrow}^{-\uparrow}$$



where

$$\sigma_{h_t}^{c_b h_b} = \sigma_{h_t}^{c_b h_b,\mathrm{BH}} + \sigma_{h_t}^{c_b h_b,\mathrm{DVCS}} + c_b \, \sigma_{h_t}^{c_b h_b,\mathrm{INT}}$$

where

$$\sigma_{h_t}^{c_b h_b,\mathrm{proc}} = \sigma_{UU}^{\mathrm{proc}} + h_b \, \sigma_{LU}^{\mathrm{proc}} + h_t \, \sigma_{UT}^{\mathrm{proc}} + h_b h_t \, \sigma_{LT}^{\mathrm{proc}}$$

$$\mathrm{proc} = \mathrm{BH}, \mathrm{DVCS}, \mathrm{INT}$$

COMBINATIONS OF TWO CROSS SECTIONS

difference

$$\sigma_{\uparrow}^{+\downarrow} - \sigma_{\uparrow}^{-\uparrow} = 2\left(\sigma_{UU}^{INT} + \sigma_{UT}^{INT} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH} - \sigma_{LT}^{DVCS} - \sigma_{LT}^{BH}\right) \rightarrow A_{L\uparrow}$$

$$\sigma_{\downarrow}^{+\downarrow} - \sigma_{\downarrow}^{-\uparrow} = 2\left(\sigma_{UU}^{INT} - \sigma_{UT}^{INT} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH} + \sigma_{LT}^{DVCS} + \sigma_{LT}^{BH}\right) \rightarrow A_{L\downarrow}$$

$$\sigma_{\uparrow}^{+\downarrow} - \sigma_{\downarrow}^{+\downarrow} = 2\left(\sigma_{UT}^{INT} + \sigma_{UT}^{DVCS} + \sigma_{UT}^{BH} - \sigma_{LT}^{INT} - \sigma_{LT}^{DVCS} - \sigma_{LT}^{BH}\right) \rightarrow A_{\downarrow T}$$

$$\sigma_{\uparrow}^{-\uparrow} - \sigma_{\downarrow}^{-\uparrow} = -2\left(\sigma_{UT}^{INT} - \sigma_{UT}^{DVCS} - \sigma_{UT}^{BH} + \sigma_{LT}^{INT} - \sigma_{LT}^{DVCS} - \sigma_{LT}^{BH}\right) \rightarrow A_{\downarrow T}$$

$$\sigma_{\uparrow}^{+\downarrow} - \sigma_{\downarrow}^{-\uparrow} = 2\left(\sigma_{UU}^{INT} + \sigma_{UT}^{DVCS} + \sigma_{UT}^{BH} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH} - \sigma_{LT}^{INT}\right) \rightarrow A_{LT,\ acorr.}$$

$$\sigma_{\downarrow}^{+\downarrow} - \sigma_{\uparrow}^{-\uparrow} = 2\left(\sigma_{UU}^{INT} - \sigma_{UT}^{DVCS} - \sigma_{UT}^{BH} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH} + \sigma_{LT}^{INT}\right) \rightarrow A_{LT,\ corr.}$$

sum

$$\sigma_{\uparrow}^{-\uparrow} + \sigma_{\uparrow}^{+\downarrow} = 2\left(\sigma_{UU}^{DVCS} + \sigma_{UU}^{BH} + \sigma_{UT}^{DVCS} + \sigma_{UT}^{BH} - \sigma_{LU}^{INT} - \sigma_{LT}^{INT}\right)$$

$$\sigma_{\downarrow}^{-\uparrow} + \sigma_{\downarrow}^{+\downarrow} = 2\left(\sigma_{UU}^{DVCS} + \sigma_{UU}^{BH} - \sigma_{UT}^{DVCS} - \sigma_{UT}^{BH} - \sigma_{LU}^{INT} + \sigma_{LT}^{INT}\right)$$

$$\sigma_{\uparrow}^{+\downarrow} + \sigma_{\downarrow}^{+\downarrow} = 2\left(\sigma_{UU}^{INT} + \sigma_{UU}^{DVCS} + \sigma_{UU}^{BH} - \sigma_{LU}^{INT} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH}\right)$$

$$\sigma_{\uparrow}^{-\uparrow} + \sigma_{\downarrow}^{-\uparrow} = -2\left(\sigma_{UU}^{INT} - \sigma_{UU}^{DVCS} - \sigma_{UU}^{BH} + \sigma_{LU}^{INT} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH}\right)$$

$$\sigma_{\downarrow}^{-\uparrow} + \sigma_{\uparrow}^{+\downarrow} = 2\left(\sigma_{UU}^{DVCS} + \sigma_{UU}^{BH} + \sigma_{UT}^{INT} - \sigma_{LU}^{INT} - \sigma_{LT}^{DVCS} - \sigma_{LT}^{BH}\right)$$

$$\sigma_{\uparrow}^{-\uparrow} + \sigma_{\downarrow}^{+\downarrow} = 2\left(\sigma_{UU}^{DVCS} + \sigma_{UU}^{BH} - \sigma_{UT}^{INT} - \sigma_{LU}^{INT} + \sigma_{LT}^{DVCS} + \sigma_{LT}^{BH}\right)$$

COMBINATIONS OF FOUR CROSS SECTIONS

difference

$$\sigma_{\uparrow}^{-\uparrow} - \sigma_{\downarrow}^{-\uparrow} + \sigma_{\uparrow}^{+\downarrow} - \sigma_{\downarrow}^{+\downarrow} = 4\left(\sigma_{UT}^{DVCS} + \sigma_{UT}^{BH} - \sigma_{LT}^{INT}\right)$$ → A_{UT}

$$-\sigma_{\uparrow}^{-\uparrow} + \sigma_{\downarrow}^{-\uparrow} + \sigma_{\uparrow}^{+\downarrow} - \sigma_{\downarrow}^{+\downarrow} = 4\left(\sigma_{UT}^{INT} - \sigma_{LT}^{DVCS} - \sigma_{LT}^{BH}\right)$$ → A_{LT}

$$-\sigma_{\uparrow}^{-\uparrow} - \sigma_{\downarrow}^{-\uparrow} + \sigma_{\uparrow}^{+\downarrow} + \sigma_{\downarrow}^{+\downarrow} = 4\left(\sigma_{UU}^{INT} - \sigma_{LU}^{DVCS} - \sigma_{LU}^{BH}\right)$$ → A_{LU}

sum

$$\sigma_{\uparrow}^{-\uparrow} + \sigma_{\downarrow}^{-\uparrow} + \sigma_{\uparrow}^{+\downarrow} + \sigma_{\downarrow}^{+\downarrow} = 4\left(\sigma_{UU}^{DVCS} + \sigma_{UU}^{BH} - \sigma_{LU}^{INT}\right)$$

PREDICTIONS FOR COMPASS

Asymmetries related to Fourier moments of φ and φ_S angles

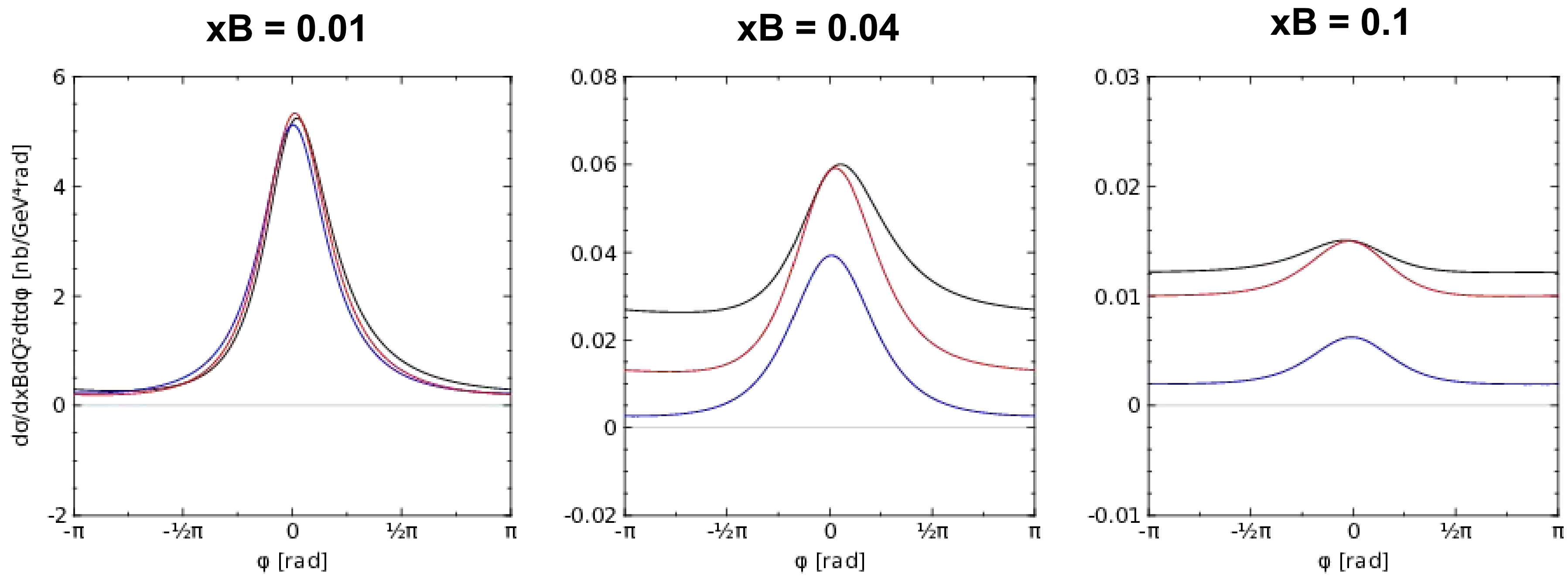
$A_{UT}^{\sin(\varphi-\varphi_S)}$	$\propto$ $-\mathrm{Re}\mathcal{E}\,\mathrm{Im}\mathcal{H} + \mathrm{Im}\mathcal{E}\,\mathrm{Re}\mathcal{H} + 0.01\,\mathrm{Re}\mathcal{E}_T\,\mathrm{Im}\mathcal{H}_T - 0.01\,\mathrm{Im}\mathcal{E}_T\,\mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\sin(\varphi-\varphi_S)\cos\varphi}$	$\propto$ $\mathrm{Re}\mathcal{E}\,\mathrm{Im}\mathcal{H} - \mathrm{Im}\mathcal{E}\,\mathrm{Re}\mathcal{H} - 0.01\,\mathrm{Re}\mathcal{E}_T\,\mathrm{Im}\mathcal{H}_T + 0.01\,\mathrm{Im}\mathcal{E}_T\,\mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\sin(\varphi-\varphi_S)\cos2\varphi}$	$\propto$ $-\mathrm{Re}\mathcal{E}\,\mathrm{Im}\mathcal{H} + \mathrm{Im}\mathcal{E}\,\mathrm{Re}\mathcal{H} + 0.01\,\mathrm{Re}\mathcal{E}_T\,\mathrm{Im}\mathcal{H}_T - 0.01\,\mathrm{Im}\mathcal{E}_T\,\mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\sin(\varphi-\varphi_S)\cos3\varphi}$	0
$A_{UT}^{\sin(\varphi-\varphi_S)\sin\varphi}$	$\propto$ $-0.65\,\mathrm{Re}\mathcal{E} + \mathrm{Re}\mathcal{H}$
$A_{UT}^{\sin(\varphi-\varphi_S)\sin2\varphi}$	$\propto$ $0.87\,\mathrm{Re}\mathcal{E} + 0.019\,\mathrm{Re}\mathcal{E}_T - \mathrm{Re}\mathcal{H} - 0.34\,\mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\sin(\varphi-\varphi_S)\sin3\varphi}$	0
$A_{UT}^{\cos(\varphi-\varphi_S)}$	$\propto$ $-0.027\,\mathrm{Re}\mathcal{E} - \mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\cos(\varphi-\varphi_S)\cos\varphi}$	$\propto$ $0.021\,\mathrm{Re}\mathcal{E} + \mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\cos(\varphi-\varphi_S)\cos2\varphi}$	$\propto$ $-\mathrm{Re}\mathcal{E} + 0.18\,\mathrm{Re}\mathcal{H} + 0.53\,\mathrm{Re}\mathcal{H}_T$
$A_{UT}^{\cos(\varphi-\varphi_S)\cos3\varphi}$	0
$A_{UT}^{\cos(\varphi-\varphi_S)\sin\varphi}$	0
$A_{UT}^{\cos(\varphi-\varphi_S)\sin2\varphi}$	0
$A_{UT}^{\cos(\varphi-\varphi_S)\sin3\varphi}$	0

- coefficients in front of CFFs are normalized to the largest one
- only relative coefficients larger than 1% are kept
- decomposition for $x_B = 0.02$, $Q^2 = 2\ \mathrm{GeV}^2$, $t = -0.2\ \mathrm{GeV}^2$, $E_b = 160$ GeV
- see Eur. Phys. J. C (2013) 73 for more details

Asymmetries related to Fourier moments of φ and φ_S angles

$A_{LT}^{\sin(\varphi-\varphi_S)}$	$\propto$ 0.65 $\mathrm{Im}\mathcal{E}$ - $\mathrm{Im}\mathcal{H}$
$A_{LT}^{\sin(\varphi-\varphi_S)\cos\varphi}$	$\propto$ -0.65 $\mathrm{Im}\mathcal{E}$ + $\mathrm{Im}\mathcal{H}$
$A_{LT}^{\sin(\varphi-\varphi_S)\cos2\varphi}$	$\propto$ -$\mathrm{Im}\mathcal{E}$ - 0.019 $\mathrm{Im}\mathcal{E}_T$ + 0.54 $\mathrm{Im}\mathcal{H}$ + 0.34 $\mathrm{Im}\mathcal{H}_T$
$A_{LT}^{\sin(\varphi-\varphi_S)\cos3\varphi}$	$\propto$ 0.19 $\mathrm{Im}\mathcal{E}$ + $\mathrm{Im}\mathcal{H}$ + 0.016 $\mathrm{Im}\mathcal{H}_T$
$A_{LT}^{\sin(\varphi-\varphi_S)\sin\varphi}$	$\propto$ -1
$A_{LT}^{\sin(\varphi-\varphi_S)\sin2\varphi}$	0
$A_{LT}^{\sin(\varphi-\varphi_S)\sin3\varphi}$	0
$A_{LT}^{\cos(\varphi-\varphi_S)}$	$\propto$ -1
$A_{LT}^{\cos(\varphi-\varphi_S)\cos\varphi}$	$\propto$ 1 +0.018 $\mathrm{Im}\mathcal{E}$ $\mathrm{Im}\mathcal{H}_T$ + 0.018 $\mathrm{Re}\mathcal{E}$ $\mathrm{Re}\mathcal{H}_T$
$A_{LT}^{\cos(\varphi-\varphi_S)\cos2\varphi}$	$\propto$ 0.01 $\mathrm{Im}\mathcal{E}_T$ $\mathrm{Im}\mathcal{H}$ + 0.01 $\mathrm{Re}\mathcal{E}_T$ $\mathrm{Re}\mathcal{H}$ - $\mathrm{Im}\mathcal{E}$ $\mathrm{Im}\mathcal{H}_T$ - $\mathrm{Re}\mathcal{E}$ $\mathrm{Re}\mathcal{H}_T$
$A_{LT}^{\cos(\varphi-\varphi_S)\cos3\varphi}$	0
$A_{LT}^{\cos(\varphi-\varphi_S)\sin\varphi}$	$\propto$ -0.011 $\mathrm{Im}\mathcal{E}$ - $\mathrm{Im}\mathcal{H}_T$
$A_{LT}^{\cos(\varphi-\varphi_S)\sin2\varphi}$	$\propto$ -$\mathrm{Im}\mathcal{E}$ + 0.18 $\mathrm{Im}\mathcal{H}$ + 0.28 $\mathrm{Im}\mathcal{H}_T$
$A_{LT}^{\cos(\varphi-\varphi_S)\sin3\varphi}$	$\propto$ -0.089 $\mathrm{Im}\mathcal{E}$ + 0.016 $\mathrm{Im}\mathcal{H}$ + $\mathrm{Im}\mathcal{H}_T$

Cross sections (BH + DVCS + INT) for $\sigma^{+\downarrow}$:



GK and CFFs@LO

GK and CFFs@NLO

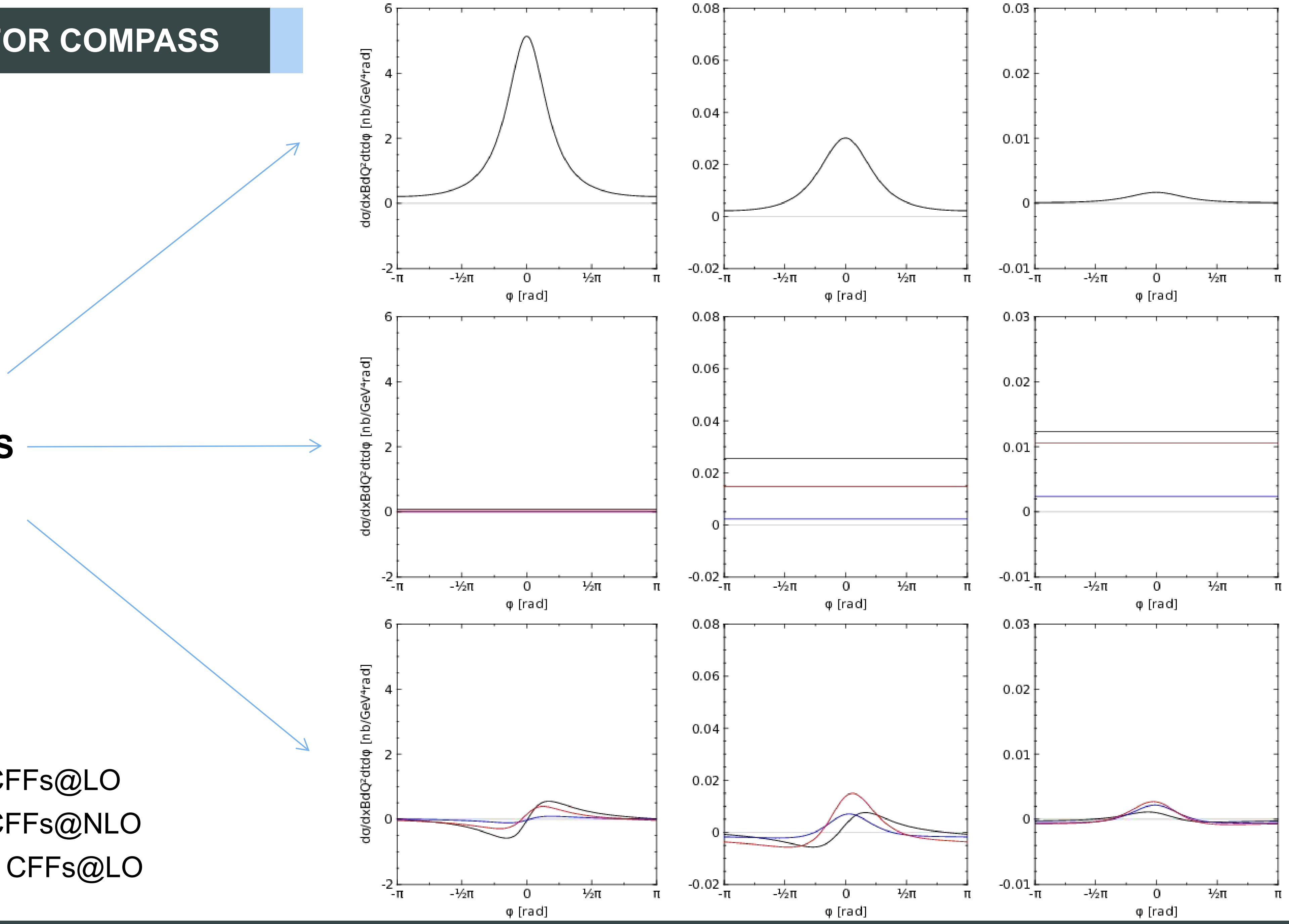
VGG and CFFs@LO

PREDICTIONS FOR COMPASS

BH

DVCS

INT

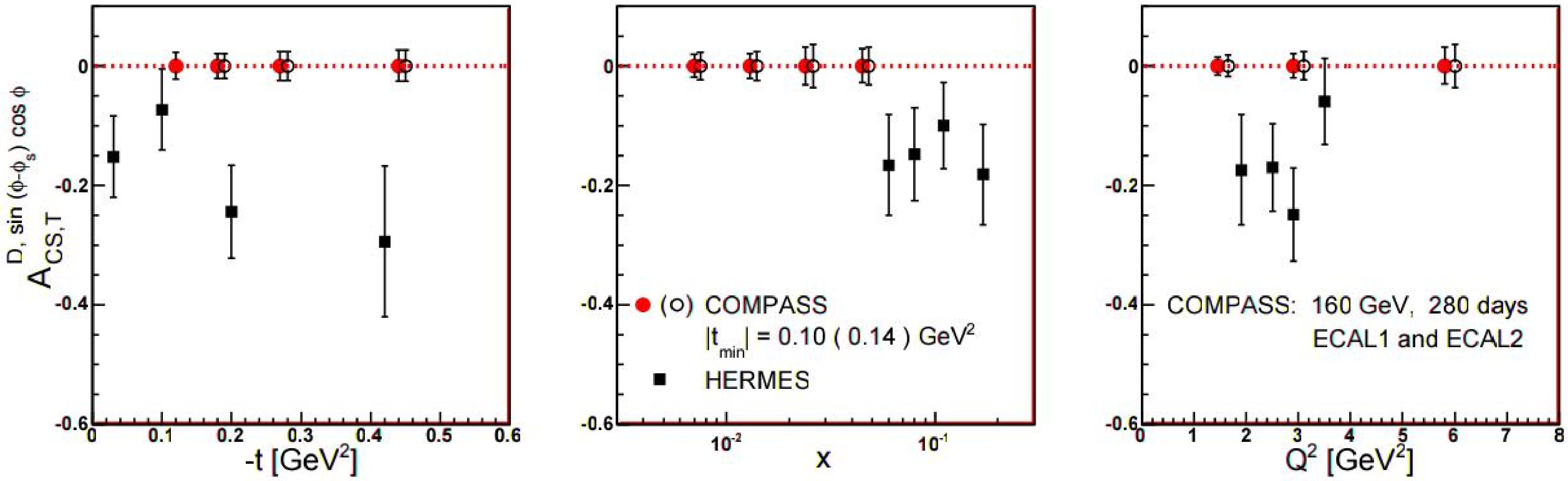


GK and CFFs@LO

GK and CFFs@NLO

VGG and CFFs@LO

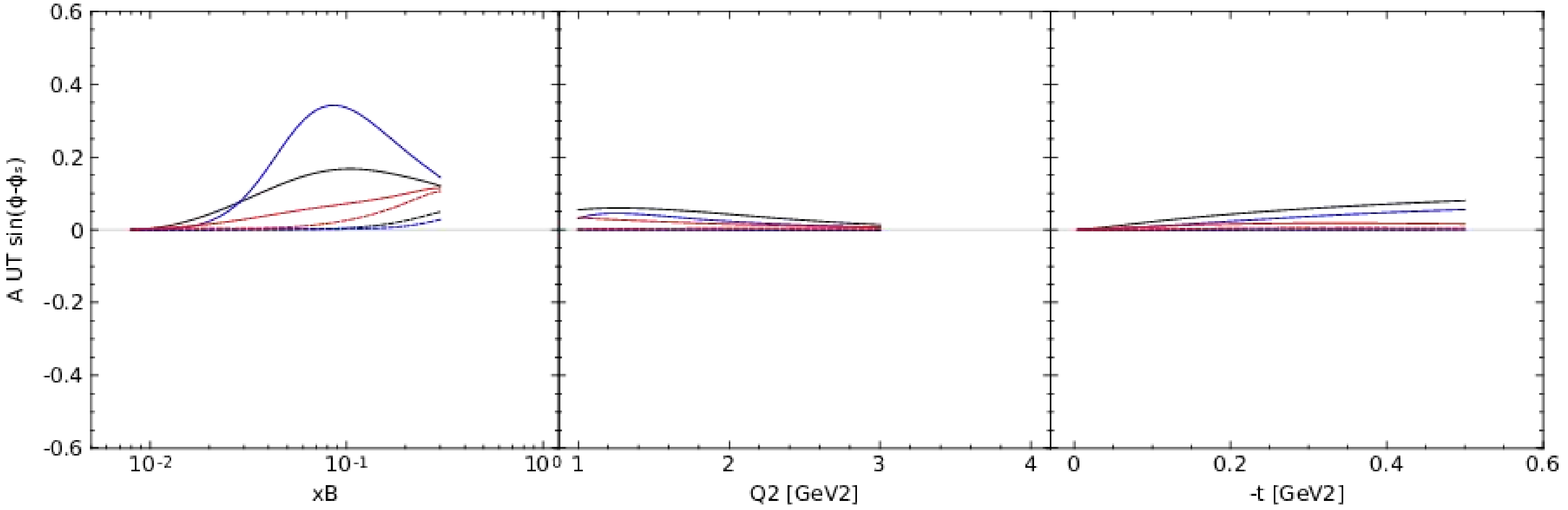
Foreseen precision of measurement from COMPASS-II proposal:



- 280 days of data taking
- Transversely polarized target filled with ammonia
- ECAL1 and ECAL2 only
- Two possible configurations of RPD: inside (●) / outside (○) the solenoid
- Expected precision ≈3%

PREDICTIONS FOR COMPASS

$$A_{UT}^{\sin(\varphi - \varphi_s)} \propto -\mathrm{Re}\mathcal{E}\,\mathrm{Im}\mathcal{H} + \mathrm{Im}\mathcal{E}\,\mathrm{Re}\mathcal{H} + 0.01\,\mathrm{Re}\mathcal{E}_T\,\mathrm{Im}\mathcal{H}_T - 0.01\,\mathrm{Im}\mathcal{E}_T\,\mathrm{Re}\mathcal{H}_T$$



GK and CFFs@LO

GK and CFFs@NLO

VGG and CFFs@LO

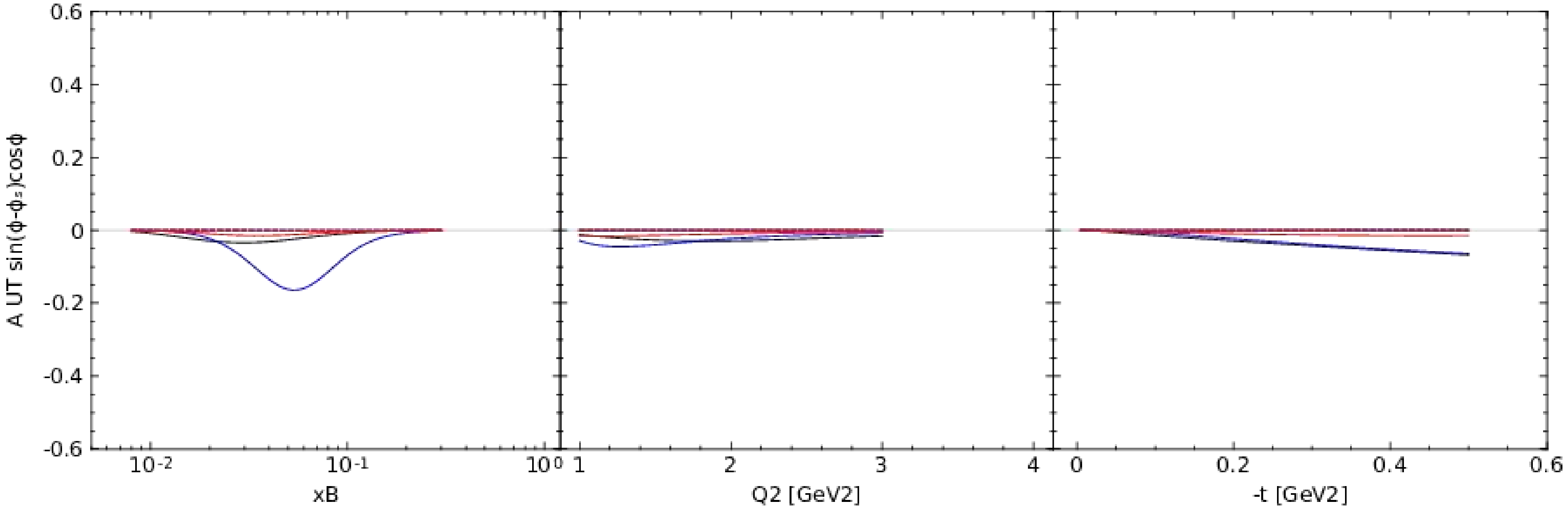
GK and CFFs@LO and GPDs E = 0

GK and CFFs@NLO and GPDs E = 0

VGG and CFFs@LO and GPDs E = 0

PREDICTIONS FOR COMPASS

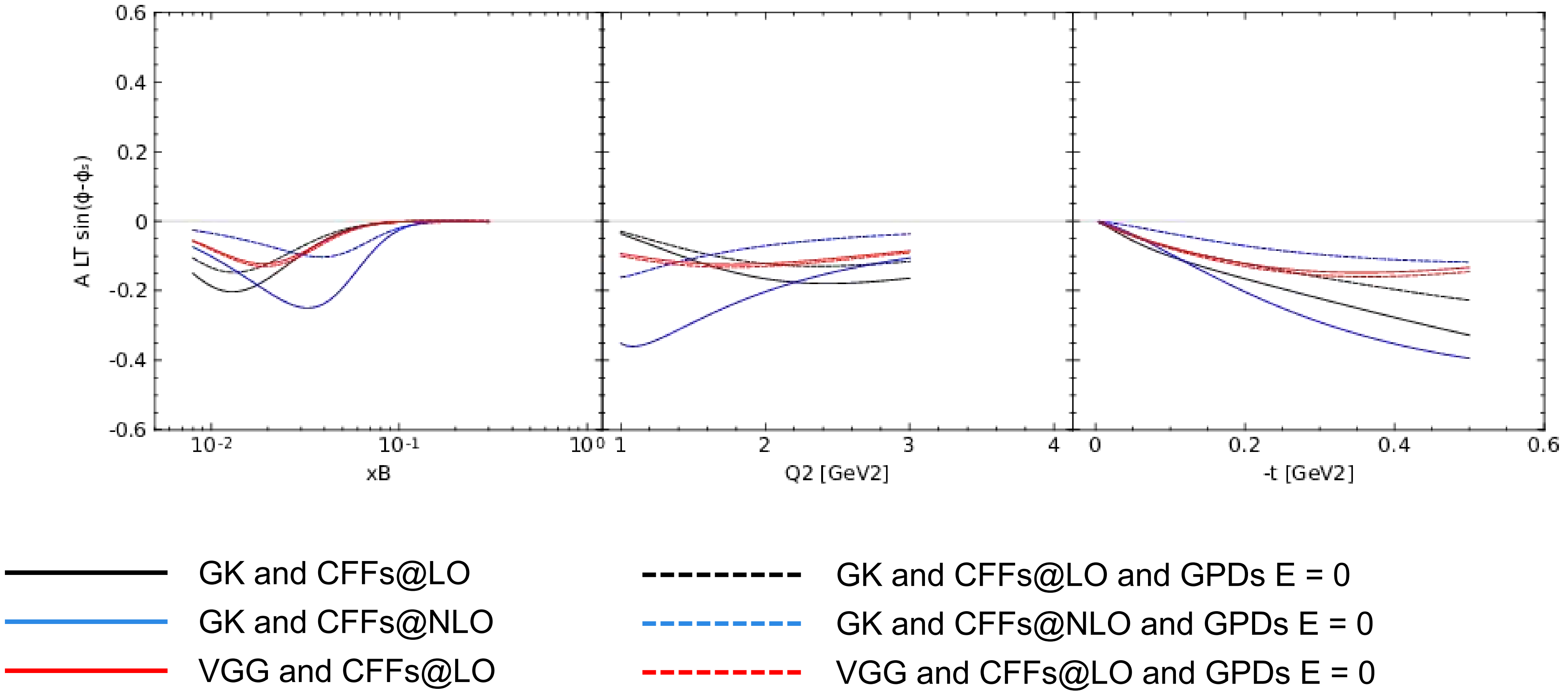
$$A_{UT}^{\sin(\varphi - \varphi_S)\cos\varphi} \propto \mathrm{Re}\mathcal{E}\,\mathrm{Im}\mathcal{H} - \mathrm{Im}\mathcal{E}\,\mathrm{Re}\mathcal{H} - 0.01\,\mathrm{Re}\mathcal{E}_T\,\mathrm{Im}\mathcal{H}_T + 0.01\,\mathrm{Im}\mathcal{E}_T\,\mathrm{Re}\mathcal{H}_T$$



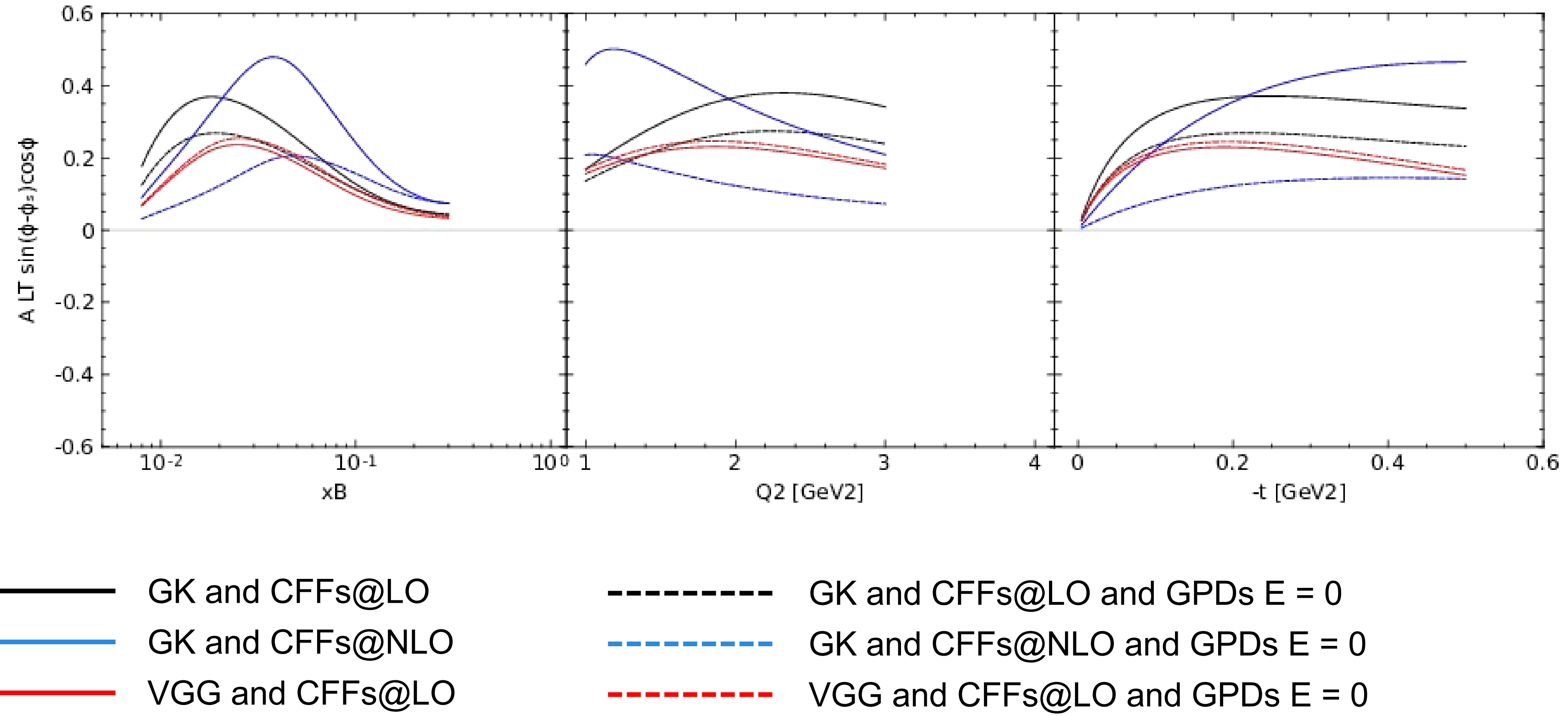
- GK and CFFs@LO
- GK and CFFs@NLO
- VGG and CFFs@LO
- GK and CFFs@LO and GPDs E = 0
- GK and CFFs@NLO and GPDs E = 0
- VGG and CFFs@LO and GPDs E = 0

PREDICTIONS FOR COMPASS

$A_{LT}^{\sin(\varphi - \varphi_S)} \propto \; 0.65\, \mathrm{Im}\mathcal{E} - \mathrm{Im}\mathcal{H}$

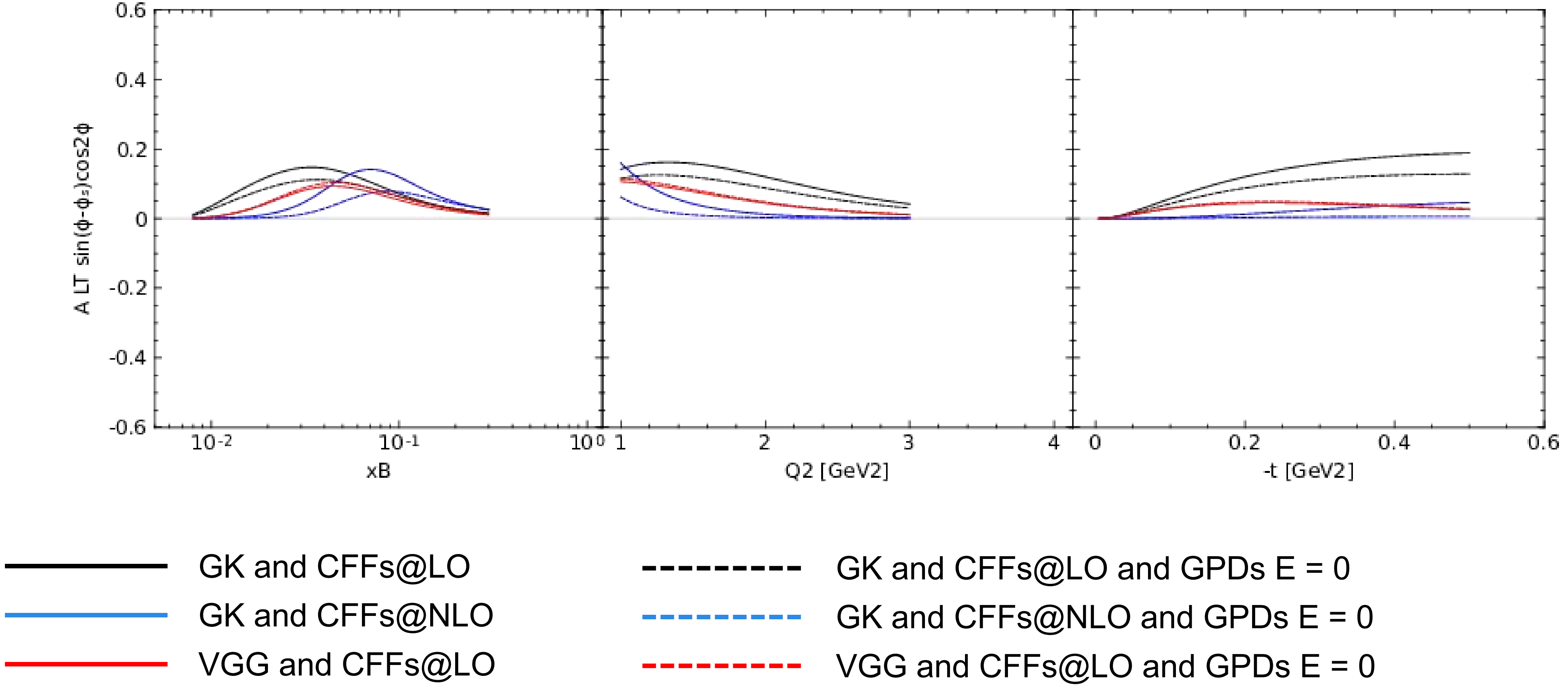


$A_{LT}^{\sin(\varphi - \varphi_S)\cos\varphi} \propto \quad -0.65\ \mathrm{Im}\mathcal{E} + \mathrm{Im}\mathcal{H}$



PREDICTIONS FOR COMPASS

$A_{LT}^{\sin(\varphi - \varphi_s)\cos 2\varphi} \propto$ $-\mathrm{Im}\mathcal{E} - 0.019\,\mathrm{Im}\mathcal{E}_T + 0.54\,\mathrm{Im}\mathcal{H} + 0.34\,\mathrm{Im}\mathcal{H}_T$



PARTONS (PARtonic Tomography Of Nucleon Software)

- Modern platform devoted to study GPDs
- Design to support the effort of GPD community
- Can be used by both theoreticians and experimentalists

- First release expected in this year
- We kindly ask for any feedback

- More info in: arXiv: hep-ph/1512.06174

Predictions for future GPD programme at COMPASS

- Observables for transversely polarized target accessible with COMPASS setup defined
- GPD-oriented interpretation provided for COMPASS kinematics
- The most promising observables to constrain GPDs E are:

$A_{UT}^{\sin(\varphi - \varphi_S)}$ $A_{UT}^{\sin(\varphi - \varphi_S)\cos\varphi}$

$A_{LT}^{\sin(\varphi - \varphi_S)}$ $A_{LT}^{\sin(\varphi - \varphi_S)\cos\varphi}$ $A_{LT}^{\sin(\varphi - \varphi_S)\cos 2\varphi}$

- Effect of NLO corrections expected to be large at COMPASS kinematics
- We plan to check impact of COMPASS expected data on CFFs/GPDs fits