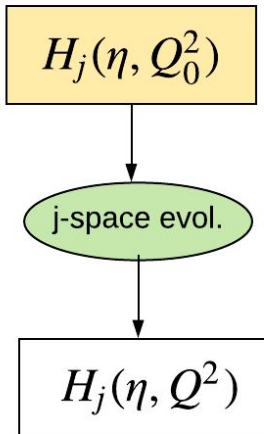


GPDs at EIC Meeting

# GPDs at EIC Meeting

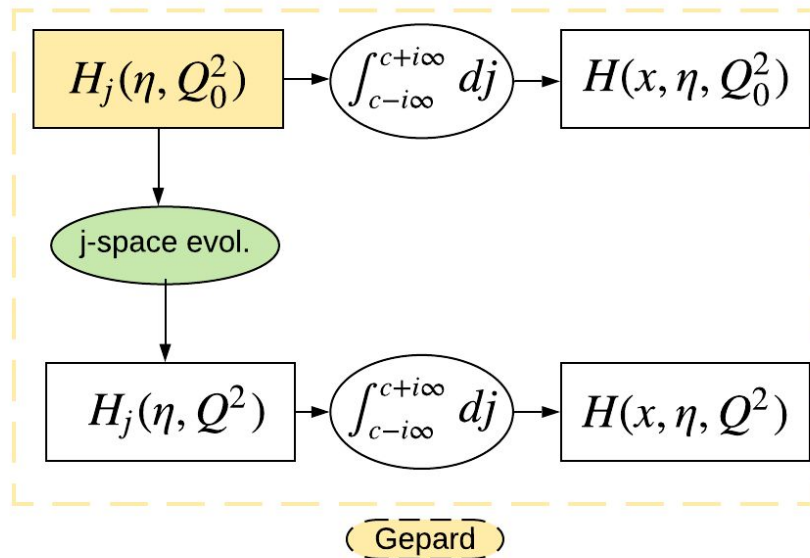
Krešimir Kumerički (University of Zagreb)  
22 Apr 2020

# Motivation for studying Freund/McDermott/MILOU

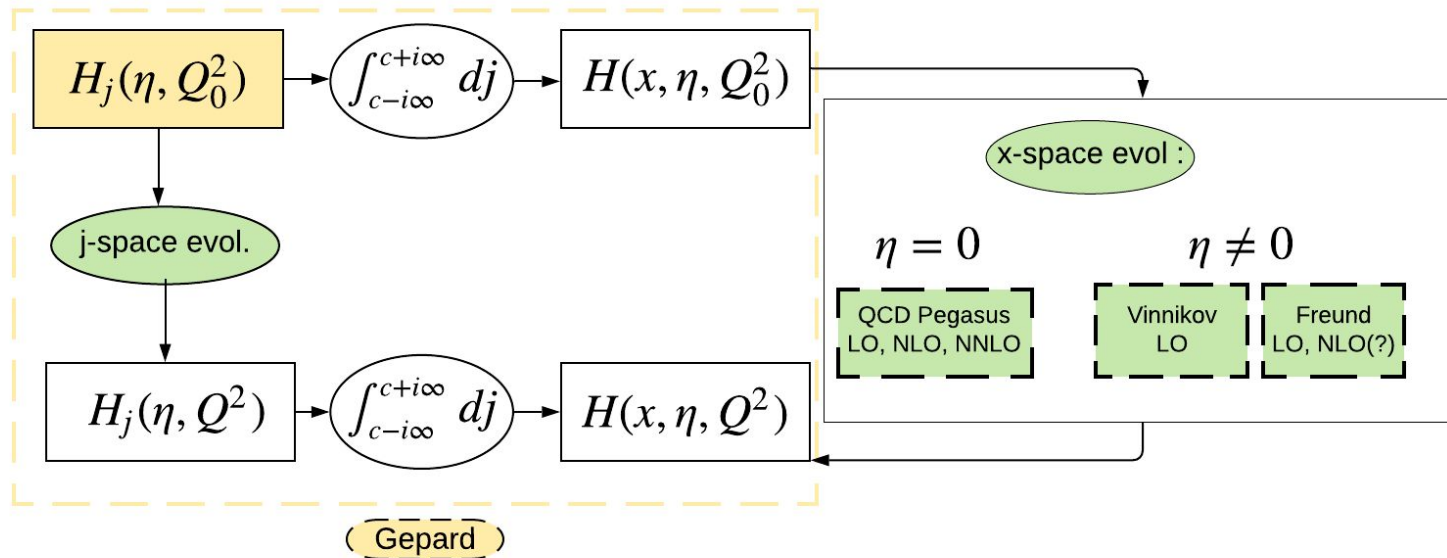


Gepard

# Motivation for studying Freund/McDermott/MILOU



# Motivation for studying Freund/McDermott/MILOU



# Studying GPDs with Python / JupyterLab



“The Software Working Group has adapted [adopted?] **JupyterLab** as a collaborative workspace to further develop EIC Science, to examine detector requirements, and to work on detector designs and concepts.”

(<http://www.eicug.org/web/content/eic-software>)

# Gepard vs. Vinnikov

Python wrapper around Vinnikov evolution code (non-singlet only):

```
pyvinnikov.evol_ns(1, log(Q02), log(Q2), xi, x, gpd)
```

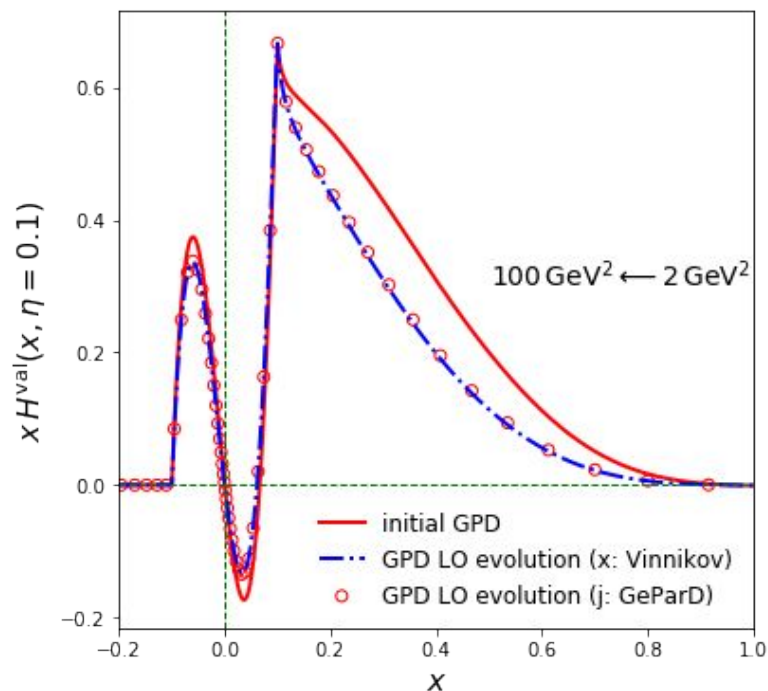
$Q02$  - initial scale

$Q2$  - final scale

$\xi$  - fixed  $\xi$

$x$  - array of  $x$  values

$gpd$  - array of  $gpd$  values



# Writing Python wrappers

- Writing Python wrapper around **Vinnikov C code** is dead easy:
  - f2py (“Fortran-2-Python”) package does it almost automatically
- Writing Python wrapper around **Freund Fortran code** is tricky:
  - Most of the communication is via Fortran COMMON blocks
  - some COMMON blocks have mixed types (float+int) which have to be separated (otherwise one is hit by nasty bugs)
  - f2py does not treat Fortran ENTRY statements correctly (Fixed by writing explicitly signatures to Fortran interface file.)

(Now evolving GPDs defined in Python should work in principle but was not yet tried.)

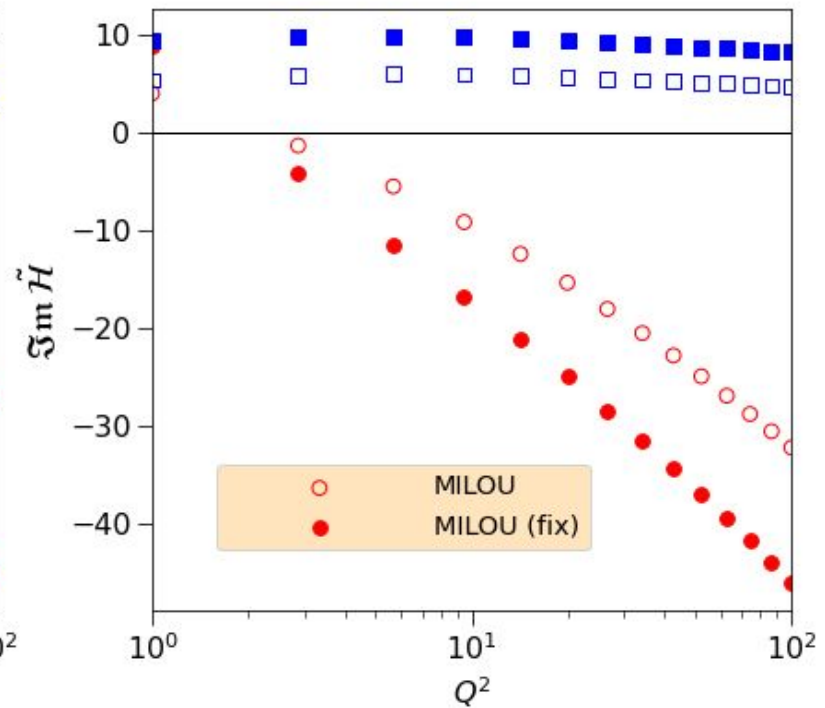
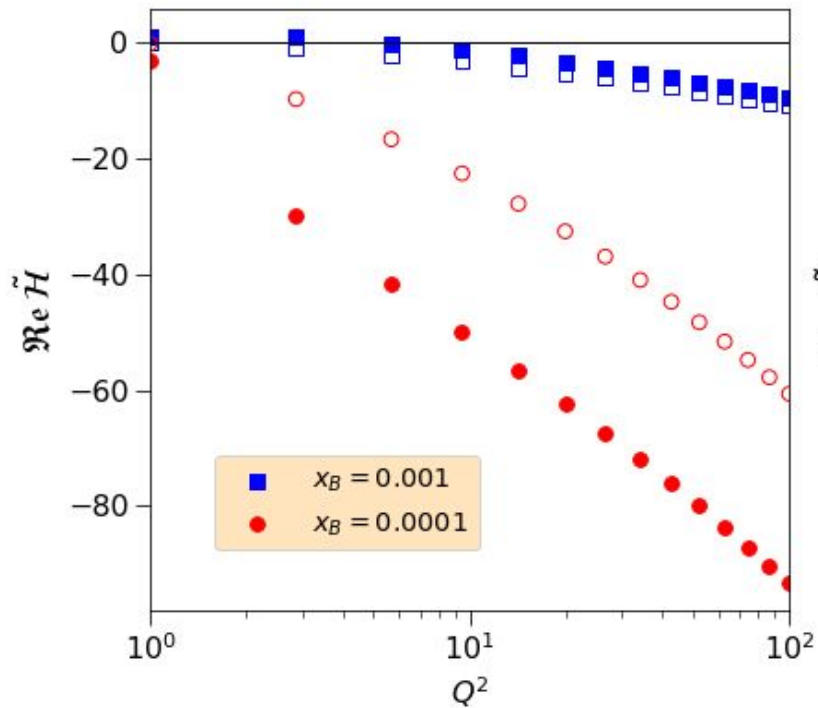
# Bug in MILOU affecting H-tilde?

```
* POLARIZED RADIATIVELY GENERATED LO AND NLO PARTON DENSITIES
*
* M. GLUCK, E. REYA, M. STRATMANN AND W. VOGELSANG,
* [...]
* COMMON: The main program or the calling routine has to have
* a common block COMMON / INTINI / IINI , and IINI
* has always to be zero when PARPOL is called for the
* first time or when 'ISET' has been changed.
* [...]
* SUBROUTINE PARPOL (ISET, X, Q2, U, D, UB, DB, ST, GL, G1P, G1M
```

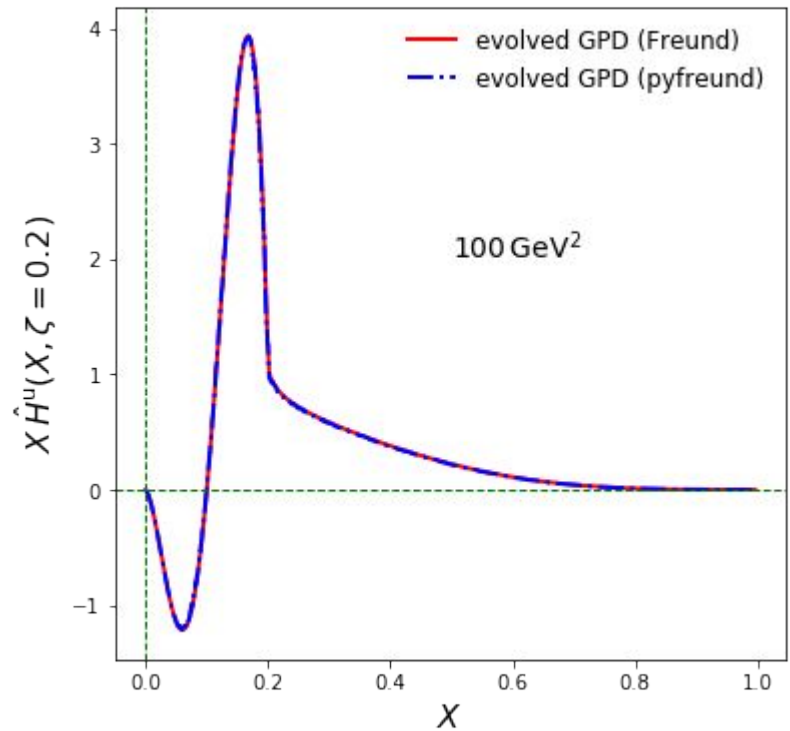
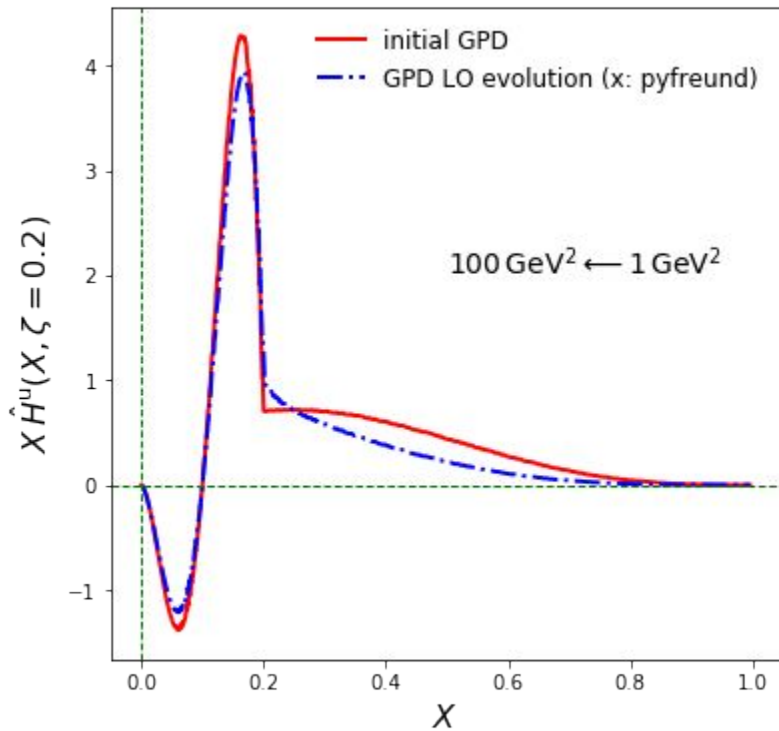
In Freund/McDermott code `inputgpdglobalgrid.f` there is no required COMMON block to reset polarized PDFs.



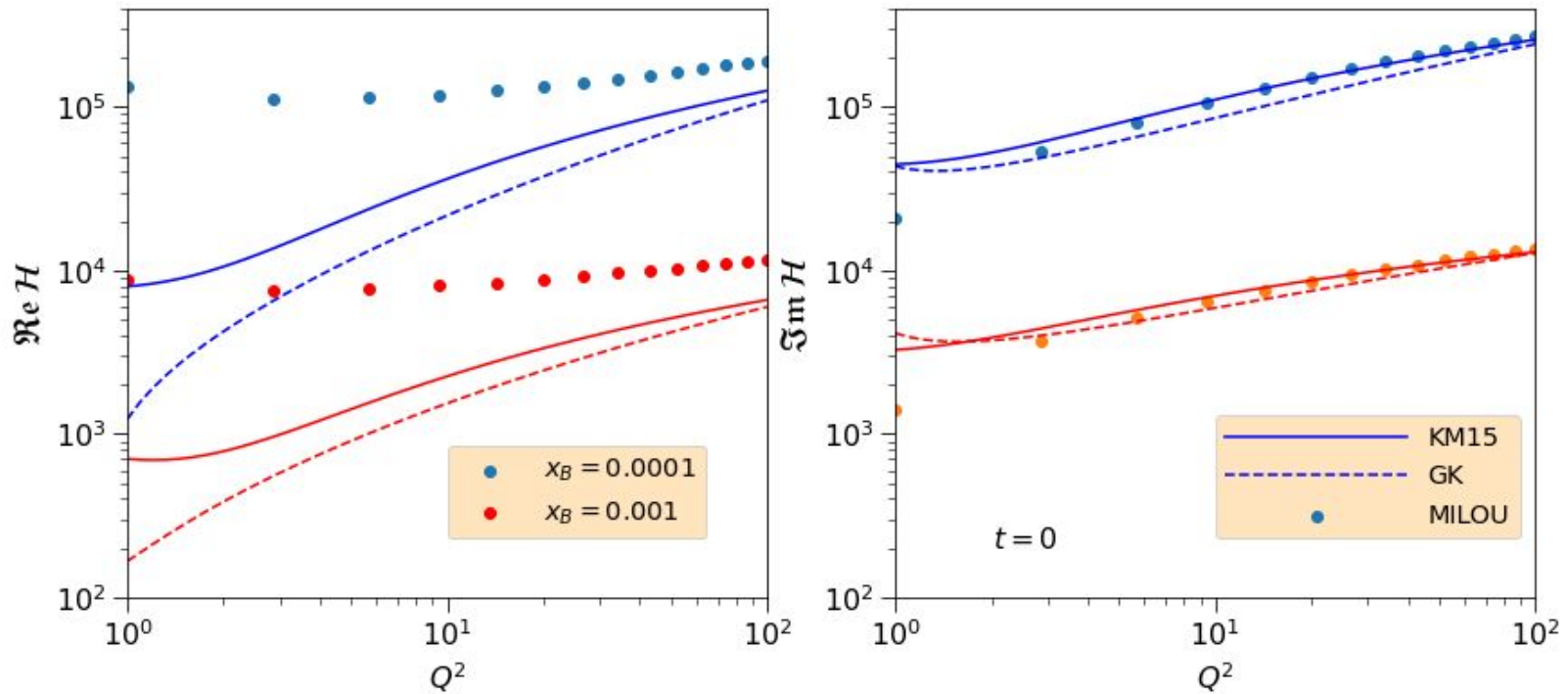
# Bug in MILOU affecting $\tilde{H}$



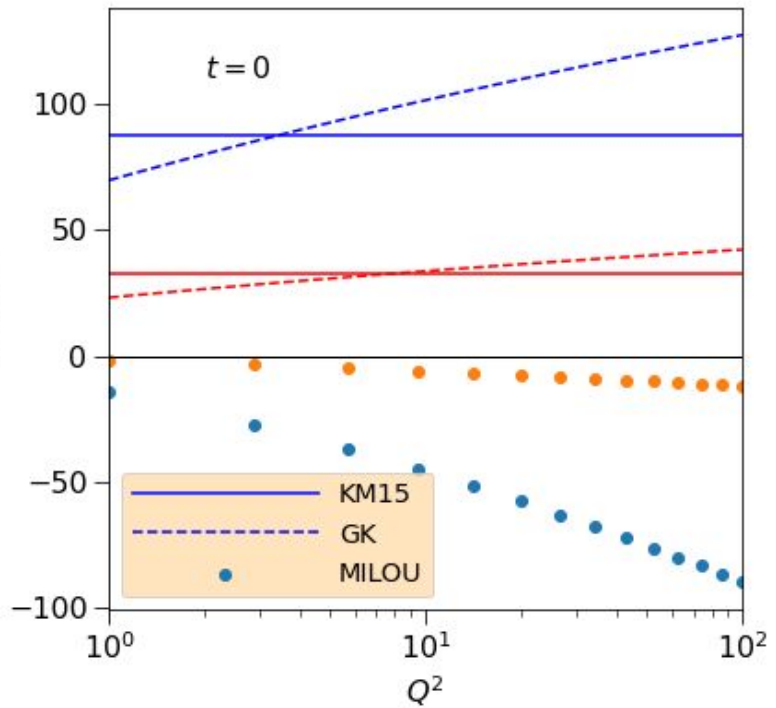
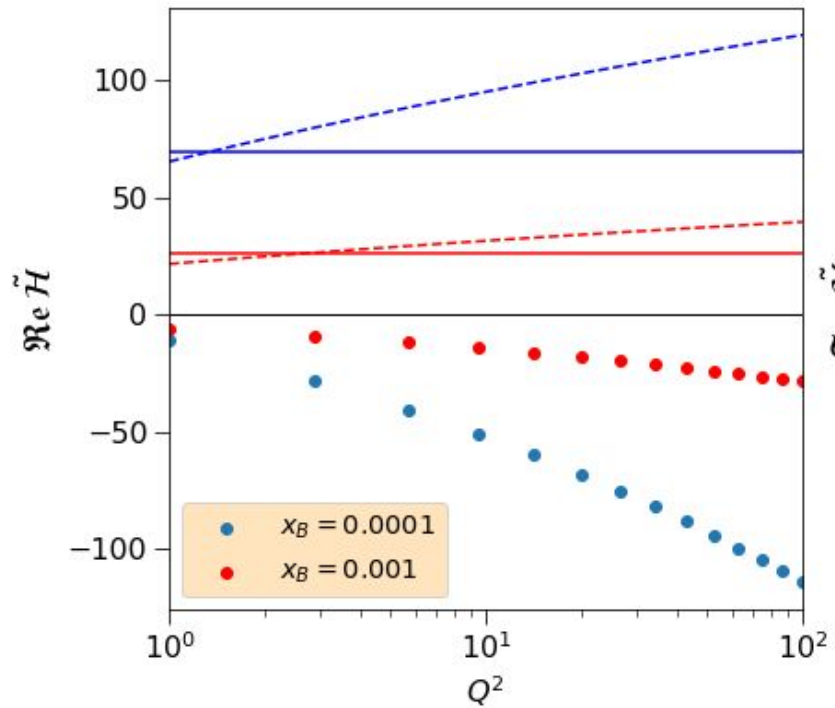
# MILOU vs. Pythonized Freund



# Comparison GK - MILOU - KM



# Comparison GK - MILOU - KM



- KM model has important part of  $t$ -dependence (Regge) which is not factorized from  $x$ -dependence, so cannot be directly used in the present MILOU MC generator.
- By the way, I can provide C subroutine that generates KM CFFs, taking about 1 milisecond per  $xB-t-Q^2$  kinematic point (on 24-thread Xeon @ 2.4 GHz)