Error Analysis Part 2

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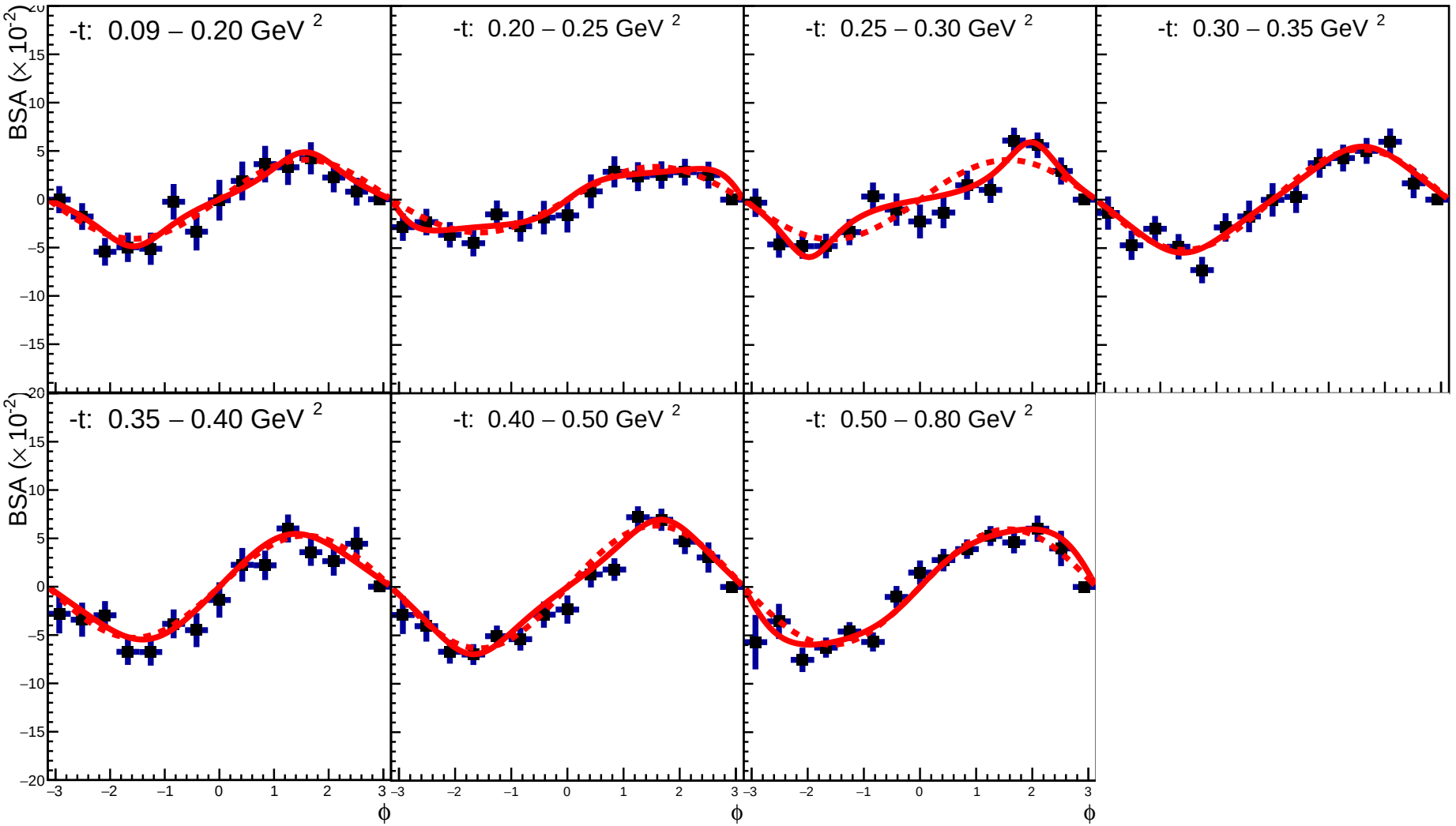
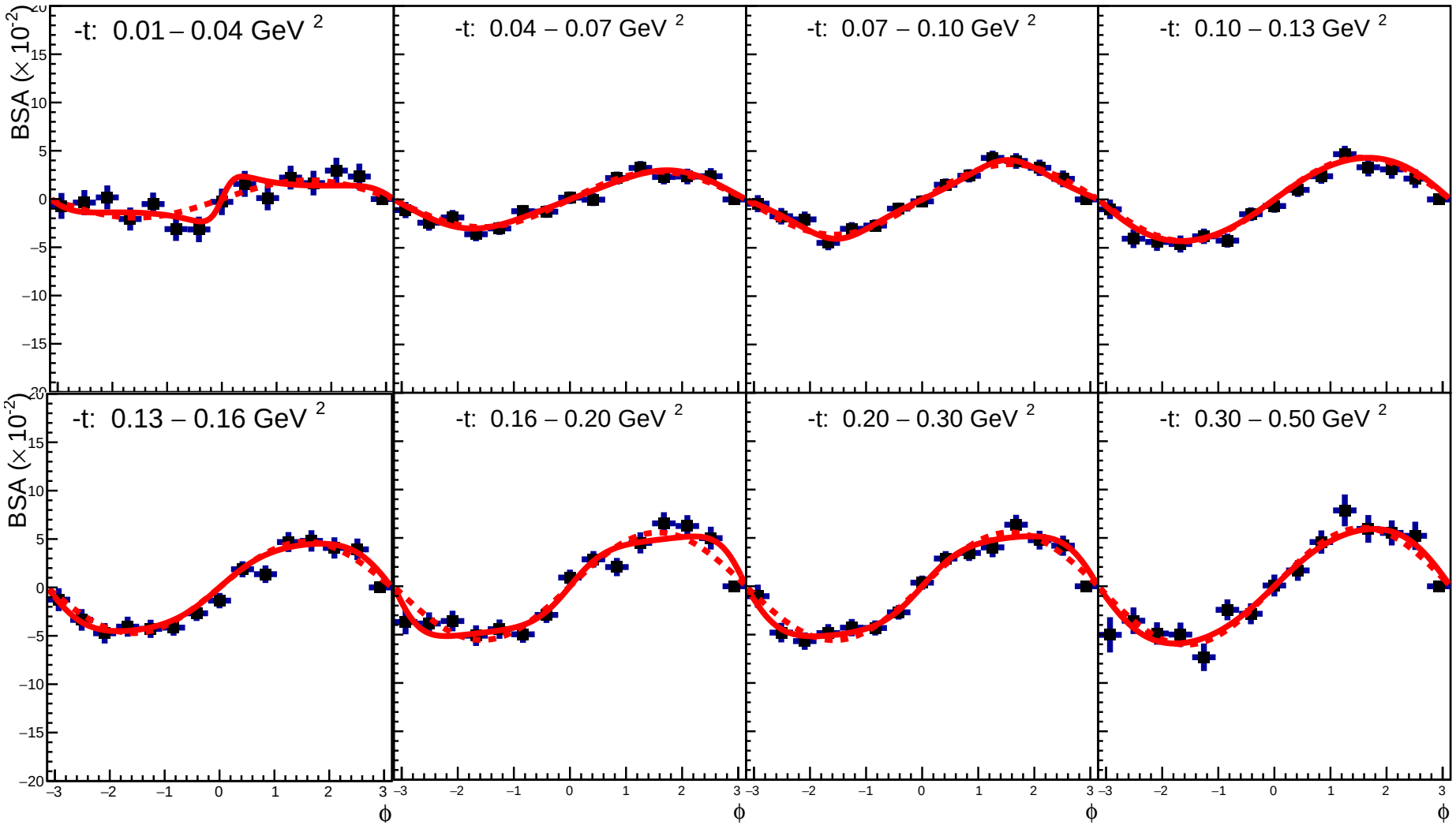
Asymmetry Q2=3, W2.32



Asymmetry Q2=2.1, W=2.95



Systematics

- Considering three unrelated systematics:

$$\delta_{SYS} = \sqrt{\delta^2_{POL} + \delta^2_{CUTS} + \delta^2_{FIT}}$$

- Error from cut dependence, calculated as the RMS of fit values for different sets of cuts:

$$\delta_{CUTS} = RMS((A - CN), (A - CW), (A - MN), (A - MW))$$

- Error from uncertainty of beam polarization, using standard formula for error propagation:

$$\delta_{POL} = \left| \frac{d(BSA)}{d(POL)} \right| (\delta_{POL})$$

- Error from full vs approximated fit, using the absolute difference between the two:

$$\delta_{FIT} = |A - A'|$$

- Point-to-point variations are dominated by δ_{FIT}.

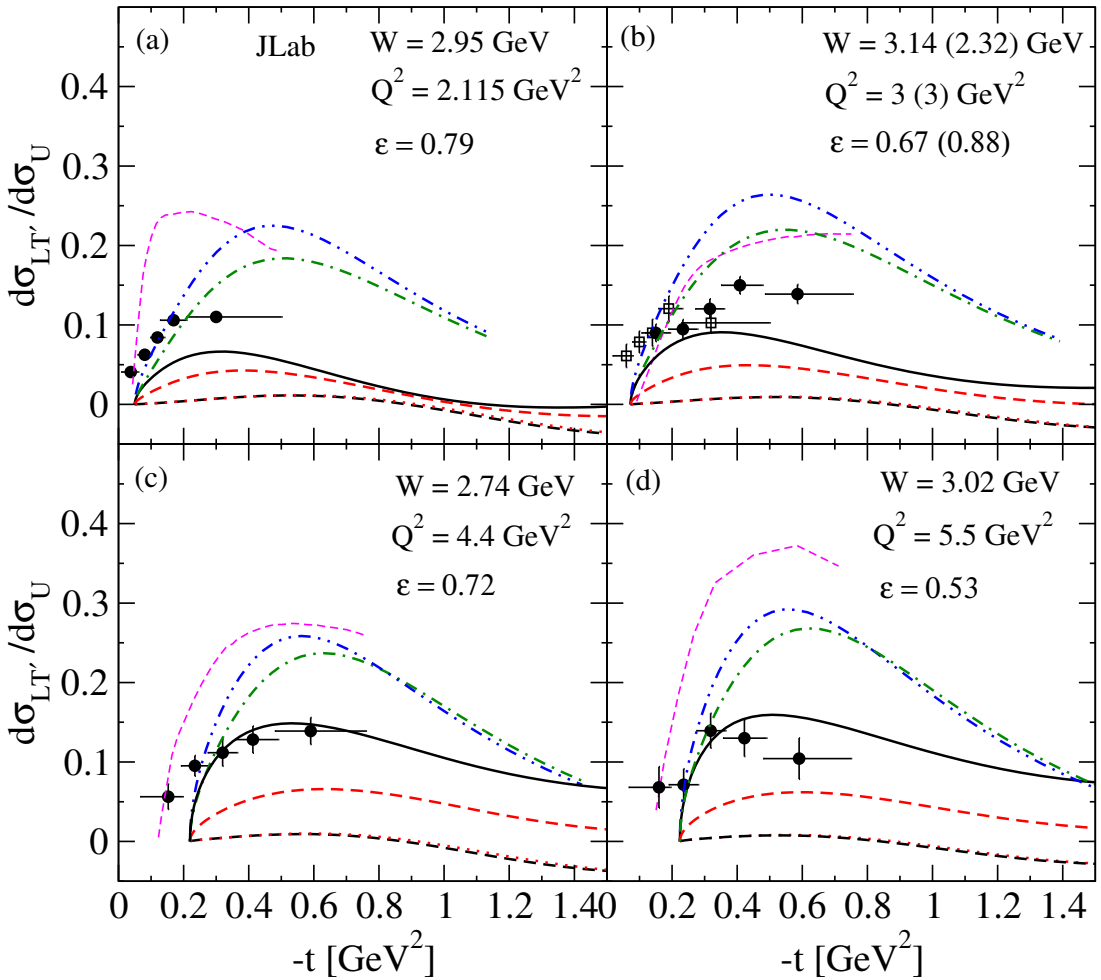
Sample Data

For Q^2=5.5, W=3.02

Bin	A	δ_{STAT}	δ_{FIT}	δ_{POL}	δ_{CUTS}	δ_{SYS}
1	2.05	1.41	1.06	0.14	0.07	1.07
2	4.20	1.39	0.75	0.25	0.14	0.8
3	9.45	1.04	0.44	0.26	0.31	0.6
4	7.88	1.47	0.40	0.25	0.27	0.54
5	8.07	1.33	0.91	0.13	0.27	0.96

Grace Plot

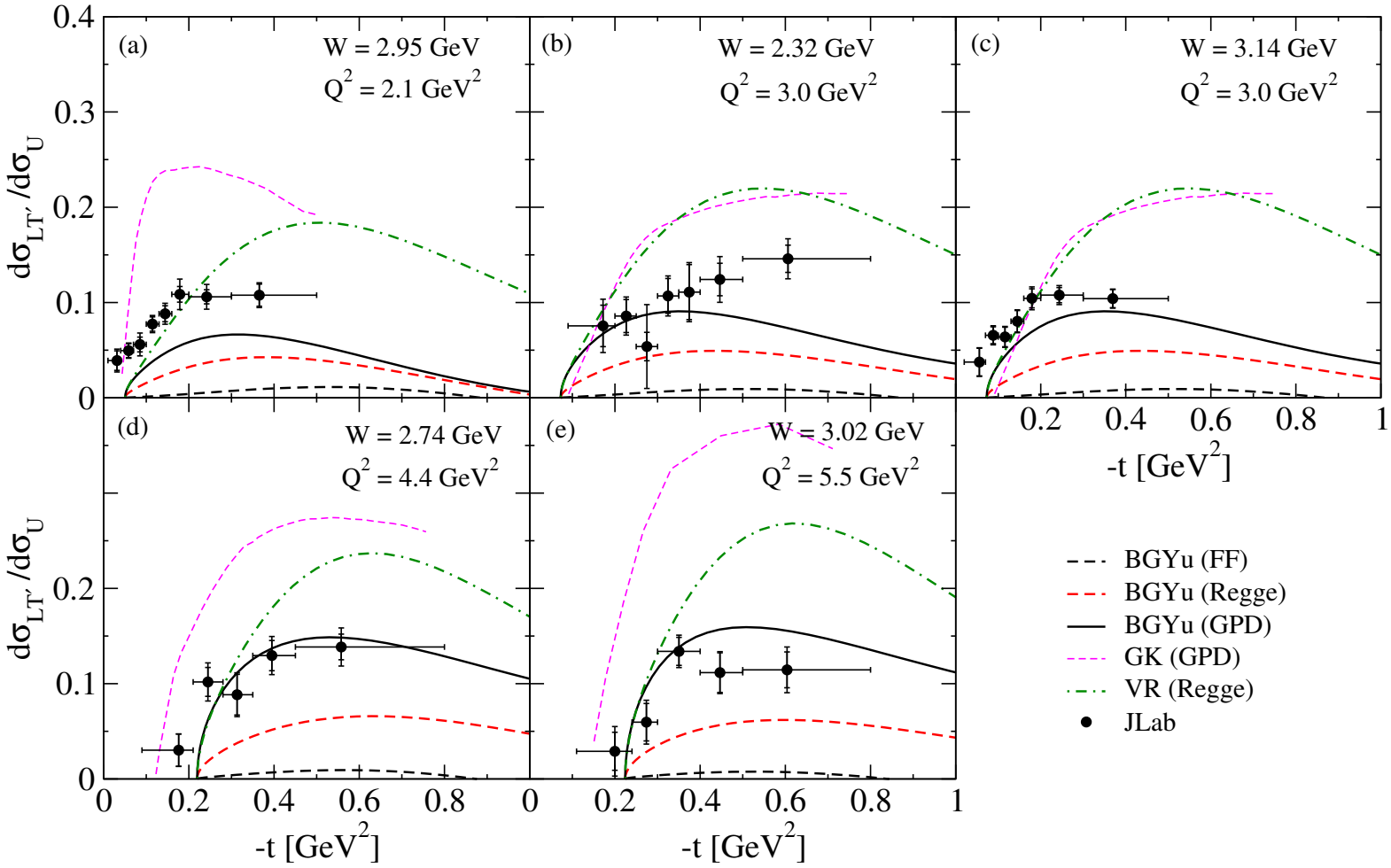
- Received lovely plot from BGYu, as well as **.agr** file: source code for the plotting software **grace**



Installing Grace

Main page: *https://plasma-gate.weizmann.ac.il/Grace/*
Download **grace-latest.tar.gz** from
https://plasma-gate.weizmann.ac.il/pub/grace/src/

```
//configure and build
//if error "No M*tif", install packages motif, motif-devel
cd grace-5.1.25/
./configure
make
make install
make links
//open file
xmgrace file.agr
```

Grace Plot Updated

- Modified **.agr** file from GBYu: updated results, created fifth panel, added legend
- Small typo in code: errors will grow a little