# Write-up: TMD chapter

In our discussions we agreed on one *golden* candidate for TMD functions which is the Sivers function (along with the unpolarized distribution) and on a *silver* topic which comprises chiral-odd functions involving transversity, Boer-Mulders and Collins function as key examples.
The Sivers fct. serves exemplary to discuss all TMD features for quarks, anti-quarks and gluons as it incorporates the main features we wish to discuss for TMDs:

- possibility to map 3D partonic picture
- spin-orbit correlations & connection to OAM
- quantum interference & role of FSI
- multiparton correlations & non-trivial QCD dynamics (factorization&non-universality)

Simulations for sensitivity studies will support the discussion.
More general topics such as the pT matching, weighted asymmetries, theory issues (factorization, evolution,...) ecc. should preferably focus on the Sivers fct. when giving examples.
For transversity, measurements via the IFF (or 2hadron FF) have been favoured as most clean access in leptoproduction.

The document is intended to approach a wide audience of physicists and we should try all to get them interested in our topic. Therefore, the contributions should not be too technical but rather discuss concepts, the points of (general) interest and - where possible - connections to other fields.

## OUTLINE:

note: we give the topic rather than the section title; orders might change; approximate length of each (sub)section is indicated as orientation

| Topic | contributer | approx. length |
|---|---|---|
| Section-I:<br>General introduction, including imaging (focussed on candidates) | Anselmino, Metz, Schweitzer | ~5-10 p. |
| Section-II:<br>Sivers fct. (together with f_1\times D_1)** | | |
| • Sense and sensitivity | Prokudin, Burton, Musch | ~20-30 p. |
| • Weighted asymmetries | Gamberg, Musch | ~3 p. |
| • pT matching | Bacchetta | ~3 p. |
| • Twist-3 | Kang,Koike,Tanaka | ~3 p. |
| Section-III:<br>Gluon Sivers | | |
| • Theory Issue | Boer,Pisano,Vogelsang | ~3-5 p. |
| • Di-hadron/(Di-jet) | Pisano,Boer, Xiao,Diehl | ~3 p. |
| • D-Dbar/J/Psi | Kang,Qiu | ~3 p. |
| Section-IV:<br>Theory highlights | | |
| • 'gauge links'/factorization/non-universality | Mulders,Rogers | ~3-5 p. |
| SIDIS/DY** | Bland,Schnell | ~3 p. |
| • Evolution | Cherednikov,Kang,Rogers | ~3 p. |
| • TMD Models & OAM | Pasquini,Schweitzer | ~3-5 p. |
| Section-V:<br>Chiral-odd fct.s | | |
| • Transversity, Collins FF, IFF | Bacchetta, Radici | ~5-10 p. |
| • B.-M. fct | Avakian, Metz | ~3 p. |
| Section-VI: | | |
| • Brief overview about tw-2, tw-3 TMDs and their (possible) imaging** | Bacchetta, Metz, Schweitzer | ~5 p. |
| • physics of higher-tw TMDs | Avakian, Chen, Schweitzer | ~3 p. |

** with contributions covering experimental status+near future measurements:
- Hermes, Compass: [Schnell, Hasch]
- DY @RHIC-II (compass) [Bland]
- TMDs @JLab12 [Avakian, Chen]

list of contributers: [topic; in collaboration with]

M. Anselmino [intro; in collab: Metz, Schweitzer]

H. Avakian [B.-M. fct; in collab: Metz]
H. Avakian [TMDs @JLab12, HT; in collab: Chen, Schweitzer]

A. Bachetta [pT matching]
A. Bachetta [transversity via IFF & Collins FF; in collab: Radici]
A. Bachetta [brief overview all TMDs; in collab: Metz, Schweitzer]

L. Bland [DY @RHIC-II, compass]

D. Boer [gluon sivers: theory issues; in collab: Pisano, Vogelsang]
D. Boer [gluon sivers: di-hadron/jet; in collab: Pisano; Diehl, Xiao]

T. Burton [Sivers: sense+sensitivity ; in collab: Musch, Prokudin]

J.-P. Chen [TMDs @JLab12, HT; in collab: Avakian, Schweitzer]

I. Cherednikov [evolution; in collab: Kang, Rogers]

M. Diehl [gluon sivers: di-hadron/jet; in collab: Boer, Pisano, Xiao]

L. Gamberg [weighted asymmetries; in collab: Musch]

D. Hasch [TMDs from Hermes&Compass; in collab: Schnell]

Z. Kang [Tw-3; in collab: Koike, Tanaka]
Z. Kang [gluon sivers: D/D-bar, J/Psi; in collab: Qui]
Z. Kang [evolution; in collab: Cherednikov, Rogers]

Y. Koike [Tw-3; in collab: Kang, Tanaka]

A. Metz [intro; in collab: Anselmino, Schweitzer]
A. Metz [BM-fct; in collab: Avakian]
A. Metz [brief overview all TMDs; in collab: Bachetta, Schweitzer]

P. Mulders [factorization, gauge-links; in collab: Rogers]

B. Musch [Sivers: sense+sensitivity ; in collab: Burton, Prokudin]
B. Musch [weighted asymmetries; in collab: Gamberg]

B. Pasquini [TMD models/OAM; in collab: Schweitzer]

C. Pisano [gluon sivers: theory issues; in collab: Boer, Vogelsang]
C. Pisano [gluon sivers: di-hadron/jet; in collab: Boer, Diehl, Xiao]

A. Prokudin [Sivers: sense+sensitivity ; in collab: Burton, Musch]

J-W. Qui [gluon sivers: D/D-bar, J/Psi; in collab: Kang]

M. Radici [transversity via IFF & Collins FF; in collab: Bachetta]

T. Rogers [factorization, gauge-links; in collab: Mulders]
T. Rogers [evolution; in collab: Cherednikov, Kang]

P. Schweitzer [intro; in collab: Anselmino, Metz]
P. Schweitzer [TMD models/OAM; in collab: Pasquini]
P. Schweitzer [physics of HT TMDs; in collab: Avakian, Chen]

G. Schnell [TMDs from Hermes&Compass; in collab: Hasch]

K. Tanaka [Tw-3; in collab: Kang, Koike]

W. Vogelsang [gluon sivers: theory issues; in collab: Boer, Pisano]

B.-W. Xiao [gluon sivers: di-hadron/jet; in collab: Diehl; Boer, Pisano]