

Closing Remark

Tensor-SIDIS Workshop and b1/Azz Collaboration Meeting, JLab, June 3-5, 2026

Jian-ping Chen
Jefferson Lab



Physics Discussion and Workshop: Stimulation/Excitement

Many physics ideas/programs started with chatting/discussion, tensor and Tensor-SIDIS program @ JLab are good examples.

Hallway chat with Karl, →

The Deuteron Tensor Structure Function b_1

A Proposal to Jefferson Lab PAC-40
(Update to PR12-11-110)

Counting house chat with Nathaly years ago, idea on tensor-SIDIS

Workshop/conference theorists/experimentalists gathering → generate physics excitements

Discussion with Alessandro @SPIN23 --> starting of tensor-SIDIS program

**Spin 1 Transverse Momentum Dependent Tensor
Structure Functions in CLAS12**
CLAS12 Analysis Proposal

Spin-1 TMDs and Structure Functions of the Deuteron
A Letter of Intent to Jefferson Lab PAC 52

This workshop, many excellent talks, help pave the way for the program.

And → exciting new Ideas?

Right questions → steps towards exciting opportunities

Why Deuteron?

Ancient Chinese philosopher: **World is formed with 1,2,3 then infinite.**

In Western world, it is **1,2 then infinite**

Modern example: large N_c limit, 3 is infinite

To understand nucleon 3D structure is one of the main goals of JLab/EIC, and worldwide hadron physics facilities

But need at least 2 to form a nucleus. Deuteron is the simplest nucleus.

After 2, not far from understanding all (infinite).

Why Tensor, Why SIDIS?

1. Key questions in strong interaction in nucleon
Understand QCD in hadrons (confinement, ...)
2. Key questions in strong interaction in nuclei
Understand the residual force (N-N interaction) from fundamental theory (QCD)
Long stand effort: quark-gluon effects in nuclei (EMC effect, ...)
Short distance behavior of N-N interaction (SRC, ...)
Interesting feature: SRC dominated by tensor part
3. Tensor polarization: quantum effect (not simple addition of p & n, D-wave, orbital angular momentum, ...)
Tensor structure function: Direct observation of quark distributions in a nuclear system! No simple model can fully explain the first observation from HERMES: Tensor spin puzzle?
4. Fully understanding quarks/gluons in deuteron, needs to go beyond inclusive (1d)
5. May reveal “Physics beyond “Standard” Nuclear/Hadron Physics Model” (from Shunzo Kumano)

Can they be measured? How well can we measure?

- Advancement: polarized tensor target. \rightarrow $\sim 30\%$
- Link between physics quantities and observables
inputs from theory friends

3-step approach:

- Exploration: size/sign of the observables: CAA analysis, modeling
- Dedicated first generation measurement(s): Hall C LOI/Proposals
- Precision study in wider kinematics/multi-observables: 2nd generation experiments with improved polarized target, SoLID, ...

A new exciting window to study strong interaction in nuclei

To be continued: next tensor-SIDIS workshop in ~ 2 years in Italy?

Thanks to

- Everybody attending this workshop/collaboration meeting
- Speakers for excellent talks
- Supporting from Tiffany and JLab staff supporting service
- Organizers: Alessandro, Ishara, Dustin, Elena, Karl and, especially, Jiwan, David, Nathaly.
- Others: ...