

TMD Collaboration Meeting

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June 15-17, 2022
Santa Fe, New Mexico

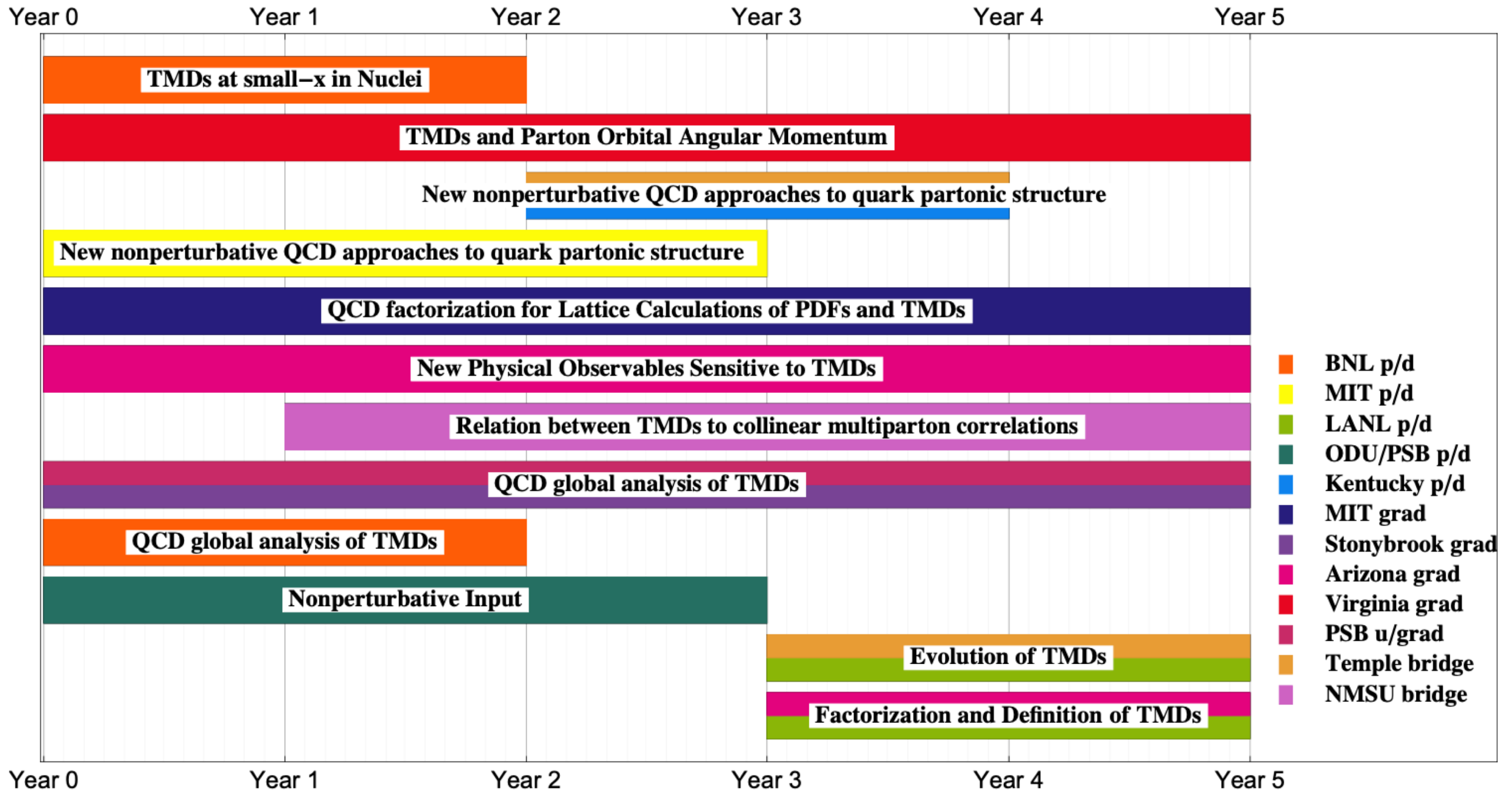
What a treat to see all of you after more than two years!

- **Exciting new development in TMD physics**
(Morning of Wed-Fri, 9:00-12:30pm)
- **TMD Handbook – would not happen without Tom & Iain!**
(Today at 2-3:30pm, Tomorrow 2-5:30pm)
- **Final Report:**
Highlights – hard to achieve without the collaboration, ...
Milestones – writing assignment, deadlines, ...
- **Future opportunities – NSF center, ...**

Jianwei Qiu

TMD Collaboration

Timetable of Activities:



Highlights:

1. Handbook
2. Summer and Winter schools
3. Global analysis –theory, lattice, phenomenology

Milestones:

- 1. Perform global fit of the quark Sivers functions from the DIS processes and make predictions for future Drell-Yan processes with the next-to-leading logarithmic TMD evolution**
- 2. Study scheme dependence in the TMD definitions and applications**
- 3. Solidify the theoretical foundations of the relationship between space-like separated matrix elements calculated using lattice QCD and the TMDs**
- 4. Extend the TMD framework to small- x in particular in the context of gluon TMDs that will be relevant at the EIC**
- 5. Investigate factorization relevant for lattice studies of PDFs through the quasi-PDF approach using lattice regulators in perturbative matching**
- 6. Extend the work in (1) to perform global analysis of all existing data on SIDIS, Drell-Yan lepton pair production and di-hadron production in e^+e^- to extract a universal set of TMDs-referred as the TMD collaboration TMD parameterization set**
- 7. Obtain a smooth description of the transverse momentum dependence of TMD-related unpolarized and polarized cross sections and a simultaneous description of the Sivers asymmetry in SIDIS and transverse SSAs for single-particle production in hadronic collision**

Milestones:

8. Investigate ways in which the functional forms of the non-perturbative input needed for TMD evolution can be constrained using phenomenology and lattice calculations
9. Extend the effort of (1) and (6) to include gluon TMDs into the QCD global fitting project using data from observables sensitive to gluon TMDs, as well as to include all other leading power TMDs, such as Boer-Mulders function $h_{\perp 1}$ and transverse spin dependent h_{1T} , higher order corrections and contributions from the matching Y -term, and more data
10. Extend the work (5) to perform lattice calculations of the x -dependence of PDFs, controlling the perturbative matching and sub-leading power corrections
11. Explore the connection between parton orbital angular momentum (OAM) and physical observables
12. Perform lattice calculations of the quark and gluon spin, orbital, and total angular momentum contributions S_q , $L_q(J_i)$, $L_g(J_i)$, and $L_q(J_M)$, $L_g(J_M)$, appearing in the J_i and Jaffe-Manohar (JM) decompositions of the nucleon spin
13. Extend the work in (4) to provide a quantitative understanding of TMDs at small- x
14. Produce a TMD handbook