

**INT Workshop INT–12–49W**  
**Orbital Angular Momentum in QCD**  
**February 6–17, 2012**

All talks in Room C–520

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**Week 1**

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<b>Mon 06–Feb</b>	<b>Introduction / Longitudinal spin structure</b>	
08:00 – 10:00		Registration in Room C–411
10:00 – 10:30	Organizers	Welcome and plan of meeting
10:30 – 11:20	N. Makins	Spin physics and the quest for orbital angular momentum
11:20 – 12:20	M. Stratmann	Spin structure from global fits – present and future (incl. EIC)
12:20 – 14:00		Lunch
14:00 – 14:30	N. d’Hose	Longitudinal spin with COMPASS
14:30 – 15:00	J.–P. Chen	Longitudinal spin with JLab 6 and 12 GeV
15:00 – 15:30	E. Aschenauer	Longitudinal spin with RHIC
15:30 – 15:50		Break
15:50 – 16:40	M. Strikman	Mechanism of semi–inclusive hadron production
16:40 – 17:30	K.–F. Liu	Lattice spin structure and gluon angular momentum – overview
17:30 – 18:30	Discussion	Future of longitudinal spin structure
<b>Tue 07–Feb</b>	<b>QCD energy–momentum tensor</b>	
09:00 – 09:50	E. Leader	Lecture: EM tensor and its relation to angular momentum
09:50 – 10:40	P. Schweitzer	Interpretation and models of QCD EM tensor
10:40 – 11:00		Break
11:00 – 11:50	S. Syritsyn	Lattice calculations of generalized form factors
11:50 – 12:20	Discussion	Physics of QCD EM tensor
12:20 – 14:00		Lunch
	<b>Angular momentum in gauge theories</b>	
14:00 – 14:50	X.–D. Ji	Lecture: Quantization of gauge theories and physical degrees of freedom
14:50 – 15:40	M. Burkardt	Field–theoretical vs. partonic formulation of angular momentum in QED
15:40 – 16:00		Break
	<b>Orbital angular momentum in light–front quantization / Few–body systems</b>	
16:00 – 16:50	Ch.–R. Ji	Angular momentum in light–front quantization
16:50 – 17:20	G. A. Miller	High– $t$ form factors and OAM
17:20 – 17:50	W. Melnitchouk	Large– $x$ structure functions and OAM
17:50 – 18:30	Discussion	OAM in the nucleon’s 3–quark component
<b>Wed 08–Feb</b>	<b>Angular momentum in QCD</b>	
09:00 – 09:20	Organizers	Questions/issues in angular momentum in QCD
09:20 – 10:20	X.–D. Ji	Angular momentum in QCD
10:20 – 10:40		Break
10:40 – 11:40	T. Goldman	Gauge invariance and energy–momentum operators
11:40 – 12:30	Discussion	Angular momentum in QCD
12:30 – 14:00		Lunch
14:00 – 14:40	M. Wakamatsu	Toward a complete decomposition of nucleon spin
14:40 – 15:20	Y. Hatta	Angular momentum in QCD
15:20 – 15:40		Break
15:40 – 16:30	E. Leader	Problems in defining separate quark and gluon momentum and angular momentum
16:30 – 18:10	Discussion	Angular momentum in QCD
18:10 – 18:30	Organizers	Informal summary
19:00		Dinner

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<b>Thu 09–Feb Orbital angular momentum in nucleon structure</b>		
09:00 – 10:00	A. Thomas	OAM and nucleon structure
10:00 – 10:40	X.–S. Chen	Gluon spin and OAM with different definitions
10:40 – 11:00		Break
11:00 – 11:40	G. Wang	Poincare covariance, canonical quantization, and gauge invariance in nucleon structure
11:40 – 12:10	Discussion	OAM in nucleon structure
12:10 – 14:00		Lunch
14:00 – 14:40	B. Pasquini	Wigner functions and light–front quark models
14:40 – 15:20	C. Lorce	OAM in transverse densities and resonances
15:20 – 15:40		Break
<b>Angular momentum sum rules</b>		
15:40 – 16:10	S. Liuti	Angular momentum sum rule for spin–1 systems
16:10 – 16:30	E. Leader	Transverse angular momentum sum rule
16:30 – 16:50	M. Burkardt	Comments on transverse angular momentum sum rule
16:50 – 18:30	Discussion	Transverse angular momentum / OAM in nucleon structure

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<b>Fri 10–Feb Orbital angular momentum in semi–inclusive scattering</b>		
09:00 – 10:00	W. Vogelsang	$p_T$ –dependent semi–inclusive scattering in QCD
10:00 – 10:40	G. Schnell	$p_T$ –dependent $ep$ experiments – overview
10:40 – 11:00		Break
11:00 – 11:40	L. Bland	OAM in $p_T$ –dependent $pp$ – overview
11:40 – 12:20	R. Seidl	Collins effect in $e^+e^-$
12:20 – 14:00		Lunch
14:00 – 14:40	Zh. Kang	OAM in collinear factorization
14:40 – 15:20	A. Metz	Single–spin asymmetries in inclusive DIS and the ETQS matrix element
15:20 – 16:00	L. Gamberg	OAM in $T$ –odd TMDs and final–state interactions
16:00 – 16:20		Break
16:20 – 16:50	M. Schlegel	Gluonic spin–orbit correlations
16:50 – 17:20	H. Avakian	TMDs with JLab 12 GeV and EIC
17:20 – 18:00	Discussion	OAM in semi–inclusive scattering
18:00 – 18:30	Organizers	Summary of Week 1 / Outlook on Week 2

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**Week 2**

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<b>Mon 13–Feb Exclusive processes: Deeply—virtual Compton scattering</b>		
09:00 – 09:50	Ch. Hyde	Exclusive experiments – overview
09:50 – 10:40	D. Müller	DVCS analysis – status and perspectives
10:40 – 11:00		Break
11:00 – 11:30	N. d’Hose	DVCS with COMPASS
11:30 – 12:10	F. Sabatie	DVCS with EIC
12:10 – 14:00		Lunch
14:00 – 14:50	M. Vanderhaeghen	Dispersion analysis of DVCS
14:50 – 15:20	C. Munoz Camacho	DVCS analysis at JLab Hall A
15:20 – 15:40		Break
15:40 – 16:10	H. Avakian	DVCS analysis at CLAS12
16:10 – 18:00	Discussion	DVCS analysis and angular momentum sum rule

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**Tue 14–Feb Exclusive processes: Vector mesons**

09:00 – 09:50	M. Guidal (remote)	Exclusive vector mesons with JLab 6 and 12 GeV
09:50 – 10:40	P. Kroll	Exclusive vector meson production and GPDs
10:40 – 11:00		Break
11:00 – 11:40	M. Vanderhaeghen	Vector meson production and GPDs: Polarization observables, angular momentum
11:40 – 12:20	Discussion	
12:20 – 14:00		Lunch
14:00 – 14:40	D. Müller	Vector meson production in QCD
14:40 – 15:00	N. d’Hose	Update on vector mesons with COMPASS
15:00 – 15:30		Break
15:30 – 16:00	C. Weiss	Comments on mechanism of vector meson production
16:00 – 18:00	Discussion	GPDs and angular momentum with vector mesons

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**Wed 15–Feb Orbital angular momentum and nucleon structure / Sea quarks**

09:00 – 09:50	A. Bacchetta (remote)	Transverse distributions and single-spin asymmetries
09:50 – 10:20	G. A. Miller	$T$ -even TMDs and nucleon deformation
10:20 – 10:40	Break	
10:40 – 11:40	S. Brodsky	OAM in semi-inclusive scattering and other QCD processes
11:40 – 12:20	Y. Goto	Sea quark spin/flavor with Drell-Yan experiments
12:20 – 14:00		Lunch

**Exclusive processes: Pseudoscalar mesons**

14:00 – 14:40	P. Kroll	Transversity in electroproduction of pseudoscalar mesons
14:40 – 15:20	S. Liuti	Transversity in exclusive $\pi^0$ and $\eta$
15:20 – 15:40		Break
15:40 – 16:10	P. Stoler	Exclusive $\pi^0$ and $\eta$ with JLab CLAS and Hall C
16:10 – 16:30	Ch. Hyde	Exclusive $\pi^0$ with JLab Hall A
16:50 – 18:00	Discussion	GPDs in pseudoscalar meson production / Sea quarks
19:00		Dinner

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**Thu 16–Feb Angular momentum in QCD**

09:00 – 09:50	D. Müller	Comments on angular momentum definitions
09:50 – 10:40	X.-S. Chen	On Leader’s criteria for separating momentum and angular momentum
10:40 – 11:00		Break
11:00 – 12:20	Discussion	Angular momentum definitions
12:20 – 14:00	Lunch	

**Follow-up discussions and contributed talks**

14:00 – 18:00		Talks/discussions to be scheduled as needed
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**Fri 17–Feb Comprehensive approach to OAM**

09:00 – 12:00	Discussion	Status of concepts and processes Combining results of different measurements Role of dynamical models
12:00 – 14:00		Lunch
14:00 – 15:00	Organizers	Summary and outlook
15:00 – 15:30		Break
15:30 – 18:00	Discussion	Priorities for future theoretical/experimental studies

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For general conference information, see <http://www.int.washington.edu/PROGRAMS/12-49w/>  
 For questions regarding the program, please contact C. Weiss (weiss@jlab.org)