

APCTP-IACS-SNBCBS Workshop on Computational Methods for Emergent Quantum Matter: From Theoretical Concepts to Experimental Realization

November 17-25, 2022

Venue: SNBCBS & IACS, Kolkata

Website: <https://www.bose.res.in/Conferences/APCTP22/program/>

Workshop Part I:

Day 1: 17 November, Thursday

Venue: Silver Jubilee Hall, SNBCBS

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
8:30-9:00	12:00-12:30	Registration (Venue: Silver Jubilee Hall (2nd Floor), SNBCBS)		
9:15-9:30	12:45-13:00	Inaugural Session (Welcome address by Organizer & Director Prof. Tanusri Saha-Dasgupta)		
9.30-10.45	13:00-14:15	Tutorial lecture 1	Manoj Kumar Harbola (IIT Kanpur)	Density Functional Theory
Tea Break				
11.15-12.30	14:45-16:00	Tutorial lecture 2	Prasanjit Samal (NISER, Bhubaneswar)	Density Functional Theory
Lunch Break at Basundhara				
14.00-15.15	17:30-18:45	Tutorial lecture 3	Manoj Kumar Harbola (IIT Kanpur)	Density Functional Theory
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk	Prasenjit Sen (HRI, Allahabad)	DFT and Beyond the Materials Design and Discovery
Tea Break				
17.00-18.30	20:30-22:00	Tutorial session	Rabeet Singh (BHU)/Prasanjit Samal (NISER, Bhubaneswar)	Density Functional Theory
19:30-21:00	-	Dinner at Basundhara		

Workshop Part I:**Day 2: 18 November, Friday****Venue: Silver Jubilee Hall, SNBNCBS**

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
9.30-10.45	13:00-14:15	Tutorial lecture 1	Manish Jain (IISc, Bangalore)	GW-BSE Method
Tea Break				
11.15-12.30	14:45-16:00	Tutorial lecture 2	Jaejun Yu (Seoul National University, South Korea)	Wannierization and Identification of Topological Phases
Lunch break at Basundhara				
14.00-15.15	17:30-18:45	Tutorial lecture 3	Manish Jain (IISc, Bangalore)	GW-BSE Method
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk	Saswata Bhattacharya (IIT Delhi)	Probing Excited States in Materials: Benchmarking Hybrid DFT vs GW vs BSE vs model BSE
Tea Break				
17.00-18.30	20:30-22:00	Tutorial session	Manish Jain (IISc, Bangalore)	GW-BSE Method
19:30-21:00	-	Dinner at Basundhara		

Workshop Part I:**Day 3: 19 November, Saturday****Venue: Silver Jubilee Hall, SNBNCBS**

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
9.30-10.45	13:00-14:15	Tutorial lecture 1	Jaejun Yu (Seoul National University, South Korea)	Wannierization and Identification of Topological Phases.
Tea Break				
11.15-12.30	14:45-16:00	Tutorial lecture 2	Hosho Katsura (University of Tokyo, Japan)	Magnonic analogs of topological insulators in 2 and 3 dimensions.

Lunch break at Basundhara				
14.00-15.15	17:30-18:45	Perspective Talk	Tanusri Saha-Dasgupta (SNBNCBS, Kolkata)	From Materials to Models.
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk	Priya Mahadevan (SNBNCBS, Kolkata)	Using wannier functions to get insights into the electronic structure.
Tea Break				
17.00-18.30	20:30-22:00	Tutorial session	Rabeet Singh (BHU)/ Prasanjit Samal (NISER, Bhubaneswar)	Density Functional Theory/ Wannier Function and Topology (Applications).
19:30-21:00	-	Dinner at Basundhara		

Day 4: 20 November, Sunday

Break

(Excursion for participants and speakers staying in guest house and hotels)

Workshop Part I:

Day 5: 21 November, Monday

Venue: Silver Jubilee Hall,SNBNCBS

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
9.30-10.45	13:00-14:15	Tutorial lecture 1 (Online)	Alok Shukla (IIT Bombay)	Wavefunction-based methods
Tea Break				
11.15-12.15	14:45-15:45	Talk	Arijit Haldar (SNBNCBS, Kolkata)	Higher order topology in quantum spin models
Lunch break at Basundhara				
14.00-15.15	17:30-18:45	Tutorial lecture 2 (Online)	Alok Shukla (IIT Bombay)	Wavefunction-based methods
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk	Dipankar Das Sarma (IISc Bangalore)	Basic considerations of electronic and magnetic structures of transition metal compounds
Tea Break				
17.00-18.30	20:30-22:00	Tutorial session	PritamBhattacha	Wavefunction/Wannier

		(Online)	ryya (IFW Dresden, Germany)	Function & Topology (Applications)
19:30-21:00	-	Dinner at Basundhara		

Workshop Part II:

Day 6: 22 November, Tuesday

Venue: Silver Jubilee Hall, SNBNCBS

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
9.30-10.45	13:00-14:15	Tutorial lecture 1	Suryanarayana Ramasesha (IISc, Bangalore)	Introduction to Density Matrix Renormalization Group (DMRG) method.
Tea Break				
11.15-12.30	14:45-16:00	Tutorial lecture 2	Tokuro Shimokawa (Okinawa Institute of Science and Technology, Japan)	Exact Diagonalization (ED)
Lunch break at Basundhara				
14.00-15.15	17:30-18:45	Tutorial lecture 3	Tokuro Shimokawa (Okinawa Institute of Science and Technology, Japan)	Exact Diagonalization (ED)
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk	Sumitendra Mazumdar (University of Arizona, USA)	Why has it been so difficult to arrive at a consistent theory of superconductivity in the high Tc cuprates?
Tea Break				
17.00-18.30	20:30-22:00	Tutorial session	Tokuro Shimokawa (Okinawa Institute of Science and Technology, Japan)	Exact Diagonalization (ED)
19:30-21:00	-	Dinner at Basundhara		

Workshop Part II:

Day 7: 23 November, Wednesday Venue: **Silver Jubilee Hall,SNBNCBS (9:00-12:00 IST)**
IACS (14:30-18:45 IST)

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		

9.00-10.15	12:30-13:45	Tutorial lecture 1 (Online)	Arun Paramakanti (University of Toronto, Canada)	Modern Mean Field theory (MFT)
Tea Break				
10:45-12.00	14:15-15:30	Tutorial lecture 2	Suryanarayana Ramasesha (IISc Bangalore)	Introduction to Density Matrix Renormalization Group (DMRG) method.
Lunch break at Basundhara				
14.30-15.45	18:00-19:15	Tutorial lecture 3	Suryanarayana Ramasesha (IISc Bangalore)	Introduction to Density Matrix Renormalization Group (DMRG) method.
Tea Break				
16.15-17:15	19:45-20.45	Perspective Talk	Masaki Oshikawa (University of Tokyo, Japan)	Protecting quantum criticality.
17.15-18.45	20:45-22:15	Perspective Talk	Debashree Ghosh (IACS, Kolkata)	Matrix product states on strongly correlated systems.
High Tea at IACS				
Dinner at Basundhara, SNBNCBS				

Workshop Part II:

Day 8: 24 November, Thursday

Venue: Silver Jubilee Hall, SNBNCBS

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
9.30-10.45	13:00-14:15	Tutorial lecture 1 (Online)	Arun Paramakanti (University of Toronto, Canada)	Modern Mean Field theory (MFT)
Tea Break				
11.15-12.30	14:45-16:00	Tutorial lecture 2	Tsuyoshi Okubo (University of Tokyo, Japan)	Tensor Network Method
Lunch break at Basundhara				
14.00-15.15	17:30-18:45	Tutorial lecture 3	Tsuyoshi Okubo (University of Tokyo, Japan)	Tensor Network Method
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk (Online)	Masafumi Udagawa (Gakushuin University, Tokyo, Japan)	Detection of Majorana zeromode in Kitaev's honeycomb spin liquid.
Tea Break				
17.00-18.30	20:30-22:00	Tutorial session	Tsuyoshi Okubo (University of	Tensor Network Method

			Tokyo, Japan)	
19:30-21:00	-	Dinner at Basundhara		

Workshop Part II:

Day 9: 25 November, Friday

Venue: Silver Jubilee Hall,SNBNCBS

Time		Session Type	Speaker	Topic
IST	KST/JST			
7:30-9:00	-	Breakfast at Basundhara		
9.30-10.45	13:00-14:15	Tutorial lecture 1	Subhro Bhattacharjee (ICTS Bangalore)	Modern Mean Field theory (MFT)
Tea Break				
11.15-12.30	14:45-16:00	Perspective Talk	Arnab Sen (IACS, Kolkata)	Emergent behavior at low and high energies in some frustrated magnets
Lunch break at Basundhara				
14.00-15.15	17:30-18:45	Tutorial lecture 2	Subhro Bhattacharjee (ICTS Bangalore)	Modern Mean Field theory (MFT)
Tea Break				
15.45-16:45	19:15-20.15	Perspective Talk	Hosho Katsura (University of Tokyo, Japan)	Flat bands and related topics
Tea Break				
17.00-18.30	20:30-22:00	Discussions + Concluding Remarks		