Recent Developments on Mixing Times: March 17-21, 2025

Events for:
Monday, March 17th - Friday, March 21st

Monday, March 17th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Shirshendu Ganguly - SCGP 102**

Speaker: Shirshendu Ganguly

Title: Ergodicity, mixing and classification of Gibbs states for area-tilted Brownian lines

Abstract: Gibbsian line ensembles are natural Markovian objects that have been the topic of much recent interest at the interface of probability and statistical physics, most prominently via the Airy line ensemble occurring as a scaling limit of Dyson Brownian motion. Recently, Caputo, Ioffe and Wachtel [CIW] have proposed an area-tilted variant of this ensemble, satisfying a corresponding Gibb/domain Markov property, aiming to capture the local behavior of level curves in entropically repulsed 3D Ising interfaces, representing a long line of study originating in Bricmont, El Mellouki and Fröhlich (1986). This naturally leads to central questions around theergodicity, rate of mixing, and classification of all possible infinite-volume states with this Gibbs property. The lack of exchangeability, and by consequence, integrability, renders this problem difficult to attack via established techniques. In this talk, we will review some recent progress in our understanding of such line ensembles, via the development of probabilistic and geometric tools.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Reza Gheissari**

Speaker: Reza Gheissari

Title: Phase ordering for the Ising dynamics on random regular graphs

Abstract: At low-temperatures, the mixing time of the Ising Glauber dynamics is exponentially slow due to a bottleneck between the mostly plus and mostly minus phases. One may then ask if this is in some sense the “only” obstruction to fast mixing . While this is true in the complete graph, on graphs with non-trivial geometry, more local obstructions can slow down mixing even when restricted to the majority plus phase. The question of rapid phase ordering asks whether a small amount of bias towards plus in the initialization leads to rapid mixing to the majority-plus phase. We present some progress on this question on random regular graphs. Based on joint work with Allan Sly and Youngtak Sohn.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

1:30pm **Workshop: Lingfu Zhang - SCGP 102**

Speaker: Lingfu Zhang

Title: Cutoff of the Repeated Averaging Process on Graphs

Abstract: Consider a connected finite graph where each vertex is assigned a (real) number. At each step, an edge is chosen uniformly at random, and the numbers at its two endpoints are both replaced by their average. It is evident that, almost surely, all numbers will converge to their overall average. An intriguing problem is to determine how fast this happens, particularly in terms of the L1 distance to the limit, analogous to total-variation mixing in Markov chains. So far, L1 cutoffs have been proved for complete graphs, complete bipartite graphs, and hypercubes, while a no-cutoff result has been established for lattices. I will discuss ongoing work in which we establish a cutoff for random regular graphs. Our proof is based on new mixing criteria and should extend to general graphs with a spectral gap and some transitive structures.

2:30pm **Workshop: Samira Arfaee, Eyob Tsegaye, and Seoyeon Yang - SCGP 102**

Speaker: 1) Samira Arfaee, 2) Eyob Tsegaye, 3) Seoyeon Yang

Title: 1) k-star transposition shuffle, 2) Mixing Time and Cutoff for the Capacity k Symmetric Partial Exclusion Process3) Cutoff and Dynamical Phase Transition for the General Multi-componentIsing Model

Abstract: 1) In this talk, I will talk about the k-star transposition shuffle,an interpolation between random and star transpositions. This shuffle has k central elements. At each step, we transpose one of these cards with a random card. We have diagonalized the transition matrix of the shuffle and using that we have proved the occurrence of the total variation cut-off at time $t_{n} = {\frac{2n-(k+1)}{2(n-1)}} n\log(n)$ with window $w_{n} = {\frac{2n-(k+1)}{2(n-1)}} n$. The talk will be based on joint work with E. Nestoridi. 2) The capacity k symmetric partial exclusion process (k-SPEP),introduced by Schütz and Sandow, is a natural generalization of the symmetric simple exclusion process (SSEP) to a setting where each site can hold at most k particles for a fixed integer k. We investigate the mixing time of the k-SPEP with m particles on a segment of length N and show that this process exhibits cutoff at time $\frac{1}{2k\pi^2}N^2\log m$. We also introduce a related complete multi-species process that we call the $S_{k,N}$ shuffle and show that this process exhibits cutoff at time $\frac{1}{2k\pi^2}N^2\log N$. This extends a similar result of Lacoin, which determined the mixing time of the SSEP on a segment of length N and the adjacent transposition shuffle, and proved cutoff in both. 3) We study the multi-component Ising model, which is also known as theblock Ising model. In this model, the particles are partitioned into a fixed number of groups with a fixed proportion, and the interaction strength is determined by the group to which each particle belongs. We demonstrate that the Glauber dynamics on our model exhibits the cutoff$\mbox{--}$metastability phase transition as passing the critical inverse-temperature β_{cr}, which is determined by the proportion of the groups and their interaction strengths, regardless of the total number of particles. For $\beta\beta_{cr}$, the dynamics shows a cutoff at $ \alpha n\log n$ with a window size $O(n)$, where α is a constant independent of n. For $\beta=\beta_{cr}$, we prove that the mixing time is of order $n^{3/2}$. In particular, we deduce the so-called non-central limit theorem for the block magnetizations to validate the optimal bound at $\beta=\beta_{cr}$. For $\beta>\beta_{cr}$, we examine the metastability, which refers to the exponential mixing time. Our results, based on the position of the employed Ising model on the complete multipartite graph, generalize the results of previous versions of the model.

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

4:00pm **Workshop: Ritesh Goenka, Mira Gordin, and Yuhan Jiang - SCGP 102**

Speaker: 1) Ritesh Goenka, 2) Mira Gordin, 3) Yuhan Jiang

Title: 1) Cutoff for a generalized Bernoulli-Laplace model, 2) Vector-Valued Concentration & Random Walks on Groups, 3) The doubly asymmetric simplex exclusion process

Abstract: 1) In 1987, Diaconis and Shahshahani showed that the Bernoulli-Laplace urn model exhibits the cutoff phenomenon. Since then, many generalizations of the model have been proposed and studied. One such model consists of d urns, each containing $2n$ black/white balls, with a total of dn balls of each color. In each step, a uniformly chosen ball from each urn is moved cyclically to the following urn. Nestoridi and White obtained bounds on the mixing time of a lifting of this chain. We prove that the cyclic shift chain described aboveexhibits cutoff. More generally, we establish cutoff for a model consisting of dmn balls of m colors distributed across d urns, in which balls are moved across urns according to a permutation sampled from a fixed distribution μ on the symmetric group S_d. Additionally, under reversibility, we obtain a sharp cutoff window and establish cutoff when the distribution μ varies with n. Our proofs use spectral profile estimates, comparison arguments, and hit-mix relations. This talk is based on joint work with Jonathan Hermon and Dominik Schmid. 2) Existing concentration inequalities for functions that take values in a general Banach space, such as the classical results of Pisier (1986), are previously known only in very special settings, such as the Gaussian measure on R^n and the uniform measure on the discrete hypercube {-1,1}^n, both examples of product spaces. Work of Ivanisvili, van Handel, and Volberg (2020) improved the known dimensional constant on the hypercube, proving a 40-year-old conjecture of Enflo in the metric theory of Banach spaces -- their argument used a Markov semigroup interpolation argument that enabled this long-sought improvement. We build on this probabilistic technique in order to prove the first such inequality to go beyond theproduct spaces, in the setting of the symmetric group. I will discuss the implications of the inequality for the metric geometry of Banach spaces, as well as our proof techniques, which are related to the mixing times of random walks on groups. This talk is based on joint work with Ramon van Handel. 3) The multispecies asymmetric simple exclusion process (mASEP) is a Markov chain in which particles of different species hop along a one-dimensional lattice. This paper studies the doubly asymmetric simple exclusion process DASEP(n,p,q) in which q particles with species 1,...,p hop along a circular lattice with n sites, but also, the particles are allowed to change from one species to another spontaneously. In this paper, we introduce two related Markov chains called the colored Boolean process and the restricted random growth model, and we show that the DASEP lumps to the colored Boolean process and the colored Boolean process lumps to the restricted random growth model. This allows us to generalize a theorem of David Ash on the relations between sums of steady- state probabilities. In particular, the stationary distribution of the DASEP exhibits a polynomial generalization of the combinatorialphenomenon called homomesy, defined by Propp and Roby. We also give explicit formulas for the stationary distribution of DASEP(n,2,2).

Tuesday, March 18th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Cyril Labbe - SCGP 102**

Speaker: Cyril Labbe

Title: Cutoff phenomenon in nonlinear recombinations

Abstract: We consider a quadratic dynamical system over probability measures on the Boolean cube, known as nonlinear recombinations. Actually we consider a discrete time and a continuous time version of this dynamics. In both cases, we establish a cutoff phenomenon for the total-variation distance to equilibrium, as the dimension of the cube diverges. Joint work with Pietro Caputo and Hubert Lacoin.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Jonathan Hermon - SCGP 102**

Speaker: Jonathan Hermon

Title: Cutoff for random walks on nilpotent groups

Abstract: Under a certain degree-rank-step condition, the spectral gap and the epsilon total variation mixing time of the walk on G are determined by those of the projection of the walk to the abelianization G/[G,G]. We'll discuss this and the following new cutoff result: for random walks on nilpotent groups cutoff is equivalent to the product condition under a certain degree condition. Joint work with Zoe Huang and Justin Salez.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

1:30pm **Workshop: Gerardo Barrera - SCGP 102**

Speaker: Gerardo Barrera

Title: Cutoff phenomenon for the ergodic CIR process and extensions

Abstract: In this presentation we investigate the convergence to equilibrium as the noise intensity ϵ tends to zero for ergodic random systems out of equilibrium driven by multiplicative non-linear noise of the following type \[d X^{\epsilon}_t(x)=(b-aX^{\epsilon}_t(x))dt+\epsilon \sqrt{X^{\epsilon}_t(x)}dB_t,\quad X_0=x, \]where $x>0$, $a>0$ and $b>0$ are constants, and $(B_t)_{t>0}$ is a one-dimensional standard Brownian motion.More precisely, we establish the occurrence of the so-called profile cutoff phenomenon in the total variation distance and in the renormalized Wasserstein distance when the intensity of the noise tends to zero. Our results include explicit cut-off time, explicit time window, and explicit profile function. Furthermore, asymptotics of the so-called mixing times are given explicitly. This is based in the paper Profile cut-off phenomenon for the ergodic Feller root process, SPA 2025, with Liliana Esquivel, Universidad de Puerto Rico, Puerto Rico.

2:30pm **Workshop: Brune Massoulie, Zsuzsanna Baran, and Andjela Sarkovic - SCGP 102**

Speaker: 1) Brune Massoulie, 2) Zsuzsanna Baran, 3) Andjela Sarkovic

Title: 1) Cutoff for the mixing time of the Facilitated Exclusion Process and the Symmetric, 2) Mixing of a random walk on a randomly twisted hypercube Exclusion Process with Traps, 3)Mixing of a random walk on a randomly twisted hypercube

Abstract: 1) The facilitated exclusion process (FEP) is a particle system, where particles evolve on a periodic one-dimensional lattice. Particles jump while following an exclusion constraint and a kinetic constraint (a local condition on the neighbours). These constraints make the FEP non-reversible, in particular, after a transience time, the system either becomes frozen forever, or reaches a set of ergodic configurations among which it will continue to evolve. We estimate this transience time and prove a cutoff phenomenon by introducing a novel mapping to another process, the SSEP with traps. It is then possible to study the mixing time, in the case where the FEP doesn't freeze: using a bijective mapping, we are able to show that the time spent in the transient phase and the ergodic phase balance each other out, which proves cutoff. 2) We study the mixing properties of a simple or lazy random walk on a randomly twisted hypercube. In both cases we establish the order of the mixing time and prove that the model does not exhibit cutoff. Joint work with Andjela Sarkovic. 3) We study the mixing properties of a simple or lazy random walk on a randomly twisted hypercube. In both cases we establish the order of the mixing time and prove that the model does not exhibit cutoff. Joint work with Zsuzsanna Baran

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

4:00pm **Workshop: Alan Yan, Amanda Priestley, and Stefan Oberdorster**

Speaker: 1) Alan Yan, 2) Amanda Priestley, 3) Stefan Oberdorster

Title: 1) Cutoff for the Biased Random Transposition Shuffle, 2) A probabilistic parking process and labeled IDLA, 3) Accelerated Mixing in Markov chain Monte Carlo

Abstract: 1) The biased random transposition shuffle is a natural generalization of the classical random transposition shuffle studied by Diaconis and Shahshahani. In this variation, rather than selecting two cards uniformly at random and swapping them, two cards are still chosen, but with a higher probability of selecting from one half of the deck over the other. By diagonalizing the transition matrix of the biased random transposition shuffle, we show that it exhibits total variation cutoff with window N. We also show that the limiting distribution of the number of fixed cards near the cutoff time is Poisson. 2) In 1966, Konheim and Weiss introduced a new classical parking protocol. The deterministic process and its resultant objects, known as parking functions, have since become a favorite object of study in enumerative combinatorics. In our work, we introduce and study a probabilistic variant of the classical parking protocol, which is closely related to Internal Diffusion Limited Aggregation, or IDLA, introduced in 1991 by Diaconis and Fulton. In particular, we show that if one runs our probabilistic parking protocol starting with a parking function whose outcome permutation (in the sense of the classical parking process of Konheim and Weiss) is the identity permutation, then we can compute the exact probability that all of the cars park. Furthermore, we compute the expected time it takes for the protocol to complete assuming all of the cars park, and prove that, in time it takes for the protocol to complete assuming all of the cars park, and prove that, in some cases, the parking process is negatively correlated. In addition, we study statistics of uniformly random weakly increasing parking functions, a subset of parking functions whose outcome is the identity permutation. In particular, we give the distribution of the last entry of a weakly increasing parking function, along with the probability that a specific set of cars is lucky, and the expected number of lucky cars. 3) In recent years, we witnessed considerable progress on the quantitative mixing of non-reversible Markov processes, such as the Langevin diffusion, via the theory of space-time Poincaré inequalities and lifts. Under assumptions revolving around the concentration of measure phenomenon, these dynamics achieve accelerated convergence to equilibrium, also known as the diffusive-to-ballistic speed-up. This acceleration is of great interest to the field of Markov chain Monte Carlo methods. To bridge the gap between theory and application, a natural first question is: Does the No-U-turn sampler, a widely used implementation of the Langevin diffusion, achieve the speed-up? We will explore this question via a combination of concentration of measure and couplings.

Wednesday, March 19th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Pierre Youssef - SCGP 102**

Speaker: Pierre Youssef

Title: Regularized functional inequalities, discrete curvature, and applications to Markov chains

Abstract: Functional inequalities in discrete settings play a key role in establishing concentration inequalities as well as capturing mixing properties of the underlying dynamics. We investigate the hierarchy of some standard functional inequalities, namely log-Sobolev inequality (LSI), modified log-Sobolev inequality (MLSI), and Poincaré inequality (PI). Using a regularization trick, we provide sharp comparisons between those inequalities. We present several applications of this, answering some open problems regarding mixing times, in particular for the switch chain on regular graphs. We also investigate connections to discrete curvature and the Peres-Tetaliconjecture. This is based on joint works with Justin Salez and Konstantin Tikhomirov.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Xiangying (Zoe) Huang - SCGP 102**

Speaker: Xiangying (Zoe) Huang

Title: Cutoff for Cayley Graphs of Nilpotent Groups

Abstract: We study the mixing behavior of random walks on Cayley graphs of nilpotent groups, with a focus on their connection to the projected walks on the Abelianizations. For a generating set S of a nilpotent group G, we establish that under a degree condition on $|S|$, the spectral gap and the ε-mixing time of the simple random walk $X = (X_t)_{t \geq 0}$ on the corresponding Cayley graph are asymptotically equivalent to those of the projected walk on the Abelianization, represented by $[G,G] X_t$. Consequently, X exhibits cutoff if and only if its projection does. Furthermore, when the generating set S consists of k elements sampled uniformly at random with replacement from G, and $1 \ll \log k \ll \log |G|$, we show that the simple random walk on the resulting Cayley graph exhibits cutoff with high probability. The cutoff time, in this case, is determined by the cutoff time of the projected walk on the Abelianization. This work is based on joint research with Jonathan Hermon.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

12:00pm **Workshop: Group Photo - SCGP Lobby**

Title: Group Photo

1:30pm **Workshop: Luca Zanetti - SCGP 102**

Speaker: Luca Zanetti

Title: Curvature and concentration in time-inhomogeneous Markov chains,

Abstract: We consider time-inhomogeneous Markov chains with transition kernels that contract in Wasserstein distance. We discuss convergence and concentration of measure phenomena, and explore applications to the analysis of stochastic gradient descent in dynamic environments.

2:30pm **Workshop: Balazs Gerencser - SCGP 102**

Speaker: Balazs Gerencser

Title: Simultaneous cutoff for Markov chains on the multitype configuration model

Abstract: With the conceptual aim of optimizing Markov chains in one way or another for better mixing, we analyze them on random directed graphs according to a multitype configurational model. We rely on the elaborate work for cutoff by Bordenave, Caputo, Salez (2018),originally for simple random walks on random directed graphs without types. This time, we allow tuning the transition probabilities corresponding to the types. Our goal is to understand the possible impact on mixing achieved through this flexibility, together with its effect on the cutoff picture. Joint work with John Fernley.

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

4:00pm **Workshop: Lucas Teyssier - SCGP 102**

Speaker: Lucas Teyssier

Title: Cutoff profiles for conjugacy invariant walks on symmetric groups

Abstract: In this talk we will discuss extensions of random transpositions to other conjugacy classes. The main result that we will present is the cutoff profile for these random walks, under a mild assumption on the number of fixed points. The proof is based on a new method to estimate the characters of symmetric groups. During the talk we will present the main combinatorial formulas that allow to compute the eigenvalues of such chains, and explain how to estimate them asymptotically. This is joint work with Sam Olesker-Taylor and Paul Thévenin.

4:40pm **Workshop: Peter Neijar - SGCP 102**

Speaker: Peter Neijar

Title: Limit profiles of ASEP

Abstract: We consider ASEP on the segment and obtain limit profiles for various initial data. Joint work with David Bernal.

6:00pm **Workshop: Banquet Dinner - SCGP Cafe**

Title: Banquet Dinner

Thursday, March 20th

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Antonio Blanca - SCGP 102**

Speaker: Antonio Blanca

Title: Sampling from the Potts model at low temperatures via random-cluster dynamics

Abstract: Sampling from the q-state ferromagnetic Potts model is a fundamental problem in statistical physics, probability theory, and theoretical computer science. On general graphs, this problem is known to be #BIS-hard, but in recent years, there has been significant progress showing the existence of efficient sampling algorithms for several families of graphs and temperature regimes. In this talk, I will present recent results that aim to understand the minimal structural properties of graphs that enable polynomial-time sampling from the q-state ferromagnetic Potts model at low temperatures with random-cluster Markov chains. Our results demonstrate that a key graph property behind fast or slow convergence time for these dynamics is whether the independent edge-percolation on the graph admits a strongly supercritical phase. Specifically, we prove that such a condition implies fast mixing of the random-cluster dynamics on graphs of at most stretched-exponential volume growth and locally treelike graphs. Based on joint work with Reza Gheissari

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Charis Efthymiou - SCGP 102**

Speaker: Charis Efthymiou

Title: On sampling two spin models using the local connective constant

Abstract: This work establishes novel, optimum mixing bounds for the Glauber dynamics on the Hard-core and Ising models . These bounds are expressed in terms of the local connective constant of the underlying graph G. This is a notion of "effective degree" of G on a local scale. Our results have some interesting consequences for bounded degree graphs:* They include the max-degree bounds as a special case, * they improve on the running time of the FPTAS considered in [Sinclair, Srivastava, Stefankonvic and Yin: PTRF 2017], * they allow us to obtain mixing bounds in terms of the spectral radius of the adjacency matrix and improve on results in [Hayes: FOCS 2006], * they also allow us to refine the celebrated connection between the hardness of approximate counting and the phase transitions from statistical physics. We obtain our mixing bounds by utilising the k-non-backtracking matrix H(G,k). This is a very interesting, alas technically intricate, object to work with. We upper bound the spectral radius of the pairwise influence matrix I_G by means of the 2-norm of H(G,k). To our knowledge, obtaining mixing bound using H(G,k) has not been considered before in the literature.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

1:30pm **Workshop: Oanh Nguyen - SCGP 102**

Speaker: Oanh Nguyen

Title: Dynamics of Epidemics on Random Graphs

Abstract: We discuss the spread of infectious diseases on random graphs through various epidemic models, including SIS, SIR, and SIRS. Our focus is on understanding key dynamical properties such as survival time, phase transitions, and the long-term behavior of infections in these networks. We examine how the underlying graph structure influences the spread, persistence, and extinction of epidemics. This talk is based on joint works with Bhamidi, Lam, Nam, Sly, and Yang.

2:30pm **Workshop: Sam Olesker-Taylor**

Speaker: Sam Olesker-Taylor

Title: A Randomised Approach to Sorting

Abstract: We introduce and analyse a new, extremely simple, randomised sorting algorithm: choose a pair of indices according to some distribution, sort the elements in positions and of the array in ascending order. We prove that taking , the harmonic sorter, leads to an order- sorting time. The sorter trivially parallelises in the asynchronous setting, yielding a linear speed-up. We also exhibit a low-communication, synchronous version with a linear speed-up.

3:10pm **Workshop: Kyprianos Iason-Prodomidis - SCGP 102**

Speaker: Kyprianos Iason-Prodomidis,

Title: Mixing Time of the Glauber Dynamics for the Critical Ising Model on Sparse Graphs,

Abstract: We consider the Ising Model on a graph on n vertices with maximal degree d and examine the mixing time of the respective Glauber Dynamics. It is known that for ? below the tree uniqueness threshold ?c, the mixing time of the Glauber Dynamics has order n log (n), while for ? > ?c and most d-regular graphs, mixing is exponentially slow. In this talk, we explain how the Stochastic Localization method can be used to prove that at the critical value ? = ?c, the mixing time is polynomial in n. If time permits, we will discuss ongoing work aiming to prove this result for graphs that are sparse on average. Joint work with Allan Sly.

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time

Friday, March 21st

8:30am **Workshop: Breakfast - SCGP Cafe**

Title: Breakfast

9:30am **Workshop: Jimmy He - SCGP 102**

Speaker: Jimmy He

Title: Cutoff profile for the ASEP with one open boundary

Abstract: Consider the ASEP on a finite interval with one open boundary. This system will eventually reach equilibrium, but how long does this take? This question was studied by Gantert, Nestoridi, and Schmid, who established the cutoff phenomenon for this Markov chain which says that the first order behavior is a sharp transition to equilibrium. In joint work with Dominik Schmid, we refine their result, studying the shape of the convergence. The proof uses ideas from integrable probability.

10:30am **Workshop: Coffee Break - SCGP Cafe**

Title: Coffee Break

11:00am **Workshop: Justin Salez - SCGP 102**

Speaker: Justin Salez

Title: An information-differential approach to cutoff

Abstract: In this talk, I will describe a new approach to cutoff for non-negatively curved Markov processes, based on a certain differential relation between entropy and varentropy. I will then present several applications, including conjugacy-invariant random walks on groups, diffusions on manifolds, or Glauber dynamics for sampling from high-temperature spin systems.

12:00pm **Workshop: Lunch - SCGP Cafe**

Title: Lunch

3:30pm **Workshop: Tea Time - SCGP Cafe**

Title: Tea Time