

Two one-day

Colloquia in Combinatorics

09 and 10 May 2018

If attending both days, please keep this programme for day two



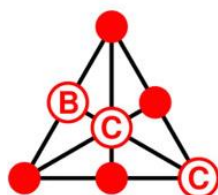
#CC2018 @QMULMaths @LSEMaths

QMUL & LSE have hosted the Colloquia in
Combinatorics for the past eleven years.

Thank you for joining us and supporting us through
the years.

SUPPORT

Support for this event from the London
Mathematical Society (www.lms.ac.uk) and the
British Combinatorial Committee
(www.britishcombinatorial.wordpress.com) is
gratefully acknowledged.



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INFORMATION

Those interested are welcome to attend for all or any part of the event; it is hoped that many people will be able to attend for both days.

Some funds are available to contribute to the **basic** travel expenses of **UK-based research students** who attend the meetings. We ask you to keep costs to a minimum, using public transport on **all** occasions and off-peak student travel tariffs wherever possible. Receipts for all journeys must be maintained as proof of travel. At this stage, we are unable to confirm the maximum amount available. Expense claim forms are available at the event from the event organisers. Please contact Enfale Farooq (e.farooq@lse.ac.uk) for further information.

Event organisers: Julia Böttcher (LSE), David Ellis (QMUL), Jan van den Heuvel (LSE), Jozef Skokan (LSE) and Justin Ward (QMUL).

WEDNESDAY 09 MAY 2018

Schedule

The first day of the Colloquia in Combinatorics will be held at Queen Mary, University of London, starting at 10.30am. Everyone interested is welcome to attend any part of the event. All the talks will be held in the Peston Lecture Theatre, Graduate Centre, Mile End Campus, QMUL. Refreshment breaks will be taken in the Graduate Centre Foyer.

Time	Speaker	Presentation title
10:00	Coffee (<i>Graduate Centre Foyer</i>)	
10:30	Carsten Thomassen	The weak circular flow conjecture and its consequences
11:20	János Pach	Erdős, Tutte, and butterflies
12:10	Lunch (<i>own arrangements – options on campus and nearby</i>)	
13:30	Paul Russell	Monochromatic infinite sumsets
14:20	Katherine Staden	Stability via symmetrisation
15:10	Afternoon tea break (<i>Graduate Centre Foyer</i>)	
15:40	Agelos Georgakopoulos	From mafia expansion to analytic functions in percolation theory
16:30	Nikhil Bansal	An algorithmic version of Banaszczyk's discrepancy theorem
17:30	Reception (<i>Senior Common Room, 1st Floor, Queen's Building</i>)	

10:30 Carsten Thomassen (Technical University of Denmark)

The weak circular flow conjecture and its consequences

Jaeger's weak circular flow conjecture (now a theorem) says that, for each odd natural number k , there exists a natural number $f(k)$ such that every $f(k)$ -edge-connected graph has an orientation which is balanced modulo k . We discuss some recent applications to graph factors modulo k , group-flow, unit-vector-flow, and the 1-2-3-conjecture.

11:20 János Pach (EPFL and Rényi Institute)

Traingles: Erdős, Tutte, and butterflies

In 1934, during his first visit to Trinity College, Cambridge, the 21 years old P. Erdős raised the following question: Is it possible to tile a unit square with finitely many smaller squares, no two of which are congruent? It has taken a few years before four promising students at Trinity College, R. L. Brooks, C. A. B. Smith, A. H. Stone, and W. T. Tutte, all of whom became prominent mathematicians, managed to answer Erdős's question in the affirmative. I will report on some recent developments related to this question, motivated by several conjectures of R. Nandakumar. In particular, we prove that the plane cannot be tiled with pairwise noncongruent triangles of the same area and the same perimeter.

This is joint work with Andrei Kupavskii and Gábor Tardos.

13:30 Paul Russell (University of Cambridge)

Monochromatic infinite sumsets

It is well known that there is a finite colouring of the natural numbers such that there is no infinite set X with $X + X$ (the pairwise sums from X , allowing repetition) monochromatic. It is easy to extend this to the rationals. Hindman, Leader and Strauss showed that there is also such a colouring of the reals, and asked if there exists a space 'large enough' that for every finite colouring there does exist an infinite X with $X + X$ monochromatic. We show that there is indeed such a space.

This is joint work with Imre Leader.

14:20 Katherine Staden (University of Oxford)

Stability via symmetrisation

The method of symmetrisation was employed by Zykov in 1949 to give a new proof of Turán's theorem in graph theory. Since then it has been useful in other extremal problems. In this talk, I will discuss a sufficient condition for the stability property of extremal graph problems that can be solved via this method. Our criterion is stated in terms of the analytic limit version of the problem. We show that, for example, it applies to the inducibility problem for an arbitrary complete bipartite graph B , which asks for the maximum number of induced copies of B in an n -vertex graph.

This is joint work with Hong Liu, Oleg Pikhurko and Maryam Sharifzadeh.

15:40 Agelos Georgakopoulos (University of Warwick)

From mafia expansion to analytic functions in percolation theory

I will present a (finite) random graph model that admits various definitions, one of which is via a percolation model on an infinite group. This will lead us to an excursion into classical results and open problems in percolation theory. The talk will be pitched at the non-expert, and with an emphasis on the usefulness of combinatorial ideas.

This is partly joint work with J. Haslegrave, and with C. Panagiotis.

16:30 Nikhil Bansal (Eindhoven University of Technology)

An algorithmic version of Banaszczyk's discrepancy theorem

In the 90's Banaszczyk developed a very powerful method for discrepancy problems, that goes beyond the partial coloring method. His result was based on deep ideas from convex geometry and was non-constructive. In this talk, I will present an alternate proof of this result, which is based on elementary techniques and also gives an efficient algorithm. This leads to the first efficient algorithms for several previous results in discrepancy.

Based on joint work with Daniel Dadush, Shashwat Garg and Shachar Lovett.

Mile End Campus

Educational/Research

ArtsOne	37
ArtsTwo	35
Arts Research Centre	39
Bancroft Building	31
Bancroft Road Teaching Rooms	10
Peter Landin Building (Computer Science)	6
Engineering Building	15
G.E. Fogg Building	13
G.O. Jones Building	25
Geography	26
Graduate Centre	18
Informatics Teaching Laboratories	5
Joseph Priestley Building	41
Library	32
Law	36
Lock-keeper's Cottage	42
Occupational Health and Safety Directorate	12
People's Palace/Great Hall	16
Queens' Building	19
Scape Building	64
Temporary Building	61

Building construction site	14
Building closed for major refurbishment	4


Residential

Albert Stern Cottages	3
Albert Stern House	1
Beaumont Court	53
Chapman House	43
Chesney House	45
Creed Court	57
France House	55
Feilden House	46
Hatton House	40
Ifor Evans Place	2
Lindop House	21
Lodge House	50
Lynden House	59
Maurice Court	58
Maynard House	44
Pooley House	60
Selincourt House	51
Varey House	49

Facilities

Advice and Counselling Service	27
Bookshop	22
Canalside	63
Careers Centre	19
Clock Tower	20
CopyShop	56
The Curve	47
Disability and Dyslexia Service	31
Drapers' Bar and Kitchen	8
Ground Café	33
The Hive	24
Housing Hub	48
IT Services	19
Mucci's	29
Occupational Health Service/ Student Health Service	28
Octagon	19a
Portering and Postal Services	17
Qmotion Health and Fitness Centre Sports Hall	7
Santander Bank	62
Security	38/54
St Benet's Chaplaincy	23
Student Enquiry Centre	19
Students' Union Hub	34
Union Shop	9
Village Shop	52
Westfield Nursery	11

Information

- Visitors who require further information or assistance should please go to the main reception in the Queens' Building.
-  The smoking of cigarettes or tobacco products are **only** permitted at designated smoking areas / shelters indicated on this map.
-  Electronic cigarettes permitted on outside spaces **only**.
-  These premises are alarmed and monitored by CCTV; please call Security on +44 (0)20 7882 5000 for more information.

Key

-  Library/bookshop
-  Fitness centre
-  Refreshment: Bar/Eatery/Coffee place
-  Staff car park
-  Bicycle parking
-  Bicycle lockers
-  Cash machine
-  Smoking area / shelter





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THURSDAY 10 MAY 2018

Schedule

The second day of the Colloquia in Combinatorics will be held at The London School of Economics and Political Science, starting at 10.30am. Everyone interested is welcome to attend any part of the event. The talks will be held in the Sheikh Zayed Theatre, New Academic Building, LSE. Refreshment breaks will be taken in the Lower Ground Floor Atrium, New Academic Building, LSE; the reception will be held on the 8th Floor, New Academic Building, LSE.

Time	Speaker	Presentation title
10:00	Coffee and arrival (<i>Lower Ground Floor Atrium, New Academic Building</i>)	
10:00	Poster presentation until 17:30 (<i>Lower Ground Floor Atrium, New Academic Building</i>)	
10:30	Perla Sousi	Random walk on dynamical percolation
11:20	Patrice Ossona de Mendez	Sparsity and beyond
12:10	Lunch (<i>own arrangements – options on campus and nearby</i>)	
13:30	Sofia Lindqvist	Monochromatic solutions to $x+y=z^2$
14:20	Maria Axenovich	Induced arboricity of graphs
15:10	Afternoon tea break (<i>Lower Ground Floor Atrium, New Academic Building</i>)	
15:40	Michelle Delcourt	Random colorings of bounded degree graphs
16:30	Alexander Sidorenko	Biggs Lecture: Extremal problems on the hypercube and the codegree Turán density of complete r -graphs
17:30	Reception (<i>8th Floor, New Academic Building</i>)	

10:30 Perla Sousi (University of Cambridge)

Random walk on dynamical percolation

We study the behaviour of random walk on dynamical percolation. In this model, the edges of a graph G are either open or closed and refresh their status at rate μ , while at the same time a random walker moves on G at rate 1, but only along edges which are open. I will talk about the mixing time of this process in the case where G is the d -dimensional lattice and the complete graph.

Based on joint works with Y. Peres and J. Steif and with Sam Thomas.

11:20 Patrice Ossona de Mendez (CNRS, Paris)

Sparsity and beyond

We review some recent progress in the study of structural properties of sparse graphs and sketch recent exciting developments on “structural sparsity”, allowing to generalize tools used for sparse graphs to dense low complexity graphs

13:30 Sofia Lindqvist (University of Oxford)

Monochromatic solutions to $x + y = z^2$

We show that given any 2-colouring of the natural numbers, there are infinitely many monochromatic solutions to the equation $x + y = z^2$. The proof makes use of the arithmetic regularity lemma to find a long monochromatic arithmetic progression. By assuming that we have no monochromatic solutions we can then apply an iterative argument to find longer and longer monochromatic arithmetic progressions, until we eventually reach a contradiction.

This is joint work with Ben Green.

14:20 Maria Axenovich (Karlsruhe Institute of Technology)

Induced arboricity of graphs

For a graph G , the arboricity $a(G)$ is the smallest number of forests covering the edges of G . The induced arboricity $ia(G)$ is the smallest number of induced forests of G covering its edges. While the arboricity is a well understood parameter depending on local densities according to Nash-Williams theorem, the induced arboricity has a different nature. For a class of graphs F , set

$$ia(F) = \sup\{ia(G) : G \in F\}.$$

We characterise classes of graphs for which $ia(F)$ is finite and provide specific bounds on $ia(F)$ for some special classes of graphs, such as planar graphs. In addition, we define a generalised induced arboricity $ia_k(G)$ similarly to the induced arboricity with an additional restriction that each component in each covering forest has size at least k . We prove that for any class F of graphs of bounded expansion and any k , there is a constant $b_k(F)$ such that $ia_k(G) < b_k(F)$ for any graph G from F .

This is a joint work with Daniel Goncalves, Philip Doerr, Jonathan Rollin, and Torsten Ueckerdt.

15:40 Michelle Delcourt (University of Birmingham)

Random colorings of bounded degree graphs

A well-known conjecture in computer science and statistical physics is that Glauber dynamics on the set of k -colorings of a graph G on n vertices with maximum degree Δ is rapidly mixing for $k \geq \Delta + 2$. In 1999 Vigoda showed rapid mixing time of a modified version of flip dynamics for $k > 11/6\Delta$, implying polynomial time mixing for Glauber dynamics under the same constraints. This conjecture has attracted a lot of attention in the literature and better results are known for certain classes of graphs.

In this talk, we improve Vigoda's bound for general graphs by showing that there exists a constant $\eta > 0$ such that the Glauber dynamics mixes in polynomial time for $k \geq (11/6 - \eta)\Delta$. Our proof combines path coupling with a new kind of metric we introduce to incorporate a count of the extremal configurations of the chain. This "extremal" metric proves to be much easier to analyze than stopping-time-based metrics, and hence we believe will have fruitful applications for bounding the mixing times of other Markov chains.

This is joint work with Guillem Perarnau and Luke Postle.

16:30 Alexander Sidorenko (New York)

‘The Norman Biggs Lecture’: Extremal problems on the hypercube and the codegree Turán density of complete r -graphs

We study the generalized Erdős-Ginzburg-Ziv problem for finite abelian groups and use results in this area to prove new bounds for the codegree Turán density of complete r -graphs.



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THURSDAY 10 MAY 2018

Poster Presentation

As part of the Colloquia in Combinatorics 2018, there is a poster session, allowing PhD students in Discrete Mathematics and related areas to present their work. The poster session runs from 10:00 to 17:30 and the best poster prize will be awarded during the wine reception (around 6pm). The jury for this prize is a subset of speakers of the Colloquia.

The following is the list of posters:

Name	Institute	Title
Natalie Behague	QMUL	Hypergraph Saturation Irregularities
Mónika Csikós	Karlsruhe	Induced Saturation of Graphs
Attila Dankovics	LSE	Low Independence Number and Hamiltonicity Implies Pancyclicity
Alberto Espuny Díaz	Birmingham	Edge Correlations in Random Regular Hypergraphs and Applications to Subgraph Testing
Matthew Fitch	Warwick	A Variant of the Kruskal-Katona Theorem
NÓra Frankl	LSE	Counting Unit-simplices Spanned by n Points in \mathbb{R}^d
Keat Hng	LSE	Finding Connected Clique-Factors in Dense Graphs
Edin Husić	LSE	Reconstructing Perfect Phylogenies via Branchings
Stan Kučera	LSE	Simultaneous Minimum Spanning Trees
Aaron Lin	LSE	Space Quartics, Ordinary Planes, and Coplanar Quadruples
Balazs Mezei	RHUL	Successive Minimal Paths in Complete Graphs with Random Edge Weights
Yanitsa Pehova	Warwick	Decomposing Graphs into Edges and Triangles
William Raynaud	QMUL	Cyclically Covering \mathbb{F}_q^n
Jessica Ryan	Glasgow	Subgraph Counting in Practice



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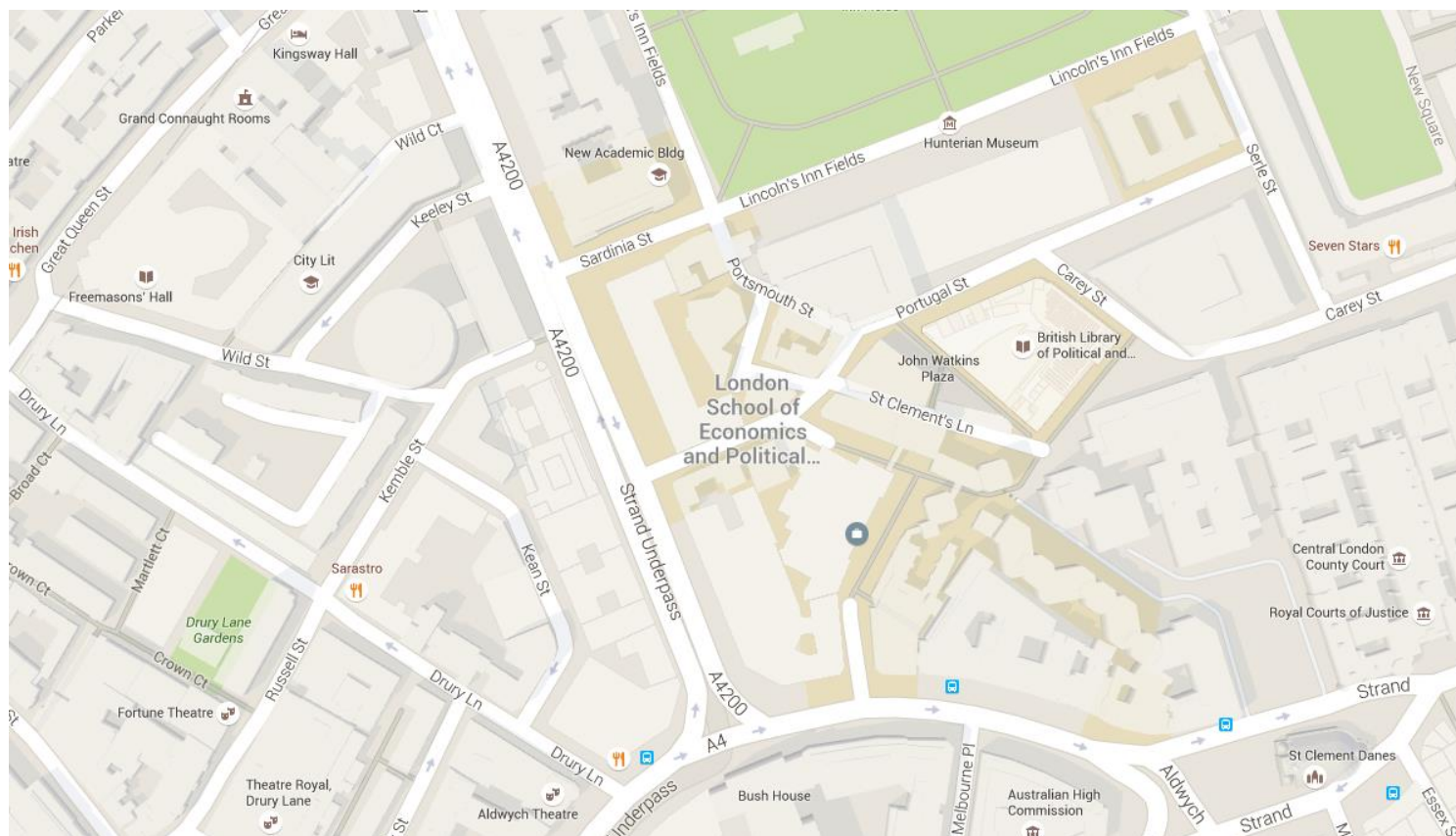
PLACES TO EAT: in and around LSE

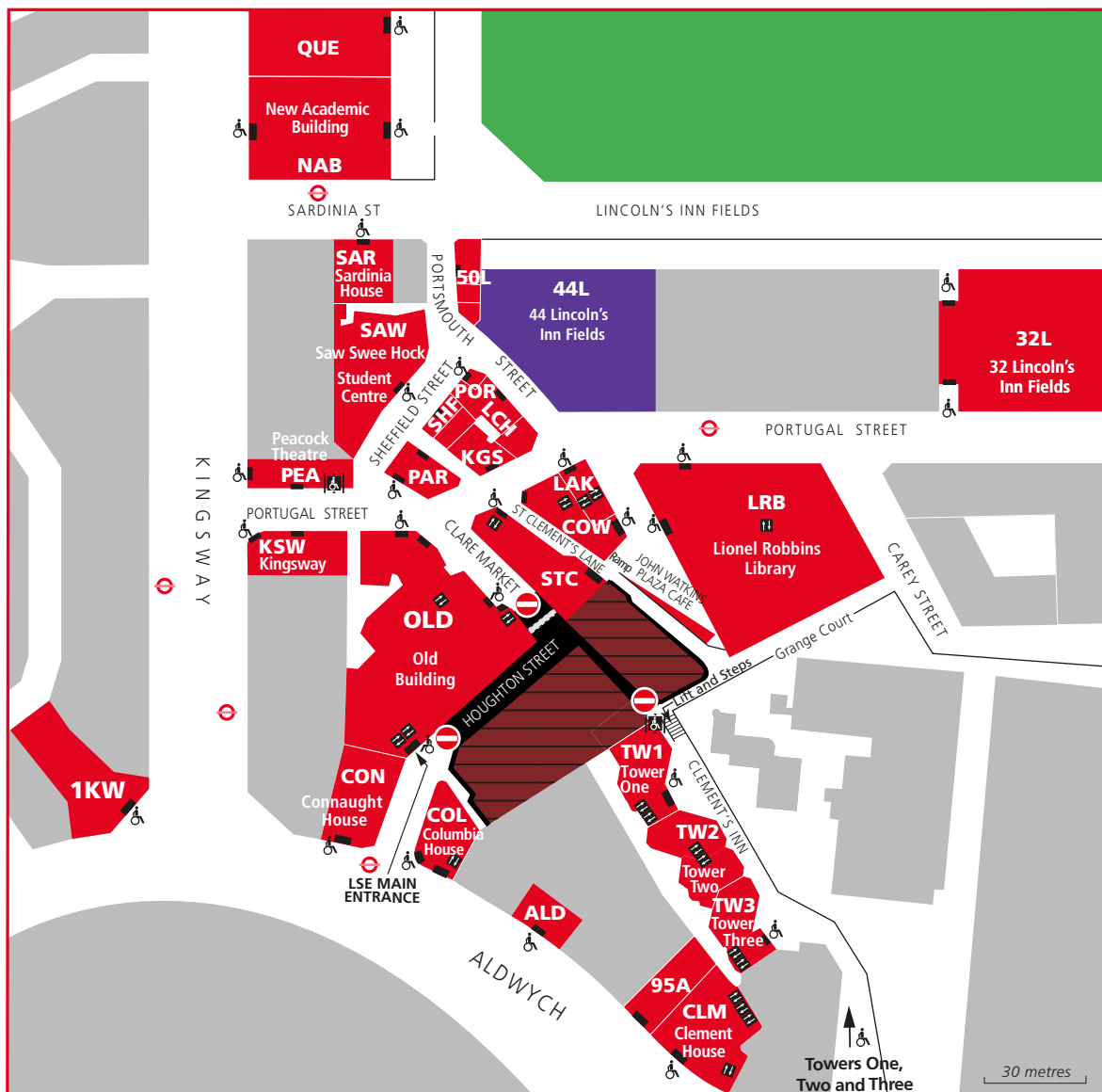
Close by:

All Bar One – modern chain with full menu – 58 Kingsway
Belgo – Belgian beer & food – 67 Kingsway
Bill's – European chain with full menu – 42 Kingsway
Costa – standard café – 9-11 Kingsway
EAT – sandwich bar (chain) – 7-9 Kingsway
Paul – bakery & café – 36-38 Kingsway
Pret a Manger – standard café – 29 -33 Kingsway
Sainsburys – supermarket – 129-133 Kingsway
Shakespeare's Head – Wetherspoon's, standard pub food – 64-78 Kingsway
Starbucks – standard café – 10 Kingsway
The Delaunay Counter – casual café-deli – 55 Aldwych
Viet Eat – Vietnamese – 48 Kingsway
Wasabi – Japanese chain serving bento boxes, sushi & hot food – 19 Kingsway

On campus:

The Bean Counter – café with hot & cold snacks – 32 Lincoln's Inn Fields
Café 54 – grab & go – New Academic Building
Fields Bar and Kitchen – perfect for a relaxed lunch – Lincoln's Inn Fields
Fourth Floor Café Bar – relaxing café with freshly made deli sandwiches – Old Building
Fourth Floor Restaurant – offers a wealth of eating options – Old Building
George IV Pub – perfect for a pub lunch – Portugal Street
LSE Garrick – cafe & restaurant – Columbia House
Mezzanine Café – pop up with different daily options – New Academic Building
Plaza Café – coffee and snacks – John Watkins Plaza





::::: Bridge 🚲 Cycle Hire Station (www.tfl.gov.uk/maps/cycle-hire) ♿ Disabled access 🚪 Disabled lift
 🚫 No entry 🚧 Roads and Footpaths closed 🏗 Buildings under construction

95A	95 Aldwych Aldwych
ALD	Aldwych House Aldwych
CLM	Clement House Aldwych.
COL	Columbia House Aldwych
CON	Connaught House Aldwych
COW	Cowdray House Portugal Street
KGS	King's Chambers Portugal Street
1KW	1 Kingsway
KSW	20 Kingsway
32L	32 Lincoln's Inn Fields
44L	44 Lincoln's Inn Fields (not occupied by LSE)
50L	50 Lincoln's Inn Fields Portsmouth Street
LCH	Lincoln Chambers Portsmouth Street
LAK	Lakatos Building Portugal Street
LRB	Lionel Robbins Building, Library

NAB	New Academic Building Lincoln's Inn Fields
OLD	Old Building Houghton Street
PAR	Parish Hall Sheffield Street
PEA	Peacock Theatre Portugal Street
POR	1 Portsmouth Street
QUE	Queens House Lincoln's Inn Fields
SAR	Sardinia House Sardinia Street
SAW	Saw Swee Hock Student Centre Sheffield Street
SHF	Sheffield Street
STC	St Clement's Clare Market
TW1	Tower One Clement's Inn
TW2	Tower Two Clement's Inn
TW3	Tower Three Clement's Inn



Get the discussion going: when tweeting about the Colloquia, please use the hashtag **#CC2018**

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