

---

**LOUIGI ADDARIO-BERRY**, McGill University

*The second eigenvalue of random lifts*

Joint work with Simon Griffiths. For a fixed  $d$ -regular graph  $H$ , a random  $n$ -lift is obtained by replacing each vertex  $v$  of  $H$  by a “fibre” containing  $n$  vertices, then placing a random matching between adjacent fibres. We show that whp, all eigenvalues of the lift that are not eigenvalues of  $H$  (“new” eigenvalues), have order  $O(\sqrt{d})$ , and that any exceptionally large new eigenvalues are whp caused by a dense subgraph of size  $O(|E(H)|)$ .