

BIRDS OF A FEATHER WRITE PAPERS TOGETHER? PRESTIGE HOMOPHILY AND INTERDISCIPLINARY COLLABORATION IN US FACULTY COAUTHORSHIP NETWORKS



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Social determinants of academic collaboration

Social and systemic factors have been shown to structure how scientists collaborate with each other. As is the case with sociodemographic homophily in collaboration [1], many of these factors reflect and may reinforce existing social inequalities that operate in the scientific ecosystem [2]. For instance, controlling for quality, idea originating from high prestige institutions spread faster and further than ideas from lower prestige institutions [3]. However, academic collaborations are not restricted to the same institutional prestige or discipline, and it remains unclear how these factors influence coauthorship.

Research questions:

How often do academic faculty write papers with faculty in other disciplines, and in which disciplines?

Do faculty collaborate more with similar-prestige scientists? How does this *prestige homophily* vary by discipline?

Data

21,455 academic faculty in five fields:

computer science (5,921), **mathematics** (6,073), **physics** (5,609), **sociology** (2,627), and **philosophy** (1,225)

197,771 papers from OpenAlex (2.29 faculty authors per paper)

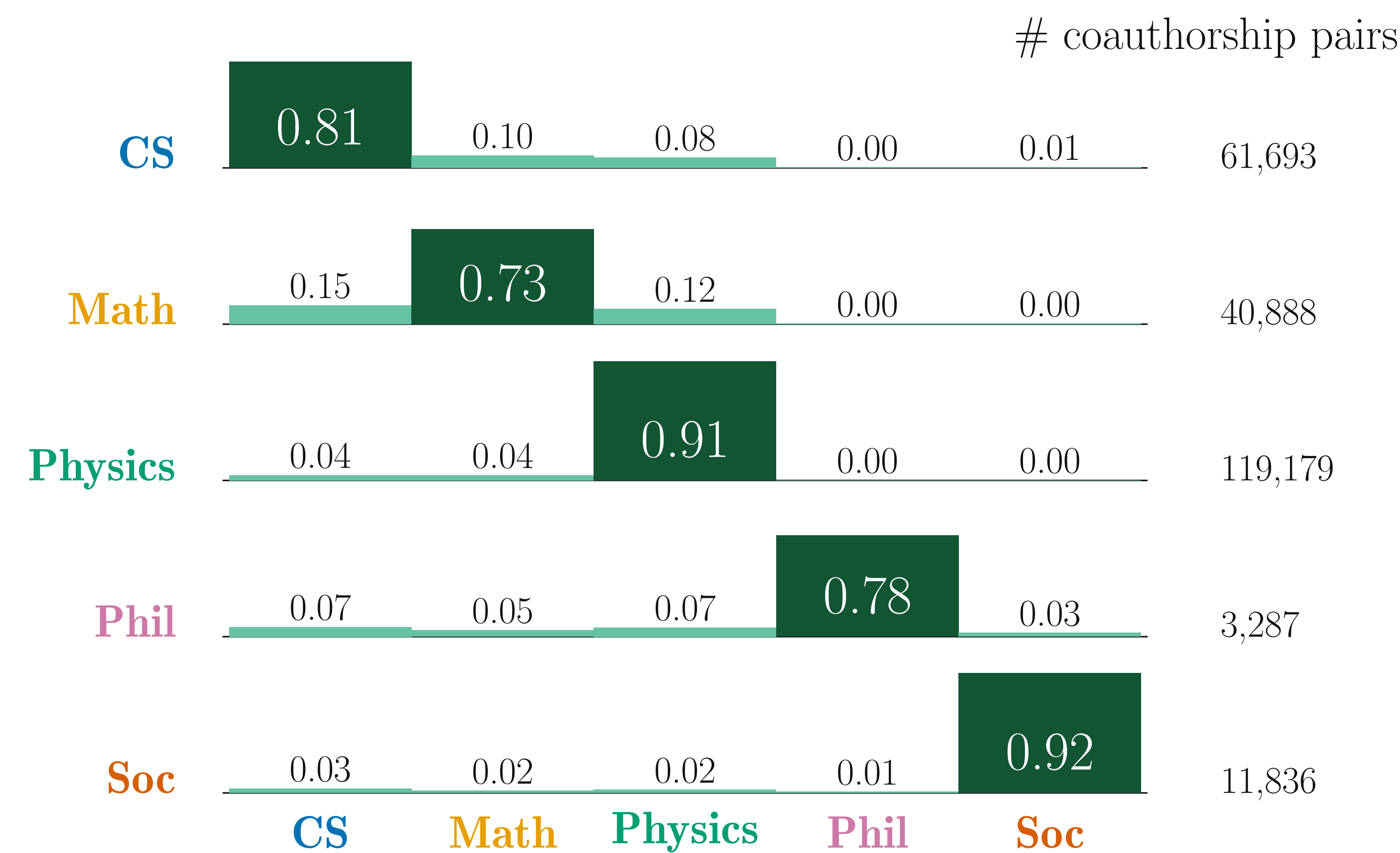
Prestige: each institution's SpringRank in the US faculty hiring network [2, 4], scaled from 0 (lowest) to 1 (highest).

Fields: from each author's department affiliation in a hand-built taxonomy of 116 fields.

How common are interdisciplinary collaborations?

- Uncommon: pairwise faculty-faculty collaborations are overwhelmingly concentrated within disciplines rather than across disciplines.
- Proportions range from 8% in sociology to 27% in mathematics.
- Computer science and physics are the most common interdisciplinary collaborators, both making up 7% of other field's collaboration pairs on average.
- Collaborations with philosophy make up <1% of all other field's collaborations.

Field-to-field coauthorship rates (row-normalized)



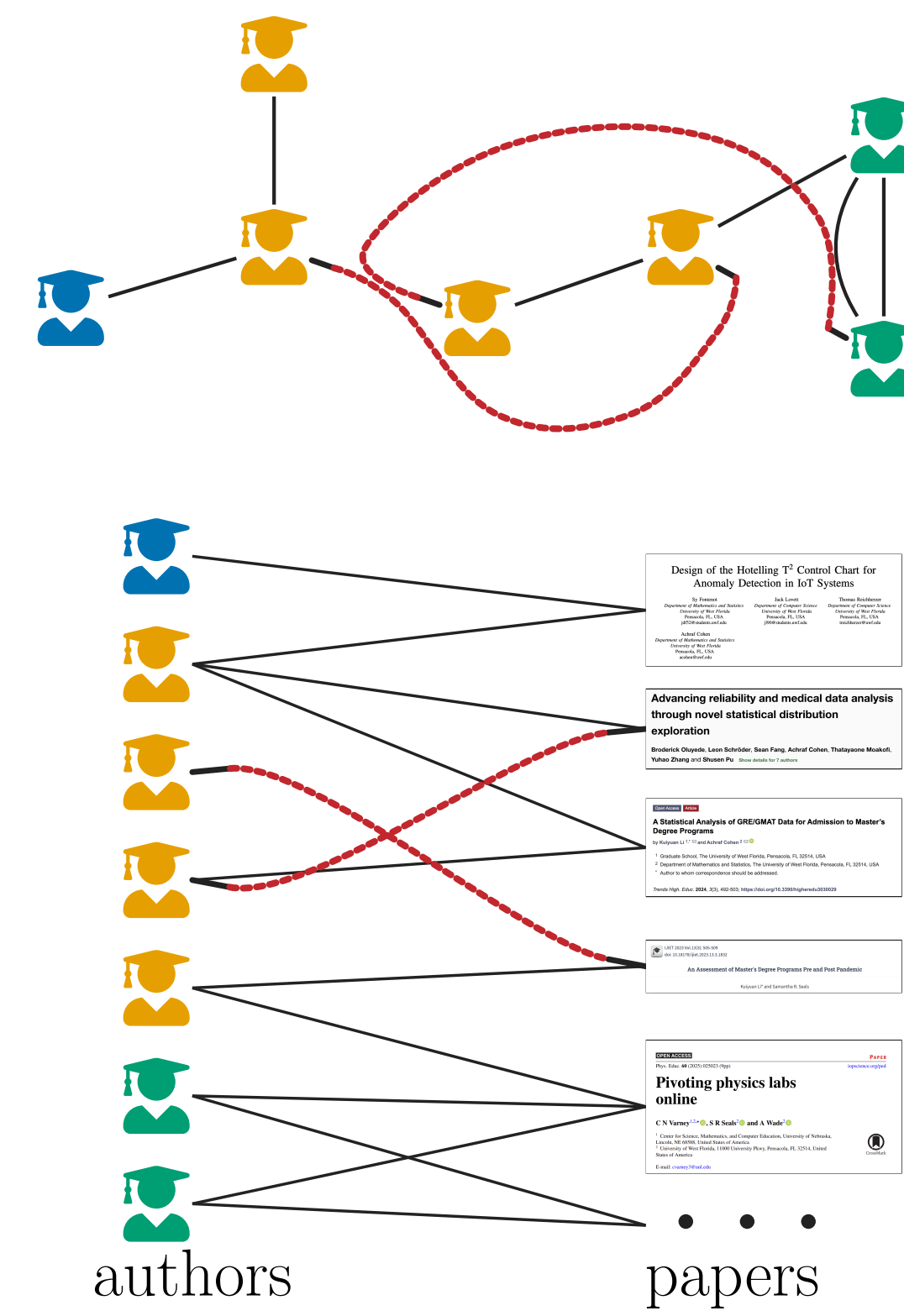
Examples of infrequent interdisciplinary collaboration types:



Coauthorship networks & reference models

Coauthorship is not a strictly dyadic relationship, but it can be represented in various ways, each with tradeoffs. We construct two types of collaboration networks, and rewire each one as a separate reference model to evaluate the observed level of prestige homophily,* equivalent to the Pearson's correlation between author prestige values [5].

Reference model $\dashv\dashv$ rewired edge



Pairwise coauthorship multigraph

- nodes = faculty authors
- edges for each coauthored paper
- rewiring preserves number of total collaborations

Author-paper bipartite network

- nodes = authors and papers
- edges connect authors to papers they wrote
- one-mode projection = pairwise coauthorship network
- rewiring preserves # faculty authors on each paper and # of papers written by each author†

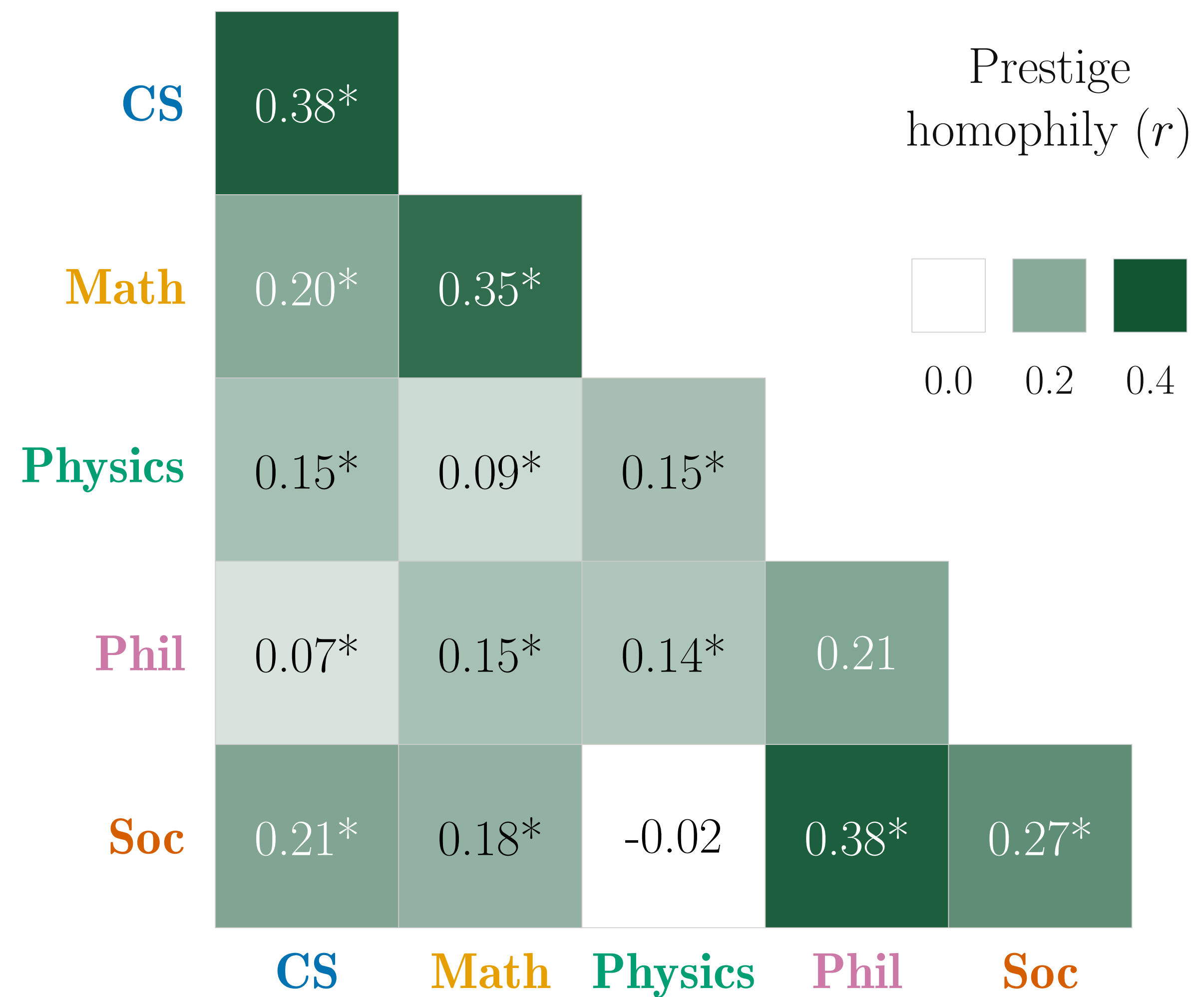
*we exclude same-institution collaborations in the prestige homophily calculations

†neither reference model preserves the disciplinary composition of collaborations: see future work section

Prestige homophily in collaborations

- Prestige homophily exceeds the level predicted by productivity and collaboration size alone (13 of 15 field-pairs significant vs. reference model).
- Within-discipline collaborations are generally more prestige-assortative than interdisciplinary collaborations.
- The three field-pairs with highest prestige homophily are CS-CS, math-math, and sociology-philosophy ($r = 0.38, 0.35, 0.38; p = 0.015$, Bonferroni corrected).

Prestige homophily across field coauthorship pairs



* $p < 0.05$ (vs. reference model, Bonferroni corrected)

Conclusions and future work

- We find that faculty-faculty coauthorship is concentrated within disciplines and is assortative by prestige.
- In future work, we will develop reference models (e.g. hypergraph rewiring) that preserve the disciplinary composition of collaborations.
- We will also explore whether and how variability in productivity and collaboration size by field and epistemic similarities between fields are related to collaboration rates and prestige homophily.

Acknowledgements: Thank you to our advisors Aaron Clauset and Dan Larremore at CU Boulder, and to grant support from NSF-2420950, NSF-13019734 and SMA-2226343.

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