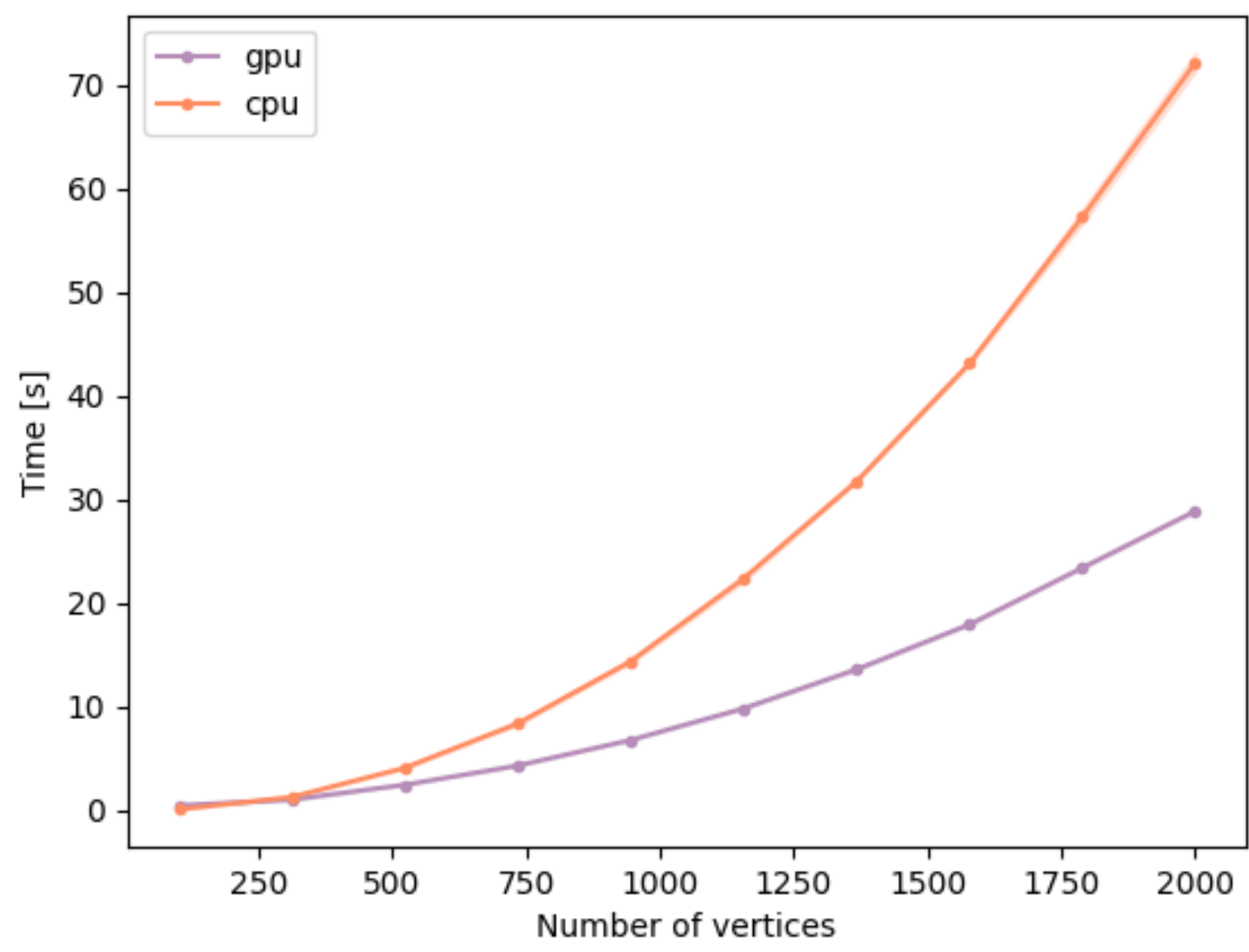
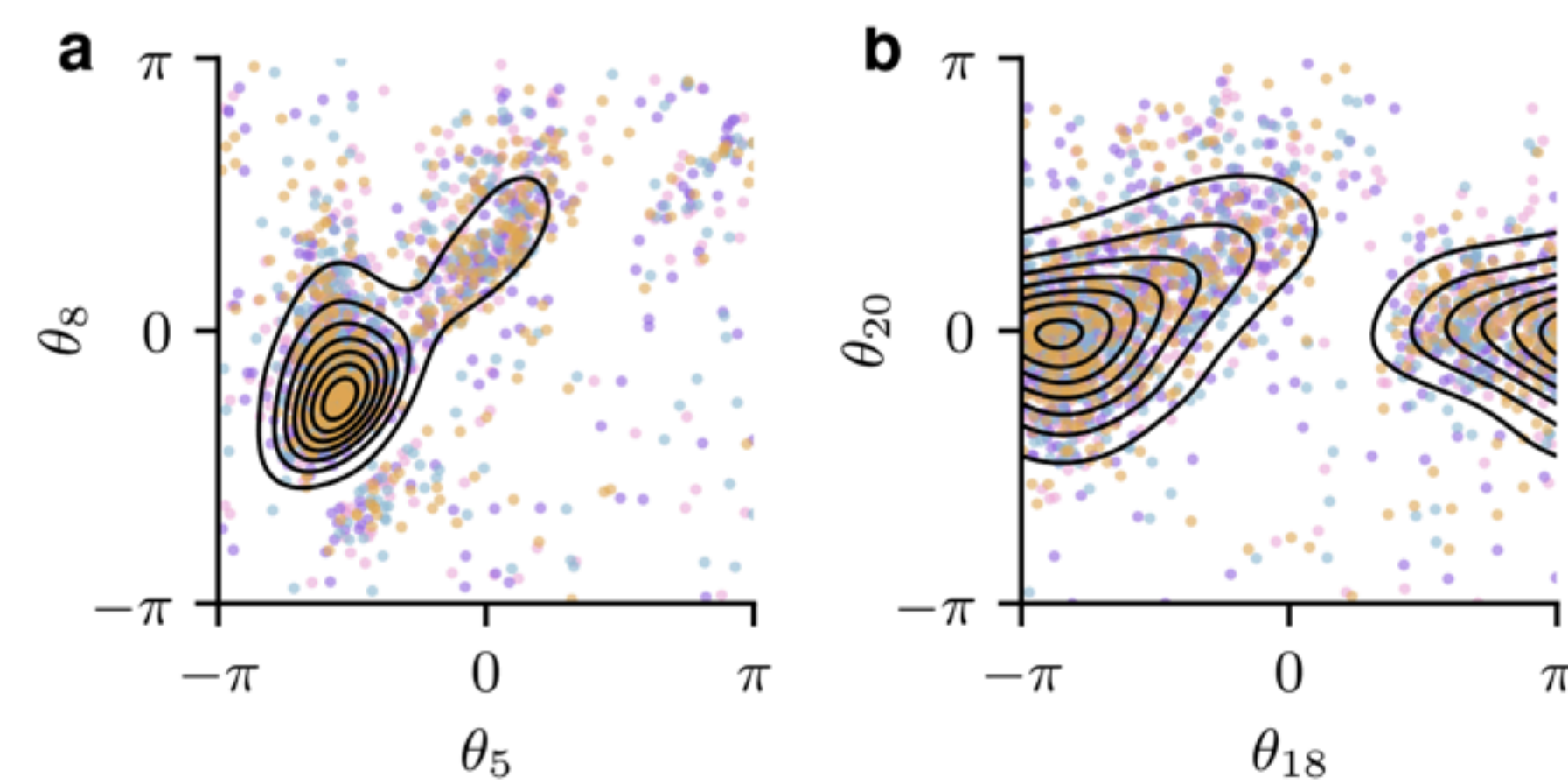


Challenges: some solutions

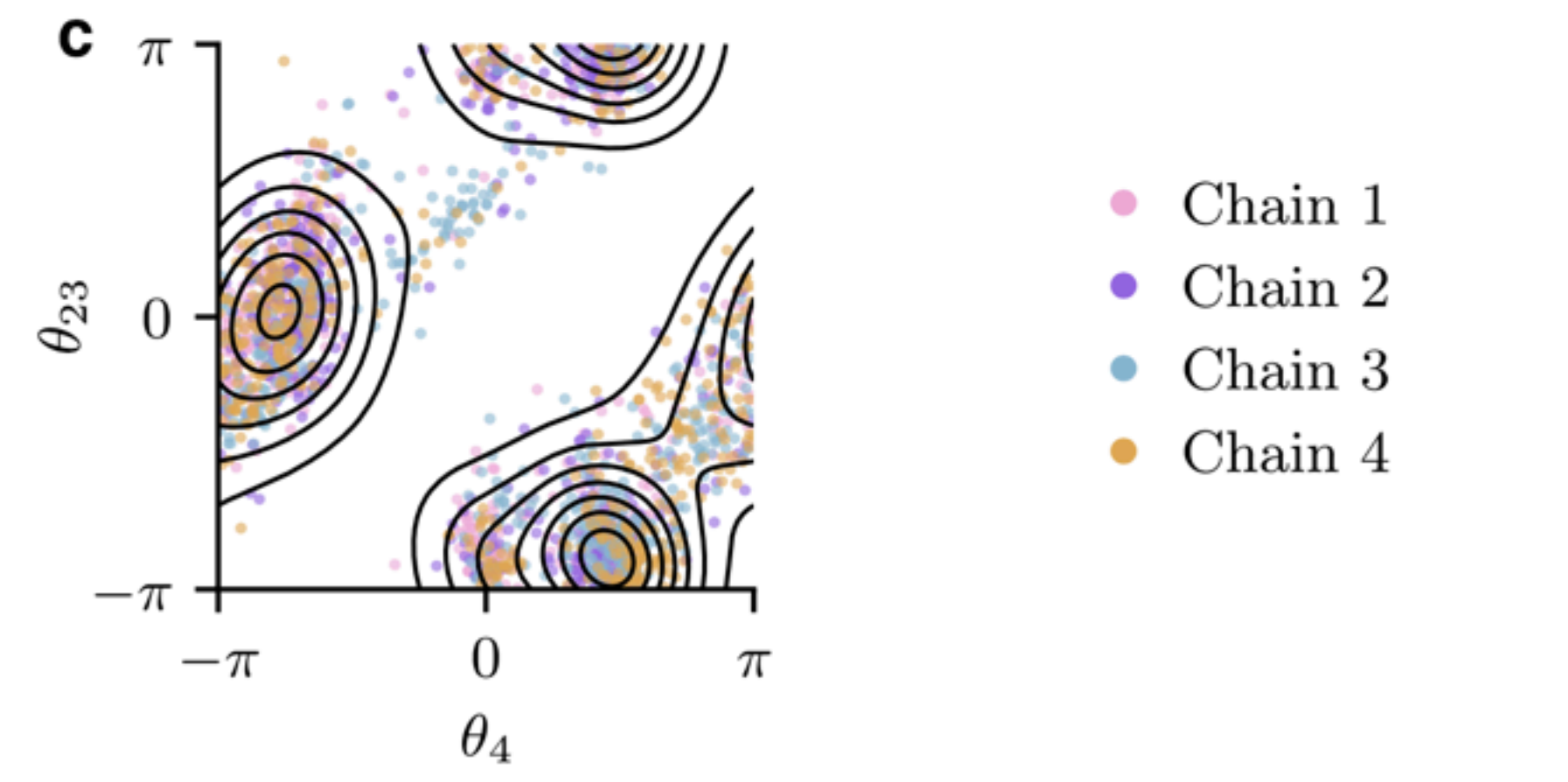
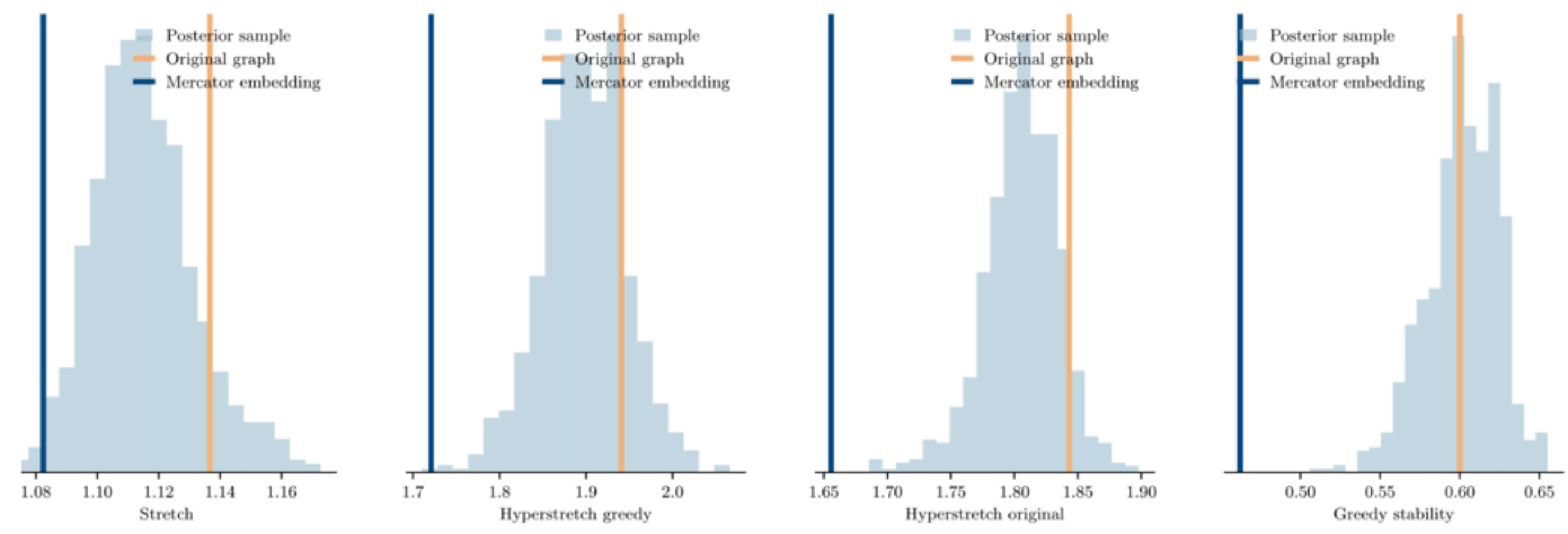
Still slow...



...and these uncertainties are not “trivial” (non-normal).



...but we now have uncertainties on graph metrics!



- Chain 1
- Chain 2
- Chain 3
- Chain 4

Challenges

- Network geometry is a promising framework, but its applicability relies heavily on our capacity to find high- bquality embeddings of the original datasets, which is hard.
- We cannot power our way through this challenge using GPUs or supercomputers: we need to design smarter algorithms.



M. Ángeles Serrano
Universitat de Barcelona & ICREA



Jérémie Lesage
Université Laval

Marián Boguñá
Universitat de Barcelona



Jean-Gabriel Young
University of Vermont

Simon Lizotte
Université Laval



nature physics

Article

https://doi.org/10.1038/s41567-023-02246-6

Geometric description of clustering in directed networks

Received: 27 March 2023

Antoine Allard^{1,2}, M. Ángeles Serrano^{3,4,5} & Marián Boguñá^{3,4}

Accepted: 13 September 2023

Symmetry-driven embedding of networks in hyperbolic space

Simon Lizotte^{1,2}, Jean-Gabriel Young^{1,3,4} and Antoine Allard^{1,2,4}

arXiv:2406.10711

Hyperbolic Embedding of Directed Networks

Jérémie Lesage, M. Ángeles Serrano, Marián Boguñá and Antoine Allard

Preprint on arXiv expected early 2025