

From Geometry and Physics to Computational Linguistics**Matilde Marcolli (California Institute of Technology)**

I will discuss how ideas from Geometry and Statistical Physics can be used to study the structure and evolution of natural languages, within the Principles and Parameters model of syntactic structures. In particular, I will argue that syntactic parameters have a rich geometric structure. The different ways in which they are distributed across different language families can be detected via topological methods. Moreover, sparse distributed memories can detect which parameters are more easily reconstructible from others. It is known that syntactic parameters of languages change over time along with language evolution, often as a consequence of the interaction between different languages. I will present a version of spin glass models that is suitable for quantitative studies of how language interaction affects syntactic parameters and can drive language evolution. The results presented in this talk are based on the papers [arXiv:1507.05134](https://arxiv.org/abs/1507.05134), [arXiv:1508.00504](https://arxiv.org/abs/1508.00504), and [arXiv:1510.06342](https://arxiv.org/abs/1510.06342).