Demian Wassermann is a Research Professor (Directeur de Recherche) in the Mind team - part of the Inria National Institute for Research in Digital Science and Technology, Saclay, France - that develops statistics and machine learning techniques for brain imaging. Demian started working in MRI in 2006; currently, he works on probabilistic knowledge representation and subject-specific modelling on neuroimaging, contributing both methodological advancements and software. In the past five years, Demian has been the organizer and program chair of several of the top conferences in the neuroimaging community (ISMRM, MICCAI, IPMI). Since 2018, Demian Wassermann has led an ERC-funded project called NeuroLang to harness probabilistic knowledge representation approaches to facilitate neuroimaging analyses. Demian's research has been featured in top venues in machine learning and machine learning in medical imaging (ICLR, NeurIPS, AAAI, IPMI, MICCAI) as well as in top venues in life and general sciences (eLife, Nature Communications).

Talk :
Neuroimaging has changed our understanding of the human brain. Providing us with in-vivo measurements of the human brain's structure and function has opened a window into the relationships across anatomy, physiology, cognition and disease. Nonetheless, it remains largely a science of consent: these relationships exist if most of the neuroimaging community exists. The reproducibility crises, prompted by the analysis of small samples and the misuse of statistical tools, have been instrumental in keeping neuroimaging a consent-based science.

In the first section of this talk, I will show how current machine learning approaches, such as natural language processing and large language models, can be harnessed to analyze the neuroscience literature and quantify the confidence the community has in different neuroimaging hypotheses.

Secondly, I will show how we can develop interpretable and reproducible results using novel neuroimaging analysis paradigms based on machine-learning paradigms. Through the development of new approaches for large-scale Bayesian Modelling based on deep learning architectures such as normalizing flows, I will show a novel analysis of the relationship between brain anatomy, function, and cognition at the population and individual levels.