Toulouse

June 24, 2021

Graduate School EDMITT
Toulouse Mathematics Institute

Dear Sir or Madam,

My name is Jianyu MA and I am an M2 student in pure mathematics.

During my undergraduate studies, I spent most of my time on differential geometry and probability theory. They provided me insightful perspectives to grasp real world through abstraction. It has been my longing for a long time to do research connecting these two fields to explore more of what I enjoyed. My M1 internship was about stochastic calculus, and I was extremely motivated as I was facing opportunities of contributing to what had attracted me for a long time. After the completion of my M1 internship, the only thing that stopped me from going further was the absence of geometry. To closely follow my heart, I chose pure mathematics as my M2 RI program in Université Paul Sabatier.

Fortunately, this year I discovered optimal mass transport, an ideal field where measure theory and geometry intertwine. This topic has been receiving a lot of attention over the last twenty years, and the related literature has grown tremendously with applications in many areas of mathematics. Dr J. Bertrand, who shares the same appetite for those fields, suggested me study the notion of barycentre in a non-Euclidean setting during my M2 internship—this notion is used to define the notion of mean beyond Euclidean spaces. During the PhD thesis, we then aim to study Central Limit Theorem in non-standard settings; this would be a nice return to probability theory. This topic has drown a lot of attention for it has significant applications in Statistics. The completion of the project requires a deep understanding of how geometric properties interfere with the behaviour of the optimal mass transport.

I have been in Toulouse for two years, and I wish that I could stay here for the beginning of my academic career. In our institute, there is a wonderful library with warm-hearted staff and huge collection of interesting books. I also appreciate teachers here as they give courses with high responsibility and patience. On a more personal level, I enjoy the vicinity of Canal du Midi and Pech-David with delightful landscapes for walking and hiking. During this Covid-19 pandemic, I am benefiting from various social aids such as food distribution for students. I feel grateful and hopeful for living in such a welcoming city. This environment perfectly meets my expectations for both my personal and academic life.

For all of these reasons, I would like to apply to and have your support for the thesis grant at IMT under supervision of Dr Bertrand with title "*Barycentre and Central Limit Theorem*".

I thank you for reading my motivation letter. I remain at your disposal.

Yours sincerely,

Jianyu MA