



- 1) **Field of study :** Geometry
- 2) **Internship topic :** MINIMAL SURFACES IN HYPERBOLIC SPACES
- 3) **Description :**
Minimal submanifolds in a Riemannian manifold are by definition critical points of the area functional. For instance, geodesics are minimal submanifolds. Similarly to geodesics, complete but non compact minimal submanifolds make sense.
If the ambient manifold (M, g) is negatively curved, then a closed geodesic is unique in its homotopy class. Equivalently, given two points at infinity there exists a unique geodesic joining them. The situation is vastly different when one replaces geodesic by surfaces even in the simplest case of M being of dimension 3 and hyperbolic.
Nevertheless, K. Ulhnebeck has shown in [U] that minimal surfaces can be unique when a further condition is satisfied. More precisely, given a "flat" enough curve C in the boundary at infinity of the hyperbolic space, there exists a unique minimal surface whose boundary is C .
The project will start with reviewing basics of negative curvature and hyperbolic geometry (boundary at infinity, uniqueness of geodesics) and minimal surfaces (that the applicant is not supposed to know) then proceed to read [U] and the application in Calegari-Marques-Neves [CMN] and [L].
The project will be supervised on zoom. However, a collaborator – Jérémy Toulisse – will be present in Nice and available for discussions. This is part of the ERC-project [AnSur](http://flab.perso.math.cnrs.fr/AnSur/), see <http://flab.perso.math.cnrs.fr/AnSur/>.
- 4) **Internship level :** Master 2
- 5) **Requirements :** Basic background in geometry
- 6) **Duration :** 3 to 6 months
- 7) **Period :** February to July 2024
- 8) **Laboratory :** LJAD
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