



# Searching for muons to the end of Earth

Atelier des deux Infinis,  
Roland–Garros high school,  
Réunion Island

## Who are you?

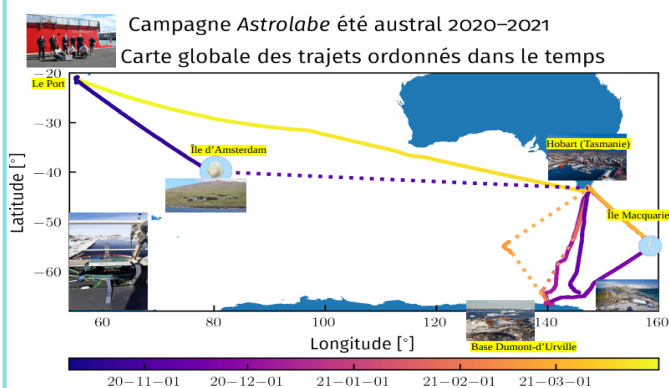
Our “Atelier des deux Infinis” is a science club of Roland Garros high school, located on Réunion island (France, in the south hemisphere near Madagascar), devoted to the physics of the two infinities. We develop a lot of projects around muons: flux variation with altitude; absorption through water depths or rock varieties; angular variation...

## What have you done?

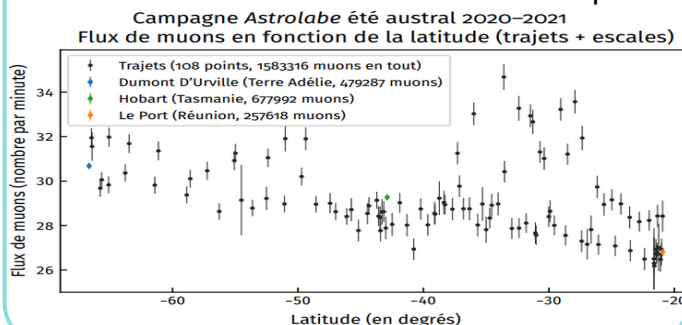
This time around, we measured the muon flow according to latitude. To do this, we worked with the national Navy and the TAAF (French southern territories), and we brought a muon sensor case on the *Astrolabe* ship. The ship left the Réunion's harbor in October 2020 and went to Hobart, in Tasmania (passing by Amsterdam island on its way). After that, it went to the Dumont–d'Urville station, a French scientific station in Antarctica, and many round trips were done from November 2020 to March 2021 (some of which made a supplementary stop by Macquarie Islands). Then the *Astrolabe* took the way back home to Réunion island, where it arrived in April 2021. We had some troubles with the data (detector faults, electromagnetic perturbations likely from ship antennas...), but were able to correct most of them (eventually by masking really problematic parts, e.g. when data were clearly off). Our analysis is still an ongoing process, as we yet have to cleanly remove data where one detector (of two) was dead.

## What did you find out?

First, here is a map of the ship path.



And here are our preliminary results: a clear downward trend the further from South pole.



## What's your take-home message?

Our measurements campaign allowed us to show that the muons flux is increasing towards the South pole when coming from Réunion island. The relative increase is in the order of 15 %, or roughly 0.3 %/° as established by the well-defined measurements in docking locations. We still have to clean the in-movement parts further, while our next project is going further in Antarctica.