# Report on the outcomes of a Short-Term Scientific Mission[1]

**Action number: CA20111**

**Grantee name: Axel Ljungström**

## Details of the STSM

Title: Computer science applications of Cubical Agda

Start and end date: 26/04/2023 to 05/05/2023

## Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

- One lecture/demo of Cubical Agda for factulty and (PhD and MSc) students. This was done `in response' to a previous Agda introduction by Ugo de'Liguoro which did not present any cubical features.

- One seminar talk on a large formalisation project in Cubical Agda to showcase its strengths/weaknesses when doing formalising large projects.

- Several discussion about proof assistants in action. In particular, we discussed which proof assistant would be suitable for formalising a project concerning constructive combinatorics and bar recursion/induction.

- Informal discussions/introductions to homotopy type theory. This was needed to better motivate certain aspects of Cubical Agda, such as the lack of Axiom K.

## Description of the STSM main achievements and planned follow-up activities

The goals were reached:

- *Goal 1: Formalize computer science applications, for example in the area of programming language theory, in Cubical Agda.*
    - Partially reached. We did not have time to start any major formalisaton projects but

[1] This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

discussed the theory underpinning a potential formalisation of mathematics/computer science concerning bar recursion/induction and constructive combinatorics. Some experimenting in Cubical Agda was done and we discussed continuing the project, either with me or with an interested BSc/MSc student, in the future. I have reported this back to potential supervisors in Stockholm but no concrete action has been taken yet (and nothing has been published).

- *Goal 2: Introduce Agda and Cubical Agda to students and researchers in Turin, with a long term goal of using Agda in teaching and research.*
    - As previously mentioned, this was done in terms of both a lecture/demo and a research seminar, both attended by several faculty members and students.