

## Report on the outcomes of a Short-Term Scientific Mission<sup>1</sup>

Action number: CA20111

Grantee name: Sacerdoti Coen Claudio

### **Details of the STSM**

Title: Indexing and retrieval of formal proofs in an heterogeneous settings

Start and end date: 16/04/2023 to 21/04/2023 (flight back the 25/04/2023)

### **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.

*(max. 500 words)*

1. implementation of an index based on substitution trees plus regular maps to index occurrences of patterns inside terms/types of LambdaPi-modulo
2. integration of the code in the lambdapi system both at the level of CLI (Command Line Interface) and as commands
3. identification of a rich set of metadatas to specify the position of the occurrence of patterns. This work is based on previous work by the author
4. modification of the lambdapi tool to allow special files of untyped rewriting rules to be used to implement generic translations of terms
5. use of the above files to normalize terms before indexing them. In particular we devised a set of rules to “undo” the encoding of the logic of Matita into LambdaPi-modulo. The same technique can be applied to other encodings and logics to allow search in heterogenous libraries. Alignments can also be captured by these rewriting rules

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

<sup>1</sup>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.

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

*(max. 500 words)*

All the goals set for the STMS have been achieved and the generated code is ready to be officially integrated into the lambdapi system. A future short-term goal consist in evaluate the system by letting users of lambdapi play with it and collect feedback. Medium-term goals consist in devising a richer query language allowing, for example, intersection and union of results, and the creation of more user-friendly interfaces, like a web interface.

The STSM contributed to the planned goals and expected outcome of WP 4, in particular the code produced will be the core of the prototype which is the deliverable expected for WP 4 at the end of the second period.

The STSM paves the way for further collaboration between the team of the University of Bologna (IT) and the one of Dedukti/lambdapi at INRIA (FR). Moreover, we will identify other members of the CA that produce large libraries of mathematical results encoded in LambdaPi-modulo in order to study a realistic use-case of heterogeneous library development supported by heterogenous queries.