

RESEARCH GRANT ON QUANTUM PROGRAMMING LANGUAGES

ORGANISATION: University of Verona

TITLE OF THE RESEARCH PROGRAM: Design and Implementation of Quantum Programming Languages

ABSTRACT OF THE RESEARCH PROGRAMME: The research program aims to the advancement of the theory and practice of quantum programming languages. Specifically, the researcher will undertake the study of type systems and denotational semantics for the languages qPCF (quantum PCF), iQu (quantum version of Reynolds' Idealized ALGOL) and Q# (a domain-specific programming language used for expressing quantum algorithms recently released by Microsoft). In this context, the candidate will define instances or extensions of the above-mentioned languages that naturally capture the high level programming of the quantum processor at the base of the D-Wave 2000Q™ System. In parallel with the foundational research work, the candidate will implement a prototype of a quantum language based on iQu, extending an implementation of ALGOL with polymorphic types and programming primitives for the parametric generation of quantum circuits.

MAIN ACTIVITIES OF THE RESEARCH FELLOW:

Study of type systems and denotational semantics for quantum languages. Design and implementation of a DSL (Domain Specific Language) for a quantum system.

DURATION OF FELLOWSHIP: 12 months

SALARY: 23.800,00 Euro (before tax)

MINIMAL REQUIREMENT: PhD title

EVALUATION OF APPLICATIONS:

- PhD up to 35 points
- Scientific publications up to 15 points
- Work experiences up to 5 points
- Other up to 5 point

for a total of 60 points maximum.

Candidates who achieved at least **35 points** in the evaluation of titles will be interviewed by a panel of experts.