

# Alejandro Díaz-Caro

## FSCD STEERING COMMITTEE ELECTION 2021

### Short bio

I obtained my PhD degree in 2011 from the Université de Grenoble, working on type theory and quantum computing. After three years of postdoc and teaching positions, first at Université Paris 13 (LIPN), then at Université Paris-Ouest and Inria, I got a permanent position at Universidad Nacional de Quilmes, at Buenos Aires, as Assistant Professor, in 2014. In 2016 I spent a semester at Università di Torino. In July of that year, I got a permanent research position at CONICET (our national equivalent to the French CNRS), currently attached to Universidad de Buenos Aires, while I still keep a Tenured Track Professorship at Quilmes. Since I have arrived to Argentina, I have directed three international research projects between Argentina and France: two STIC-AmSud, with partners also at Uruguay, Chile, and Brazil, and one ECOS-Sud. Currently, I direct the Argentinian side of the LDPL team at the IRP SINFIN, between CONICET and CNRS.

### Selected publications

- A. Díaz-Caro and O. Malherbe. A categorical construction for the computational definition of vector spaces. *Applied Categorical Structures* 28(5):807–844, Springer, 2020.
- A. Díaz-Caro and G. Dowek. Proof normalisation in a logic identifying isomorphic propositions. (FSCD’19) LIPIcs 131:14, 2019.
- A. Díaz-Caro, M. Guillermo, A. Miquel, and B. Valiron. Realisability in the Unitary Sphere. LICS’19 pgs. 1–13, 2019.
- A. Díaz-Caro, G. Dowek, and J. P. Rinaldi. Two linearities for quantum computing in the lambda calculus. *BioSystems* 186:104012, 2019.
- A. Díaz-Caro. A lambda calculus for density matrices with classical and probabilistic controls. (APLAS’17) LNCS 10695:448–467, 2017.
- P. Arrighi, A. Díaz-Caro, and B. Valiron. The vectorial lambda-calculus. *Information & Computation*, 254(1):105-139, 2017.
- A. Assaf, A. Díaz-Caro, S. Perdrix, C. Tasson, and B. Valiron. Call-by-value, call-by-name and the vectorial behaviour of the algebraic  $\lambda$ -calculus. *Logical Methods in Computer Science*, 10(4:8), 2014.
- A. Díaz-Caro, G. Manzonetto, and M. Pagani. Call-by-value non-determinism in a linear logic type discipline. (LFCS’13) LNCS 7734:164–178, 2013.
- P. Arrighi and A. Díaz-Caro. A System F accounting for scalars. *Logical Methods in Computer Science*, 8(1:11), 2012.

### Election statement

My main research focus is on quantum computing extensions to the lambda calculus. In particular, I have helped to develop the line of the *quantum control* paradigm in the quantum lambda calculus. I have worked first with purely syntactic methods, then, more recently, also in denotational models (with realizability methods and category theory). My research, while mostly is in the area of lambda calculus and quantum computing, covers a wide range of topics concerned by the FSCD community: studying the concept of confluence of probabilistic systems; designing type systems for quantum languages and proving their syntactic properties; study denotational (categorical, realizability based) models, and logics (natural deduction, linear logic).

I believe that FSCD is a wide-area community, which has highly benefited from the merge of RTA and TLCA. Such a merge, has extended the audience, where researchers can found from mathematical foundations to the theory of practical programming languages. This large range of topics is what makes of FSCD a strong and last lasting conference for the years to come. The last two years have encountered us facing an unprecedented challenge in modern times: how to meet without travelling, and I feel that we have make the most of this situation. For the future, the new challenge is how to profit from the advantages that we have encountered at this new reality, while overcoming the downsides of the virtual reality. I think that we have a great challenge to accommodate all the opinions and realities, and I am willing to face that challenge within our community.