Valentin **Le Fèvre**, PhD

Post-doctoral student

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I am currently a post-doctoral student at Barcelona Supercomputing Center (BSC) since September, 2020. My research in High Performance Computing (HPC) focuses on algorithmics optimization, linear algebra, resilience and energy consumption challenges.

Education

École Normale Supérieure de Lyon

Lyon, France

PhD degree — *Sep. 2017 - Jun. 2020*

- PhD in computer science advised by Yves Robert and Anne Benoit at Laboratoire d'Informatique du Parallélisme (LIP), École Normale Supérieure de Lyon (ENS de Lyon), ED 512 (MathInfo Lyon).
- Manuscript entitled *Resilient scheduling algorithms for large-scale platforms*.
- PhD defense successfully held on June, 18th 2020.
- Lead to the publications of 4 publications in international journals, 3 publications in international conferences and 4 publications in international workshops.

École Normale Supérieure de Lyon

Lyon, France

Bachelor and Master degree in Pure Computer Science — *Sep. 2013 - Jun. 2016*

- French "Grande école", that is to say a leading institution of higher education, entrance to which is based on competitive examination, the second most difficult to enter in France.
- "Mention Bien".

Lycée Pierre Corneille

Rouen, France

"Classe préparatoire" MPSI/MP* — *Sep. 2011 - Jul. 2013*

- Two years intensive courses preparing for the entrance exam to French "Grandes Écoles".
- Specialized in Mathematics and Physics, with Computer Science option.

Lycée Georges Dumézil

Vernon, France

Baccalauréat — *Sep. 2008 - Jul. 2011*

- French graduation at the end of the highschool, specialized in Engineering.
- 17.6/20 ("mention Très Bien" and jury's honors).

Experience

Teaching Assistant

Lyon, France

École Normale Supérieure de Lyon — *Sep. 2017 - Jan. 2020*

- Master 1 - Parallel Algorithms and Distributed Programmation (Sep. 2017 - Jan. 2018)
- Bachelor 3 - Algorithmics 2 (Feb. 2018 - May 2018)
- Master 1 - Parallel Algorithms and Distributed Programmation (Sep. 2018 - Jan. 2019)
- Bachelor 3 - Algorithmics 2 (Feb. 2019 - May 2019)
- Bachelor 3 - Algorithmics 1 (Sep. 2019 - Jan. 2020)

Teaching Assistant

Lyon, France

Université Lyon 1 — *Sep. 2019 - Dec. 2019*

- Bachelor 2 - Algorithmics and C++ Programmation (Sep. 2019 - Dec. 2019)
- Bachelor 1 - Practice teaching in Architecture (Nov. 2019 - Dec. 2019)

Research Intern with Leonardo Bautista-Gomez and Marc Casas

Barcelona, Spain

Barcelona Supercomputing Center (BSC) — *Apr. 2017 - Jul. 2017*

- Studied multi-grid linear system solvers and trade-off between energy consumption or execution time and accuracy of results.
- Run architecture-specific simulators to evaluate performance of a new algorithm.

Research Intern with Yves Robert and Anne Benoit

Lyon, France

Laboratoire de l'Informatique du Parallélisme (LIP) — *Jan. 2017 - Mar. 2017*

- Studied optimal checkpointing period coupled with replication on heterogeneous platforms.

Research Intern with Guillaume Aupy

Nashville, TN, USA

Vanderbilt University, Engineering and Computer Science department — *Sep. 2016 - Dec. 2016*

- Designed and simulated offline algorithms for periodic scheduling of I/O at the application level in supercomputers.

2nd year of Master degree internship with Yves Robert and Anne Benoit *Lyon, France*

Laboratoire de l'Informatique du Parallélisme (LIP) *Feb. 2016 - Jun. 2016*

- Studied resilience problems such as optimal checkpointing period with different execution speeds, multilevel checkpointing and task checkpointing in general DAGs.

1st year of Master degree internship with George Bosilca and Thomas Hérault *Knoxville, TN, USA*

Innovative Computing Laboratory (ICL) at UTK *May 2015 - Aug. 2015*

- Studied memory management on GPUs, designed algorithms for scheduling on heterogeneous platforms and performed simulations to assess their performance.

Bachelor degree internship with Clément Pernet *Lyon, France*

Laboratoire de l'Informatique du Parallélisme (LIP) *Jun. 2014 - Jul. 2014*

- Learned about error-correcting codes like Reed-Solomon.
- Adapted new methods of decoding (interleaving) to Rational Fraction Codes and applied them to distributed linear system solvers.

Observation week in a French company in Aeronautics *Vernon, France*

Safran Snecma *Feb. 2008*

- Designed cups and skate-boards on a CAO software and analyzed mechanical and thermal actions on them.

Publications

International journals

2022 **[J8] Comparing Distributed Termination Detection Algorithms for Modern HPC Platforms,** George Bosilca, Aurélien Bouteiller, Thomas Herault, Valentin Le Fèvre, Yves Robert, Jack Dongarra. *International Journal of Networking and Computing.* Vol. 12, No. 1, pp. 26-46, DOI:10.15803/ijnc.12.1_26.

2021 **[J7] Resilient Scheduling of Moldable Parallel Jobs to Cope with Silent Errors,** Anne Benoit, Valentin Le Fèvre, Lucas Perotin, Padma Raghavan, Yves Robert, Hongyang Sun. *IEEE Transactions on Computers.* Vol.71, No.7, pp. 1696-1710, DOI:10.1109/TC.2021.3104747.

2021 **[J6] Resilient Scheduling Heuristics for Rigid Parallel Jobs,** Anne Benoit, Valentin Le Fèvre, Padma Raghavan, Yves Robert, Hongyang Sun. *International Journal of Networking and Computing.* Vol. 11, No. 1, pp. 2-26, DOI: 10.15803/ijnc.11.1_2.

2019 **[J5] I/O scheduling strategy for periodic applications,** Ana Gainaru, Valentin Le Fèvre, Guillaume Pallez. *ACM Transactions on Parallel Computing*, Vol. 6, No. 2, Art. 7, DOI:10.1145/3338510.

2019 **[J4] A Generic Approach to Scheduling and Checkpointing Workflows,** Li Han, Valentin Le Fèvre, Louis-Claude Canon, Yves Robert, Frédéric Vivien. *International Journal of High Performance Computing Applications*, Vol. 33, No. 6, pp. 1255-1274, DOI:10.1177/1094342019866891.

2019 **[J3] Comparing the performance of rigid, moldable and grid-shaped applications on failure-prone HPC platforms,** Valentin Le Fèvre, Thomas Hérault, Yves Robert, Aurélien Bouteiller, Atsushi Hori, George Bosilca, Jack Dongarra. *Parallel Computing*, Vol. 85, pp. 1-12, DOI:10.1016/j.parco.2019.02.002.

2018 **[J2] Combining Checkpointing and Replication for Reliable Execution of Linear Workflows with Fail-Stop and Silent Errors,** Anne Benoit, Aurélien Cavelan, Florina M. Ciorba, Valentin Le Fèvre, Yves Robert. *International Journal of Networking and Computing*, Vol. 9, No. 1, pp. 2-27, DOI:10.15803/ijnc.9.1_2.

2017 **[J1] Towards Optimal Multi-Level Checkpointing,** Anne Benoit, Aurélien Cavelan, Valentin Le Fèvre, Hongyang Sun, Yves Robert. *IEEE Transactions on Computers*, Vol. 66, No. 7, pp. 1212-1226, DOI:10.1109/TC.2016.2643660.

International proceedings

2023 **[C4] Efficient Execution of SpGEMM on Long Vector Architectures,** Valentin Le Fèvre, Marc Casas. *In proceedings of the 32nd International Symposium on High-Performance Parallel and Distributed Computing (HPDC'23)*, pp. , DOI:10.1145/3588195.3593000. *Orlando, FL, USA*

2020 **[C3] Resilient Scheduling of Moldable Jobs on Failure-Prone Platforms,** Anne Benoit, Valentin Le Fèvre, Lucas Perotin, Padma Raghavan, Yves Robert, Hongyang Sun. *In proceedings of the 2020 IEEE International Conference on Cluster Computing (CLUSTER)*, pp. 81-91, DOI:10.1109/CLUSTER49012.2020.00018. *Kobe, Japan*

2019 **[C2] Replication is more efficient than you think,** Anne Benoit, Thomas Hérault, Valentin Le Fèvre, Yves Robert. *In proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC'19)*, pp. 1-14, DOI:10.1145/3295500.3356171. *Denver, CO, USA*

2018 **[C1] A Generic Approach to Scheduling and Checkpointing Workflows,** Li Han, Valentin Le Fèvre, Louis-Claude Canon, Yves Robert and Frédéric Vivien. *In proceedings of the 47th International Conference on Parallel Processing (ICPP 2018)*, pp. 1-10, DOI:10.1145/3225058.3225145. *Eugene, OR, USA*

International workshops

2022	**[W10] A Selective Nesting Approach for the Sparse Cholesky Factorization**, Valentin Le Fèvre, Tetsuzo Usui, Marc Casas. *In proceedings of the International Workshop on Extreme Scale Programming Models and Middleware (ESPM2)@SC'22*, pp. 1-9, DOI: 10.1109/ESPM256814.2022.00006.	*Dallas, TX, USA*
2021	**[W9] Revisiting Credit Distribution Algorithms for Distributed Termination Detection**, George Bosilca, Aurélien Bouteiller, Thomas Herault, Valentin Le Fèvre, Yves Robert, Jack Dongarra. *In proceedings of the 23*rd *Workshop on Advances in Parallel and Distributed Computational Models (APDCM), held in conjunction with IPDPS 2021*, pp. 611-620, DOI: 10.1109/IPDPSW52791.2021.00095.	*Portland, OR, USA*
2020	**[W8] A comparison of several fault-tolerance methods for the detection and correction of floating-point errors in matrix-matrix multiplication**, Valentin Le Fèvre, Thomas Herault, Julien Langou, Yves Robert. *In proceedings of the 13*th *International Workshop on Resilience held in conjunction with Euro-Par 200*, pp. 303-315, DOI: 10.1007/978-3-030-71593-9_24.	*Warsaw, Poland*
2020	**[W7] Design and Comparison of Resilient Scheduling Heuristics for Parallel Jobs**, Anne Benoit, Valentin Le Fèvre, Padma Raghavan, Yves Robert, Hongyang Sun. *In proceedings of the 22nd Workshop on Advances in Parallel and Distributed Computational Models (APDCM), held in conjunction with IPDPS 2020*, pp. 567-576. DOI: 10.1109/IPDPSW50202.2020.00099 - **Best paper award**.	*New Orleans, LA, USA*
2018	**[W6] Do moldable applications perform better on failure-prone HPC platforms?**, Valentin Le Fèvre, George Bosilca, Aurélien Bouteiller, Thomas Hérault, Atsushi Hori, Yves Robert and Jack Dongarra. *In proceedings of the International Workshop on Resilience held in conjunction with Euro-Par 2018*, pp. 787-799, DOI: 10.1007/978-3-030-10549-5_61.	*Torino, Italy*
2018	**[W5] Combining Checkpointing and Replication for Reliable Execution of Linear Workflows**, Anne Benoit, Aurélien Cavelan, Florina Ciorba, Valentin Le Fèvre and Yves Robert. *In proceedings of the International Workshop on Advances in Parallel and Distributed Computational Models (APDCM), held in conjunction with IPDPS 2018*, pp. 793-802, DOI: 10.1109/IPDPSW.2018.00126.	*Vancouver, Canada*
2018	**[W4] Approximating a Multi-Grid solver**, Valentin Le Fèvre, Leonardo Bautista-Gomez, Osman Unsal and Marc Casas. *In proceedings of the International Workshop on Performance Modeling, Benchmarking, and Simulation (PMBS), held in conjunction with SC'18*, pp. 97-107, DOI: 10.1109/PMBS.2018.8641651.	*Dallas, TX, USA*
2017	**[W3] Periodic I/O scheduling for supercomputers**, Guillaume Aupy, Ana Gainaru and Valentin Le Fèvre. *In proceedings of the International Workshop on Performance Modeling, Benchmarking, and Simulation (PMBS), held in conjunction with SC'17*, pp. 44-66, DOI: 10.1007/978-3-319-72971-8_3.	*Denver, CO, USA*
2017	**[W2] Optimal Checkpointing Period with Replicated Execution on Heterogeneous Platforms**, Anne Benoit, Aurélien Cavelan, Valentin Le Fèvre and Yves Robert. *In proceedings of the Fault Tolerance for HPC at eXtreme Scale Workshop (FTXS), held in conjunction with HPDC'17*, pp. 567-576, DOI: 10.1109/IPDPSW50202.2020.00099.	*Washington D.C., USA*
2016	**[W1] A different re-execution speed can help**, Anne Benoit, Aurélien Cavelan, Valentin Le Fèvre, Hongyang Sun and Yves Robert. *In proceedings of the International Workshop on Power-aware Algorithms, Systems and Architectures (PASA), held in conjunction with ICPP'16*, pp. 250-257, DOI: 10.1109/ICPPW.2016.45.	*Philadelphia, PA, USA*

Other research activities

Member of Program Committee of ACM Student Research Competition (SRC) at SC'23

Undergraduate students. *August 2023*

Member of Program Committee of ACM Student Research Competition (SRC) at SC'22

Undergraduate students. *August 2022*

Occasional reviewer for HPDC

1 review in 2022. *2022-present*

Occasional reviewer for TPDS

1 review in 2022. *2022-present*

Member of Program Committee of ICPP

Track Algorithms. *May 2021*

Participation to conferences

ESPM2 workshop of Supercomputing — *Dallas, TX, USA*

Presentation of publication [W10]. — *November 2023*

13th JLESC workshop — *Online*

Short talk about post-doc work on Cholesky factorization. — *December 2021*

Resilience workshop of Euro-Par — *Warsaw, Poland*

Presentation of publication [W8]. — *August 2020*

9th JLESC workshop — *Knoxville, TN, USA*

Short talk about publication [W5]. — *April 2019*

Resilience workshop of Euro-Par — *Torino, Italy*

Presentation of publication [W6]. — *August 2018*

8th JLESC workshop — *Barcelona, Spain*

Short talk about publication [W4]. — *April 2018*

5th JLESC workshop — *Lyon, France*

Short talk about publication [W1]. — *June 2016*

Skills

Programmation Python, C/C++, Risc-V intrinsincs, MPI, OpenMP, bash, LaTeX, HTML/CSS, PHP, SQL.

Others At ease with word processing and graphics softwares.

Languages French (mother tongue), English (proficient), Spanish (average).

Extracurricular Activity

Webmaster — *Around 2007-2011*

- Worked on free time as web developer (online game) with help of drawers and designers.

Student Union — *Lyon, France*

Event organizer — *2014*

- Member of the student union (600+ partisans) at ENS de Lyon. Organized the music part of the annual Gala of ENSL, including finding music groups and handling the sound system, as well as several other major events in the university life.

“Conservatoire“ de Lyon — *Lyon, France*

Jazz Saxophone — *Sep. 2013 - Jul. 2016*

- Studied saxophone jazz besides my computer science studies.
- Successfully finished the intermediate level in musical theory and practice.
- Now playing in > 5 different bands after leaving.