

# CURRICULUM-VITAE

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	Pierre RAMET
Born	13 October 1971 in Montreuil (France)
Citizenship	French
Current position	FULL PROFESSOR at Bordeaux University
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## Education

**2023- :** Full professor in computer science at Bordeaux University. Research activities done within the **TOPAL** team (Tools and Optimization for high Performance Applications and Learning).

**2017 :** Accreditation to supervise research at Bordeaux University (defense 27 November 2017).

**Title :**

*Hierarchical matrices, Hybrid methods, Heterogeneous architectures in Sparse Linear Solvers*

**Reviewers :**

- M. Frederic DESPREZ (INRIA);
- M. Yousef SAAD (Univ. Minnesota);
- M. Ian DUFF (Rutherford Appleton Lab.);

**Jury members :**

- M. Raymond NAMYST (Univ. Bordeaux);
- M. Esmond NG (Berkeley Nat. Lab.);
- M. Yves ROBERT (ENS Lyon);
- Mme. Isabelle TERASSE (AIRBUS);
- M. Sivan TOLEDO (Univ. Tel-Aviv);

**2000-2023 :** Associate professor in computer science at Bordeaux University.

**1997-2000 :** PhD. Thesis at Bordeaux University (defense 12 January 2000).

**Title :**

*Optimization of communication and data distribution in dense and sparse linear algebra*

**Reviewers :**

- M. Patrick AMESTOY (ENSEEIH);
- M. Michel COSNARD (ENS Lyon);

**Jury members :**

- M. Frederic DESPREZ (INRIA);
- M. Jack DONGARRA (Univ. Tennessee);
- M. Iain DUFF (Rutherford Appleton Lab.);
- M. Jean ROMAN (ENSEIRB), advisor;

**1996-1997 :** Military service at CEA/CESTA.

**1992-1995 :** Ingeneer training in computer science at ENSEIRB.

My interests span high-performance computing, focusing on sparse linear algebra. I am the developer of PaStiX, a high-performance sparse direct solver. Beyond sparse linear algebra, I am interested in

- Parallel algorithms (graph partitioning, nested dissection)
- Numerical algorithms (H-matrices, low rank approximations)
- Hardware accelerators (GPU, KNL)

## 1 Teaching Activities

The following list indicates the number of hours spent in teaching activities on a yearly basis.

- Undergraduate level/Licence : System programming 24h, Databases 32h, Object programming 48h, Distributed programming 32h, Cryptography 24h, AI 24h at Bordeaux University.
- Post graduate level/Master : Load balancing and scheduling 16h, Numerical algorithms 32h at Bordeaux INP (ENSEIRB-MATMECA). I also give classes on Cryptography 24h, HoChiMinh City in Vietnam.

## 2 Administration Activities

- Since 2020, I am head of the SATANAS team (Supports and Algorithms for High Performance Numerical Applications). I was deputy head between 2011 and 2020.
- Between 2008 and 2016, I was expert for GENCI (French supercomputing resources).
- Between 2005 and 2009, I was an elected member of the selection committee of the computer science department at Bordeaux University.

## 3 Scientific Responsibilities

Since 2015, I am scientific advisor at CEA (French Alternative Energies and Atomic Energy Commission) in the field of high performance computing in numerical simulations.

## 4 PhD. Advising

### PhD. Advising

**Avel Calluaud (100%)** *Combined compiler and runtime approach for a direct hierarchical solver*, Bordeaux University, in progress, funded by CEA.

**Clement Richefort (100%)** *Sparse multi-level solver for electromagnetism problems*, Bordeaux University, in progress, funded by CEA.

**Eragul Korkmaz (50%)** *Sparse Direct Solver using Hierarchical Matrices*, Bordeaux University, September 2022, funded by ANR SASHIMI.

**Gregoire Pichon (50%)** *Using low rank compression techniques in sparse direct solvers*, Bordeaux University, November 2018, funded by Inria and DGA.

**Salli Moustafa (50%)** *Massively Parallel Cartesian Discrete Ordinates Method for Neutron Transport Simulation*, Bordeaux University, December 2015, funded by EDF.

**Astrid Casadei (80%)** *Optimizations of hybrid sparse linear solvers relying on Schur complement and domain decomposition approaches*, Bordeaux University, October 2015, funded by the french ministry for research.

**Xavier Lacoste (80%)** *Scheduling and memory optimizations for sparse direct solver on multi-core/multi-gpu cluster systems*, Bordeaux University, February 2015, funded by ANR ANEMOS.

**Bruno Lathuilière (80%)** *Methode de decomposition de domaine pour les equations du transport simplifie en neutro-nique*, Bordeaux University, January 2010, funded by EDF.

**Mathieu Faverge (50%)** *Ordonnancement hybride statique-dynamique en algebre lineaire creuse pour de grands clusters de machines NUMA et multi-coeurs*, Bordeaux University, December 2009, funded by ANR NUMASIS.

## 5 Research topics

My interests span high-performance computing, focusing on sparse linear algebra. I mainly work on high performance parallel solver for very large sparse linear systems based on block direct method and block iterative method. I develop the `PaStiX` software which is based on an efficient scheduling and memory manager, in order to solve 3D problems with several million unknowns from simulation codes for electromagnetism with CEA/CESTA and fusion physics with CEA/EURATOM. I also work on domain decomposition method applied to neutron physics with EDF. More recently, I investigate hierarchical compression techniques to reduce the burden on large blocks appearing during the nested dissection process. In collaboration with E. Darve from Stanford University, We have developed a preliminary sparse direct solver using block low-rank kernels considering ordering strategies to enhance data locality and compressibility.

## 6 Software Development

I am the Co-PI of the `PaStiX`<sup>1</sup> software. `PaStiX` is a parallel sparse direct solver, based on a dynamic scheduler for modern hierarchical architectures. Some recent results demonstrate that using generic runtime systems provide a uniform and portable programming interface across heterogeneous environments, and are, therefore, a sustainable solution for hybrid environments. Furthermore, exploiting such a modular programming paradigm should facilitate the experiments of H-matrix arithmetics in this advance software package.

## 7 Reviews

- **Reviews for international journals** : TOMS (ACM), SISC (SIAM), Journal of Computational Physics (Elsevier), Parallel Computing (Elsevier), Computer & Fluids (Elsevier), Concurrency and Computation : Practice and Experience (Wiley), Numerical Methods in Fluids (Wiley), Numerical Methods in Engineering (Wiley), International Journal of High Performance Computing Applications (Sage), Journal of Computational and Applied Mathematics (Elsevier).
- **Reviews for international conferences** : IPDPS (IEEE), HiPC (IEEE), EuroPar (Springer), PMAA, PA-RENG, Compas, ...

## 8 Dissemination

Between 2011 and 2016 I was a trainer during a training of the Prace european initiative entitled “Parallel Linear Algebra”.

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1. <https://gitlab.inria.fr/solverstack/pastix>

## 9 Projects and contracts

- I was involved in the following international collaborations :
  - 2013-2017.** Stanford University and Lawrence Berkeley National Laboratory within the associate team FAST-LA :Fast and Scalable Hierarchical Algorithms for Computational Linear Algebra.
  - 2011-2015.** University of Tennessee within the associate team MORSE :Matrices Over Runtime Systems Exascale.
  - 2008-2009.** University of Minnesota within the associate team PHYLEAS :Study of parallel hybrid sparse linear solvers.
  - 2007-2008.** Japan Atomic Energy Agency.
- I am currently involved in the following ANR project :
  - 2019-** ANR SOLHARIS :SOLvers for Heterogeneous Architectures over Runtime systems, Investigating Scalability.
  - 2018-** ANR SASHIMI :Sparse Direct Solver using Hierarchical Matrices.
- I was the deputy head of the following ANR project :
  - 2011-2015.** ANR MN11 ANEMOS :Advanced Numeric for ELMs : Modeling and Optimized Schemes.
  - 2006-2010.** ANR CIS06 ASTER :Adaptive MHD Simulation of Tokamak ELMs for ITER.
- I was also involved in some other ANR projects :
  - 2013-2017.** ANR MN13 SOLHAR :Solvers for heterogeneous architectures on top of task-based runtime systems.
  - 2008-2012.** ANR COSINUS08 PETAL and COSINUS10 PETALH : Preconditioning scientific applications on pETascALe Heterogeneous machines.
  - 2006-2010.** ANR CIS06 SOLSTICE :SOLvers et SimulaTIons in Extreme Computing.
  - 2005-2009.** ANR CIS05 NUMASIS :High performance computing on NUMA architectures for seismology simulations.
- I was involved in the following industrial contracts :
  - 2014-** Industrial contracts with the CEA/CADARACHE : optimization of the linear algebra routines in the JOREK, a production controlled plasma fusion simulation code for ITER.
  - 2014-2016.** Contract with Algo' Tech : this collaboration, backed up by financial support from Bpifrance, enabled the SME to make the technological leap necessary for the development of a software version adapted to HPC.
  - 2006-2015.** Industrial contracts with the EDF : in this collaboration, we work on a parallel 3D Cartesian SN solver specialized for nuclear core simulation code.
  - 2000-** Industrial contracts with the CEA/CESTA : a long-term collaboration on performance analysis of our contributions to sparse direct solver for matrices coming from different applications developed at CEA/CESTA.

## 10 Publications

### International journals

- [1] M. Hoelzl, G. Huijsmans, S. Pamela, M. Bécoulet, et al.. *The JOREK non-linear extended MHD code and applications to large-scale instabilities and their control in magnetically confined fusion plasmas*. Journal of Nuclear Fusion, 61(6) 065001, 2021.
- [2] S. Moustafa, F. Févotte, M. Faverge, L. Plagne, P. Ramet. *Efficient Parallel Solution of the 3D Stationary Boltzmann Transport Equation for Diffusive Problems*. Journal of Computational Physics, 388(1) :335-349, 2019.
- [3] G. Pichon, E. Darve, M. Faverge, P. Ramet, and J. Roman. *Sparse Supernodal Solver Using Block Low-Rank Compression : design, performance and analysis*. International Journal of Computational Science and Engineering, 27 :255-270, 2018.
- [4] G. Pichon, M. Faverge, P. Ramet, and J. Roman. *Reordering strategy for blocking optimization in sparse linear solvers*. SIAM Journal on Matrix Analysis and Application, 38(1) :226-248, 2017.
- [5] S. Moustafa, I. Dutka-Malen, L. Plagne, A. Poncot, and P. Ramet. *Shared Memory Parallelism for 3D Cartesian Discrete Ordinates Solver*. Annals of Nuclear Energy, 82 :179-187, 2015.
- [6] M. Barrault, B. Lathulière, P. Ramet et J. Roman. *Efficient Parallel Resolution of The Simplified Transport Equations in Mixed-Dual Formulation*. Journal of Computational Physics, 230(5) :2004-2020, 2011.
- [7] G. Huysmans, Pamela S., E. van der Plas et P. Ramet. *Non-Linear MHD simulations of Edge Localised Modes (ELMs)*. Journal on Plasma Physics and Controlled Fusion, 51(12) :124012, 2009.
- [8] R. Abgrall, R. Huart et P. Ramet. *Numerical simulation of unsteady MHD flows and applications*. Magneto-HydroDynamics Journal, 45(2) :225-232, 2009.
- [9] P. Hénon, P. Ramet et J. Roman. *On finding approximate supernodes for an efficient ILU(k) factorization*. Parallel Computing, 34 :345-362, 2008.
- [10] P. Hénon, P. Ramet, et J. Roman. *PaStiX : A High-Performance Parallel Direct Solver for Sparse Symmetric Definite Systems*. Parallel Computing, 28(2) :301-321, 2002.
- [11] E. Caron, S. Chaumette, S. Contassot-Vivier, F. Desprez, E. Fleury, C. Gomez, M. Goursat, E. Jeannot, D. Lazure, F. Lombard, J.M. Nicod, L. Philippe, M. Quinson, P. Ramet, J. Roman, F. Rubi, S. Steer, F. Suter et G. Utard. *Scilab to Scilab//, the OURAGAN Project*. Parallel Computing, 27(11) :1497-1519, 2001.
- [12] D. Goudin, P. Hénon, F. Pellegrini, P. Ramet, J. Roman et J.-J. Pesqué. *Parallel Sparse Linear Algebra and Application to Structural Mechanics*. Numerical Algorithms, 24 :371-391, 2000.

### Other research reports and publications under review

- [13] Korkmaz, E. and Faverge, M. and Pichon, G. and Ramet, P. *Reaching the Quality of SVD for Low-Rank Compression Through QR Variants*. Research Report 9476, <https://hal.inria.fr/hal-03718312v4>.
- [14] Pichon, G. and Darve, E. and Faverge, M. and Ramet, P. and Roman, J. *Supernodes ordering to enhance Block Low-Rank compression in sparse direct solvers*. Research Report 9238, <https://hal.inria.fr/hal-01961675>.
- [15] Augonnet, Cédric and Goudin, David and Kuhn, Matthieu and Lacoste, Xavier and Namyst, Raymond and Ramet, Pierre. *A hierarchical fast direct solver for distributed memory machines with manycore nodes*. Research Report, <https://hal-cea.archives-ouvertes.fr/cea-02304706>.
- [16] Sellama, Hocine and Huijsmans, Guido and Ramet, Pierre. *Adaptive mesh refinement for numerical simulation of MHD instabilities in tokamaks : JOREK code*. Research Report 8635, <https://hal.inria.fr/hal-01088094>.

## International conferences with proceedings (Springer LNCS, IEEE or SIAM)

- [17] C. Richefort, M. Lecouvez, R. Falgout, and P. Ramet. Toward a multilevel method for the Helmholtz equation. 21st SIAM Copper Mountain Conference on Multigrid Methods, Copper Mountain, Colorado, USA, avril 2023.
- [18] E. Korkmaz, M. Faverge, G. Pichon, and P. Ramet. *Deciding Non-Compressible Blocks in Sparse Direct Solvers using Incomplete Factorization*. HiPC 2021, 28th IEEE International Conference on High Performance Computing, Data, and Analytics, pages 1-10, Bangalore, India, decembre 2021.
- [19] C. Gou, A. Al Zoobi., A. Benoit, M. Faverge, L. Marchal, G. Pichon., P. Ramet. *Improving mapping for sparse direct solvers : A trade-off between data locality and load balancing*. EuroPar 2020 - 26th International European Conference on Parallel and Distributed Computing, Warsaw, Poland, pages 1-16, aout 2020.
- [20] G. Pichon, E. Darve, M. Faverge, P. Ramet, and J. Roman. *Sparse Supernodal Solver Using Block Low-Rank Compression*. 18th IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing (PDSEC 2017), Orlando, USA, juin 2017.
- [21] S. Moustafa, M. Faverge, L. Plagne, P. Ramet. *3D Cartesian Transport Sweep for Massively Parallel Architectures with PARSEC*. 29th IEEE International Parallel & Distributed Processing Symposium (IPDPS'15), pages 581-590, Hyderabad, India, mai 2015.
- [22] A. Casadei, P. Ramet, and J. Roman. *An improved recursive graph bipartitioning algorithm for well balanced domain decomposition*. 21st IEEE International Conference on High Performance Computing, pages 1-10, Goa, India, december 2014.
- [23] X. Lacoste, M. Faverge, P. Ramet, S. Thibault, and G. Bosilca. *Taking advantage of hybrid systems for sparse direct solvers via task-based runtimes*. HCW'2014 workshop of IPDPS, pages 29-38, Phoenix, USA, mai 2014.
- [24] G. Huysmans, Pamela S., E. van der Plas et P. Ramet. *Non-Linear MHD simulations of Edge Localised Modes*. 36th EPS Plasma Physics Conference, Sofia, Bulgarie, juin 2009.
- [25] M. Barrault, B. Lathulière, P. Ramet et J. Roman. *A domain decomposition method applied to the simplified transport equations*. IEEE 11th International Conference on Computational Science and Engineering, Sao Paulo, Brazil, pages 91-97, juillet 2008.
- [26] Y. Caniou, J.-S. Gay et P. Ramet. *Tunable parallel experiments in a GridRPC framework : application to linear solvers*. VECPAR'08, LNCS 5336, pages 430-436, Toulouse, France, juin 2008.
- [27] N. Kushida, Y. Suzuki, N. Teshima, N. Nakajima, Y. Caniou, M. Dayde et P. Ramet. *Toward an International Sparse Linear Algebra Expert System by Interconnecting the ITBL Computational Grid with the Grid-TLSE Platform*. VECPAR'08, LNCS 5336, pages 424-429, Toulouse, France, juin 2008.
- [28] M. Faverge et P. Ramet. *Dynamic Scheduling for sparse direct Solver on NUMA architectures*. Proceedings of PARA'08, Trondheim, Norway, LNCS, mai 2008.
- [29] P. Hénon, P. Ramet et J. Roman. *Partitioning and Blocking Issues for a Parallel Incomplete Factorization*. PARA'06, Workshop on state-of-the-art in scientific computing, Umea, Suede, LNCS 4699, pages 929-937, juin 2006.
- [30] P. Hénon, P. Ramet et J. Roman. *On using an hybrid MPI-Thread programming for the implementation of a parallel sparse direct solver on a network of SMP nodes*. Sixth International Conference on Parallel Processing and Applied Mathematics, Workshop HPC Linear Algebra, Poznan, Pologne, LNCS 3911, pages 1050-1057, september 2005.
- [31] P. Hénon, F. Pellegrini, P. Ramet, J. Roman, et Y. Saad. *Applying parallel direct solver skills to build robust and highly performant preconditioners*. PARA'04, Workshop on state-of-the-art in scientific computing, Copenhagen, Danemark, LNCS 3732, pages 601-619, juin 2004.
- [32] O. Beaumont, P. Ramet et J. Roman. *Asymptotically optimal algorithm for Laplace task graphs on heterogeneous platforms*. Fifth International Conference on Parallel Processing and Applied Mathematics (PPAM), Czestochowa, Pologne, LNCS 3019, pages 880-887, septembre 2003.

- [33] P. Hénon, P. Ramet et J. Roman. *Efficient algorithms for direct resolution of large sparse system on clusters of SMP nodes*. SIAM Conference LA'2003, Williamsburg, USA, juillet 2003.
- [34] P. Hénon, P. Ramet et J. Roman. *PaStiX : A Parallel Direct Solver for Sparse SPD Matrices based on Efficient Static Scheduling and Memory Management*. SIAM Conference PPSC'2001, Portsmouth, Virginie, USA, mars 2001.
- [35] P. Hénon, P. Ramet et J. Roman. *PaStiX : A Parallel Sparse Direct Solver Based on a Static Scheduling for Mixed 1D/2D Block Distributions*. IPDPS'2000, Cancun, Mexique, LNCS 1800, pages 519-525, mai 2000.
- [36] P. Hénon, P. Ramet et J. Roman. *A Mapping and Scheduling Algorithm for Parallel Sparse Fan-In Numerical Factorization*. EuroPar'99, Toulouse, France, LNCS 1685, pages 1059-1067, septembre 1999.
- [37] F. Desprez, P. Ramet et J. Roman. *Optimal Grain Size Computation for Pipelined Algorithms*. EuroPar'96, Lyon, France, LNCS 1123, pages 165-172, septembre 1996.

## Books and book chapters

- [38] O. Coulaud, L. Giraud, P. Ramet, and X. Vasseur. *Developments in Parallel, Distributed, Grid and Cloud Computing for Engineering*. Chapter Augmentation and Deflation in Krylov subspace methods, pages 249-275. Saxe-Coburg Publications, Kippen, Stirlingshire, United Kingdom, 2013.

## International conferences or workshops

- [39] C. Richefort, M. Lecouvez, R. Falgout, and P. Ramet. *Multigrid Method for the Indefinite Helmholtz Equation*. SIAM Conference on Computation Science and Engineering, Amsterdam, Pays-Bas, fevrier 2023.
- [40] P. Ramet et al. *Study of the recent developments around the PaStiX solver for the EoCoE project : distributed memory, runtime systems, and low-rank* 32nd International Conference on Parallel Computational Fluid Dynamics, Nice, France, mai 2021.
- [41] M. Faverge, E. Korkmaz, G. Pichon, and P. Ramet. *Recent Developments Around the Block Low-Rank PaStiX Solver* SIAM Conference on Parallel Processing for Scientific Computing, Seattle, USA, fevrier 2020.
- [42] E. Korkmaz, M. Faverge, G. Pichon, and P. Ramet. *Rank Revealing QR Methods for Sparse Block Low Rank Solvers*. Sparse Days, Toulouse, France, juillet 2019.
- [43] M. Faverge, G. Pichon, P. Ramet, and J. Roman. *Exploiting Parameterized Task-graph in Sparse Direct Solvers* SIAM Conference on Computation Science and Engineering, Spokane, USA, fevrier 2019.
- [44] G. Pichon, E. Darve, M. Faverge, P. Ramet, and J. Roman. *Block Low-rank Algebraic Clustering for Sparse Direct Solvers* SIAM Conference on Computation Science and Engineering, Spokane, USA, fevrier 2019.
- [45] G. Pichon, E. Darve, M. Faverge, P. Ramet, and J. Roman. *Block Low-rank Algebraic Clustering for Sparse Direct Solvers* PMAA'2018, Zurich, Suisse, juin 2018.
- [46] G. Pichon, E. Darve, M. Faverge, P. Ramet, and J. Roman. *SIAM Conference on Computation Science and Engineering*, Atlanta, USA, fevrier 2017.
- [47] G. Pichon, M. Faverge, and P. Ramet. *Exploiting Modern Manycore Architecture in Sparse Direct Solver with Runtime Systems*. SIAM Conference on Computation Science and Engineering, Atlanta, USA, fevrier 2017.
- [48] G. Pichon, M. Faverge, P. Ramet, and J. Roman. *Impact of Blocking Strategies for Sparse Direct Solvers on Top of Generic Runtime*. SIAM Conference on Computation Science and Engineering, Atlanta, USA, fevrier 2017.
- [49] E. Darve, M. Faverge, G. Pichon, P. Ramet, and J. Roman. *Sparse Supernodal Solver Using Hierarchical Compression*. Workshop on Fast Direct Solvers, Purdue, USA, novembre 2016.

- [50] P. Ramet *On the use of low rank approximations for sparse direct solvers*. SIAM Annual Meeting, Boston, USA, juillet 2016.
- [51] M. Faverge, G. Pichon, P. Ramet, and J. Roman. *Impact of Blocking Strategies for Sparse Direct Solvers on Top of Generic Runtimes*. SIAM Conference on Parallel Processing for Scientific Computing, Paris, France, avril 2016.
- [52] E. Darve, M. Faverge, G. Pichon, P. Ramet, and J. Roman. *Exploiting H-Matrices in Sparse Direct Solvers*. SIAM Conference on Parallel Processing for Scientific Computing, Paris, France, avril 2016.
- [53] M. Faverge, G. Pichon, P. Ramet, and J. Roman. *Blocking strategy optimizations for sparse direct linear solver on heterogeneous architectures*. Sparse Days, Saint Girons, France, juin 2015.
- [54] M. Faverge, G. Pichon, P. Ramet, and J. Roman. *On the use of H-Matrix Arithmetic in PaStiX : a Preliminary Study*. Workshop on Fast Solvers, Toulouse, France, juin 2015.
- [55] X. Lacoste, M. Faverge, and P. Ramet. *A task-based sparse direct solver suited for large scale hierarchical/heterogeneous architectures*. SIAM Conference on Computation Science and Engineering, Salt Lake City, USA, fevrier 2015.
- [56] A. Casadei, P. Ramet, and J. Roman. *Towards a recursive graph bipartitioning algorithm for well balanced domain decomposition*. SIAM Conference on Computation Science and Engineering, Salt Lake City, USA, fevrier 2015.
- [57] P. Ramet. *On the design of parallel linear solvers for large scale problems*. International Congress on Industrial and Applied Mathematics, Pekin, China, aout 2015.
- [58] A. Casadei and P. Ramet. *Towards a recursive graph bipartitioning algorithm for well balanced domain decomposition*. International Congress on Industrial and Applied Mathematics, Pekin, China, aout 2015.
- [59] S. Moustafa, M. Faverge, L. Plagne, and P. Ramet. *Parallel 3D Sweep Kernel with PARSEC*. 16th IEEE International Conference on High Performance and Communications, workshop on HPC-CFD in Energy/Transport Domains, Paris, France, aout 2014.
- [60] A. Casadei, P. Ramet, and J. Roman. *Nested Dissection with Balanced Halo*. SIAM Workshop on Combinatorial Scientific Computing, Lyon, France, juillet 2014.
- [61] E. Agullo, M. Faverge, L. Giraud, A. Guermouche, P. Ramet, and R. Roman. *Toward parallel scalable linear solvers suited for large scale hierarchical parallel platforms*. WCCM-ECCM-ECFD, Barcelona, Spain, juillet 2014.
- [62] S. Moustafa, I. Dutka-Malen, L. Plagne, A. Poncot, and P. Ramet. *Shared Memory Parallelism for 3D Cartesian Discrete Ordinates Solver*. Joint International Conference on Supercomputing in Nuclear Applications + Monte Carlo, Paris, France, octobre 2013.
- [63] X. Lacoste, M. Faverge, and P. Ramet. *Sparse Linear Algebra over DAG Runtimes*. SIAM Conference on Computation Science and Engineering, Boston, USA, fevrier 2013.
- [64] A. Casadei, L. Giraud, P. Ramet, and J. Roman. *Towards Domain Decomposition with Balanced Halo*. Workshop Celebrating 40 Years of Nested Dissection, Waterloo, Canada, juillet 2013.
- [65] P. Ramet. *From hybrid architectures to hybrid solvers*. Workshop Celebrating 40 Years of Nested Dissection, Waterloo, Canada, juillet 2013.
- [66] X. Lacoste, P. Ramet, M. Faverge, I. Yamazaki, G. Bosilca. *Toward a supernodal sparse direct solver over DAG runtimes*. PMAA'2012, London, England, juin 2012.
- [67] A. Casadei et P. Ramet. *Memory Optimization to Build a Schur Complement*. SIAM Conference LA'2012, Valencia, Spain, juin 2012.
- [68] X. Lacoste et P. Ramet. *Sparse direct solver on top of large-scale multicore systems with GPU accelerators*. SIAM Conference LA'2012, Valencia, Spain, juin 2012.



- [69] M. Faverge et P. Ramet. *Fine Grain Scheduling for Sparse Solver on Manycore Architectures*. SIAM Conference PPSC'2012, Savannah, USA, fevrier 2012.
- [70] Y. Suzuki, N. Kushida, T. Tatekawa, N. Teshima, Y. Caniou, R. Guivarch, M. Dayde et P. Ramet. *Development of an International Matrix-Solver Prediction System on a French-Japanese International Grid Computing Environment*. Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo 2010, Tokyo, Japan, octobre 2010.
- [71] M. Barrault, B. Lathulière, P. Ramet et J. Roman. *A Non Overlapping Parallel Domain Decomposition Method Applied to The Simplified Transport Equations*. International Conference on Mathematics, Computational Methods and Reactor Physics, New-York, USA, mai 2009.
- [72] R. Abgrall, O. Coulaud, P. Hénon, R. Huart, G. Huysmans, G. Latu, B. Nkonga, S. Pamela et P. Ramet. *Numerical simulation of tokamak plasmas*. 7th PAMIR International Conference on Fundamental and Applied MHD, Presqu'île de Giens, France, septembre 2008.
- [73] M. Faverge, X. Lacoste et P. Ramet. *A NUMA Aware Scheduler for a Parallel Sparse Direct Solver*. PMAA'2008, Neuchatel, Suisse, juin 2008.
- [74] M. Barrault, B. Lathulière, P. Ramet et J. Roman. *A Domain Decomposition Method Applied to Large Eigenvalue Problems in Neutron Physics*. PMAA'2008, Neuchatel, Suisse, juin 2008.
- [75] M. Barrault, B. Lathulière, P. Ramet et J. Roman. *A domain decomposition method for the resolution of an eigenvalue problem in neutron physics*. International Symposium on Iterative Methods in Scientific Computing (IMACS), Lille, France, mars 2008.
- [76] P. Hénon, P. Ramet et J. Roman. *On finding approximate supernodes for an efficient ILU(k) factorization*. PMAA'2006, Rennes, France, septembre 2006.
- [77] B. Braconnier, B. Nkonga, M. Papin, P. Ramet, M. Riccuito, J. Roman et R. Abgrall. *Efficient solution technique for low Mach number compressible multiphase problems*. PMAA'2006, Rennes, France, septembre 2006.
- [78] P. Hénon, F. Pellegrini, P. Ramet et J. Roman. *Blocking Issues for an Efficient Parallel Block ILU Preconditioner*. SIAM Conference On Preconditioning Techniques For Large Sparse Matrix Problems In Scientific And Industrial Applications, Atlanta, USA, mai 2005.
- [79] P. Hénon, P. Ramet et J. Roman. *A Blockwise Algorithm for Parallel Incomplete Cholesky Factorization*. PMAA'2004, Marseille, France, octobre 2004.
- [80] P. Hénon, B. Nkonga, P. Ramet et J. Roman. *Using of the High Performance Sparse Solver PaStiX for the Complex Multiscale 3D Simulations performed by the FluidBox Fluid Mechanics Software*. PMAA'2004, Marseille, France, octobre 2004.
- [81] P. Hénon, F. Pellegrini, P. Ramet, J. Roman et Y. Saad. *High Performance Complete and Incomplete Factorizations for Very Large Sparse Systems by using Scotch and PaStiX softwares*. SIAM Conference PPSC'2004, San Francisco, USA, fevrier 2004.
- [82] P. Hénon, F. Pellegrini, P. Ramet et J. Roman. *Towards High Performance Hybrid Direct-Iterative Solvers for Large Sparse Systems*. SIAM Conference On Preconditioning Techniques For Large Sparse Matrix Problems In Scientific And Industrial Applications, Napa, USA, octobre 2003.
- [83] P. Hénon, P. Ramet et J. Roman. *Parallel factorization of very large sparse SPD systems on a network of SMP nodes*. PMAA'2002, Neuchâtel, Suisse, novembre 2002.
- [84] P. Hénon, P. Ramet et J. Roman. *PaStiX : A High-Performance Parallel Direct Solver for Sparse Symmetric Definite Systems*. PMAA'2000, Neuchâtel, Suisse, août 2000.
- [85] D. Goudin, P. Hénon, F. Pellegrini, P. Ramet, J. Roman et J.-J. Pesqué. *Description of the EMILIO Software Processing Chain and Application to Structural Mechanics*. PMAA'2000, Neuchâtel, Suisse, août 2000.

## Invited international workshops

- [86] P. Ramet. *Heterogeneous architectures, Hybrid methods, Hierarchical matrices for Sparse Linear Solvers*. Seminar at Stanford, avril 2018.
- [87] P. Ramet. *From hybrid architectures to hybrid solvers*. Seminar at Stanford, juillet 2013.
- [88] P. Ramet. *Hybrid methods, Hybrid architectures, Hybrid compressions for sparse direct solvers*. Seminar at Stanford, novembre 2013.
- [89] P. Ramet. *Dynamic Scheduling for Sparse Direct Solver on NUMA and Multicore Architectures*. ComplexHPC meeting, Lisbon, Portugal, octobre 2009.
- [90] P. Hénon, P. Ramet et J. Roman. *A supernode amalgamation algorithm for an efficient block incomplete factorization*. Workshop on parallel iterative solvers and domain decomposition techniques, Minneapolis, USA, juillet 2008.
- [91] P. Hénon, P. Ramet et J. Roman. *A supernode amalgamation algorithm for an efficient block incomplete factorization*. Workshop PPAM'07, Gdansk, Pologne, septembre 2007.
- [92] P. Ramet. *High performances methods for solving large sparse linear systems - Direct and Incomplete Factorization*. Workshops ReDIMsOPS, Japan Atomic Energy Agency, Tokyo, Japon, mai 2007.
- [93] O. Czarny, G. Huysmans, P. Hénon et P. Ramet. *Improvement of existing solvers for the simulation of MHD instabilities*. Numerical flow models for controlled fusion, Porquerolles, France, avril 2007.
- [94] P. Hénon, F. Pellegrini, P. Ramet et J. Roman. *An efficient hybrid MPI/Thread implementation on a network of SMP nodes for the parallel sparse direct solver PaStiX : ordering / scheduling / memory management / out-of-core issues, and application to preconditioning*. Sparse Days and Grid Computing, Saint Giron, France, juin 2003.

## PhD. Advising

- [95] E. Korkmaz. *Improving the memory and time overhead of low-rank parallel linear sparse direct solvers*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, septembre 2022.
- [96] G. Pichon. *On the use of low-rank arithmetic to reduce the complexity of parallel sparse linear solvers based on direct factorization techniques*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, novembre 2018.
- [97] S. Moustafa. *Massively Parallel Cartesian Discrete Ordinates Method for Neutron Transport Simulation*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, decembre 2015.
- [98] A. Casadei. *Optimizations of hybrid sparse linear solvers relying on Schur complement and domain decomposition approaches*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, octobre 2015.
- [99] X. Lacoste. *Scheduling and memory optimizations for sparse direct solver on multi-core/multi-gpu cluster systems*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, fevrier 2015.
- [100] B. Lathulière. *Méthode de décomposition de domaine pour les équations du transport simplifiées en neutronique*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, janvier 2010.
- [101] M. Faverge. *Ordonnancement hybride statique-dynamique en algèbre linéaire creuse pour de grands clusters de machines NUMA et multi-coeurs*. PhD thesis, LaBRI, Université Bordeaux, Talence, France, decembre 2009.

## Softwares

[102] PaStiX. A scientific library that provides a high performance parallel solver for very large sparse linear systems based on direct methods.

Available at : <https://gitlab.inria.fr/solverstack/pastix>.

APP (IDDN.FR.001.230016.000.S.C.2008.000.31235).

Self-Assessment<sup>2</sup> : A-5, SO-4, SM-4, EM-4, SDL-5

Own-Contribution : DA-4, CD-3, MS-3, TPM-4

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2. [https://www.inria.fr/sites/default/files/2019-10/Criteria\\_software\\_self\\_assessment.pdf](https://www.inria.fr/sites/default/files/2019-10/Criteria_software_self_assessment.pdf).