Demande n°4323 - ARED

Acronyme :RobDNA

Identification

Identification

N°	4323
Année	2026
Statut	Soumis à l'établissement
Date de création	30/01/2026
Date de modification	02/02/2026
Date de soumission	30/01/2026
Acronyme	RobDNA
Intitulé du projet / thèse	Stockage robuste de données sur ADN
Dispositif	ARED
Civilité du porteur	Madame
Nom du porteur	ROUMY
Prénom du porteur	Aline
Courriel	aline.roumy@inria.fr

Priorité régionale

Priorité régionale

Priorité régionale	Atténuation et/ou adaptation au changement climatique

Stratégie régionale de recherche et d'innovation (S3)

Stratégie régionale de recherche et d'innovation (S3)

Domaine d'innovation stratégique (DIS) principal	Économie numérique sécurisée et responsable
Levier thématique associé au DIS principal	Technologies numériques sobres et responsables
Axe transversal : transitions climatique et écologique	Adaptation au changement climatique
Axe transversal : cohésion et inclusion sociale	Non concerné

Organisme de tutelle

Organisme de tutelle

Établissement	CNRS BRETAGNE PAYS LOIRE
Commune	RENNES

Civilité	Madame
Nom	EVEN
Prénom	Isabelle

Unité de recherche

Unité de recherche

Nom de l'unité	IRISA
Civilité	Monsieur
Nom	BARAIS
Prénom	Olivier

Données complémentaires de l'unité de recherche

Libellé	Valeur
Statut et numéro de l'unité de recherche (UMR, USR, EA)	
Le cas échéant, nom de l'équipe de recherche	
Le cas échéant, nom du responsable de l'équipe de recherche	
Activités de recherche et points forts de l'équipe	COMPACT conçoit des algorithmes de compression et traitement de données pour flux visuels massifs, alliant performance et garanties théoriques. L'équipe se distingue par son excellence académique et ses partenariats industriels avec des acteurs du bassin rennais comme InterDigital, Ateme, MediaKind.
Si implication dans un/plusieurs programmes européens ou internationaux, préciser	

Co-directeur de thèse

Co-directeur de thèse

Civilité	Monsieur
Nom	LAVENIER
Prénom	Dominique
Unité de recherche	IRISA
Établissement de tutelle	CNRS BRETAGNE PAYS LOIRE

Description

Description du projet

Libellé	Valeur
Résumé synthétique du projet (2000 caractères max)	La croissance exponentielle du volume de données numériques met en évidence les limites des technologies de stockage conventionnelles en termes de densité, de durabilité et de consommation énergétique. Dans ce contexte, le stockage de données sur ADN apparaît comme une alternative prometteuse, offrant une densité de stockage exceptionnelle, une très longue durée de conservation et un faible coût énergétique. Toutefois, la mise en œuvre pratique du stockage sur ADN soulève de nombreux défis, notamment en raison des erreurs introduites lors des étapes de synthèse et de

Libellé	Valeur
	séquençage. Ce projet de thèse vise à développer des algorithmes permettant une récupération robuste des données dans les systèmes de stockage sur ADN. Il se concentre plus particulièrement sur la conception conjointe de méthodes de compression et de correction d'erreurs adaptées aux spécificités du séquençage nanopore. Cette technologie, bien que rapide et compatible avec une lecture en temps réel, introduit des erreurs complexes telles que des insertions et des deletions, qui sont particulièrement difficiles à corriger car elles créent des désynchronisations. Deux approches sont traditionnellement proposées pour faire face à ces erreurs : la conception de séquences d'ADN contraintes afin de limiter leur apparition, ou l'utilisation de codes correcteurs d'erreurs pour les corriger a posteriori. Ces stratégies sont souvent considérées comme antagonistes. L'originalité de ce projet réside dans la proposition d'une approche hybride visant à combiner prévention et correction des erreurs. L'objectif est de concevoir des schémas dans lesquels la structuration des séquences d'ADN, la compression des données et la correction d'erreurs sont pensées conjointement. En s'appuyant sur des outils issus de la théorie de l'information, du codage de canaux non binaires et du transcodage spécifique à l'ADN, ce travail vise à améliorer significativement la robustesse et l'efficacité de la récupération des données après séquençage. À terme, cette thèse contribuera au développement de solutions de stockage sur ADN plus fiables et plus proches d'une exploitation à grande échelle.
Caractère structurant/stratégique du projet (descriptif/ex. : art.5 Rglmt ARED 2026 -2000 car. max)	Le caractère structurant et stratégique de cette thèse repose sur deux axes complémentaires. D'une part, elle viendra en support du projet PEPR MolecularXiv, qui finance les expérimentations coûteuses (wetlab), en renforçant l'axe algorithmique et théorique indispensable. D'autre part, elle permettra une contribution internationale au standard JPEG DNA, en développant des algorithmes de compression robuste pour le stockage de données sur ADN, qui est l'objectif de la phase 2 du standard JPEG DNA et qui démarrera en janvier 2027.
Porteur du projet : date d'obtention de l'HDR ou dérogation	Aline Roumy est Directrice de Recherche Inria, responsable de l'équipe de recherche COMPACT, portant sur la compression d'images et de vidéo. Elle a obtenu son HDR en 2018.
Collaborations scientifiques (nature/pays) et partenariat socio-économique envisagé (3000 car. max.)	Ce projet de thèse s'inscrit dans un environnement scientifique fortement collaboratif, à l'interface entre sciences du numérique, théorie de l'information, chimie, biologie et biotechnologies. Tout d'abord, ce travail offrira l'opportunité de contribuer activement à la deuxième phase de normalisation du standard JPEG DNA, prévue de démarre en janvier 2027. Cette deuxième phase vise précisément la définition d'algorithmes de compression robuste adaptés au stockage de données sur ADN, capables de prendre en compte les contraintes biologiques et les erreurs introduites lors de la synthèse et du séquençage. Les objectifs scientifiques du projet — conception conjointe de schémas de compression et de correction d'erreurs pour des canaux complexes — sont en parfaite adéquation avec les enjeux de cet effort de normalisation. Par ailleurs, ce projet de thèse est conçu comme un complément scientifique au PEPR MoleculArXiv existant, dédié au stockage de données sur ADN. Alors que le PEPR couvre une large partie des développements expérimentaux et technologiques, son déploiement est actuellement contraint par le coût élevé des expérimentations de type wetlab, qui nécessite des financements supplémentaires. Le projet doctoral permettra ainsi de renforcer l'axe algorithmique et théorique du PEPR, en apportant des solutions de codage et de récupération des données susceptibles de réduire les besoins expérimentaux et d'optimiser l'exploitation des données produites.
Si DIS identifié, préciser l'adéquation du projet avec le DIS (2000 car. maximum)	Ce projet s'inscrit pleinement dans le thème Technologies numériques sobres et responsables, car il vise à développer des solutions de stockage de données sur ADN à la fois fiables et énergétiquement efficaces. L'ADN permet une conservation à long terme sans consommation continue d'électricité,

	contrairement aux centres de données classiques, réduisant ainsi l'empreinte carbone du stockage massif de données. En améliorant la robustesse et l'efficacité des algorithmes de compression et de correction d'erreurs, la thèse contribuera à un numérique plus durable et résilient face aux enjeux environnementaux et au changement climatique.
Si priorité régionale cochée, préciser en quoi le projet s'y rattache effectivement (2000 car.max.)	La transition numérique entraîne une forte croissance de la consommation énergétique et de l'empreinte carbone des infrastructures de stockage de données, les centres de données représentant une part croissante des émissions de gaz à effet de serre en raison de leurs besoins en électricité, refroidissement et renouvellement des équipements. Dans ce contexte, il devient crucial de développer des solutions numériques sobres et durables. Le stockage sur ADN constitue une réponse stratégique à ces enjeux. Sa densité exceptionnelle réduit drastiquement l'espace nécessaire pour stocker de grandes quantités de données, et sa conservation à long terme, sans apport énergétique continu, permet de limiter fortement l'usage d'électricité et de systèmes de refroidissement. Contrairement aux technologies actuelles, l'ADN peut être stocké à température ambiante pendant des décennies, voire des siècles, offrant ainsi une solution durable face aux risques climatiques et à l'augmentation continue des besoins numériques. Le projet de thèse s'inscrit pleinement dans cette perspective, en développant des algorithmes de compression et de correction d'erreurs robustes, qui améliorent la fiabilité du stockage sur ADN de manière à rendre cette technologie déployable. Il contribue ainsi à la réduction de l'empreinte carbone des infrastructures de stockage et à l'adaptation aux défis climatiques, en offrant une technologie de conservation des données à long terme à faible impact environnemental.
Si priorité régionale "Politique publique Région", préciser (voir liste au point 4, Règlement 2026)	
Cotutelle financière internationale (oui/non)	
Nom(s) du(des) cofinanceur(s) envisagé(s) ou confirmé(s)	
Si cofinancement industriel, justifier le choix du dispositif ARED au lieu du dispositif CIFRE	
État du cofinancement (indiquer "acquis" ou "demandé")	acquis
Si demandé, date prévisionnelle de réponse du cofinanceur	
Si cofinancement refusé, autre(s) source(s) de cofinancement identifiée(s)	
Si reversement prévu, préciser (partenaire, montant)	

Candidat

Candidat

Genre	Masculin
Nationalité	Maroc

Collaboration internationale

Collaboration internationale

Pays	
Etablissement partenaire à l'étranger	

Pièces jointes

Date de mi	Type de pièce	Commentaire	Document	Valide	Commentaire
02/02/2026	ARED - Dépôt - CV du porteur	Obligatoire - Le CV doit préciser si le porteur est titulaire de l'HDR et, le cas échéant, depuis quand, et mentionner la liste des doctorant·e·s déjà encadré·e·s et des publications associées.	ARoumy2026.pdf	Non traité	
02/02/2026	ARED - Dépôt - Avis directeur·rice d'unité	Obligatoire - Voir le modèle à suivre dans l'onglet "Documents à télécharger"		Non traité	
02/02/2026	ARED - Dépôt - Justificatif cofinancement	Facultatif - Dépôt de demande, justificatif d'obtention, courrier du cofinanceur pressenti...		Non traité	
02/02/2026	ARED - Dépôt - Lettre partenaire étranger	Facultatif - Lettre d'engagement de l'établissement partenaire étranger en cas de cotutelle internationale		Non traité	
02/02/2026	ARED - Dépôt - Pièce complémentaire	Facultatif	CV_Riad_Bendouro.pdf	Non traité	
02/02/2026	ARED - Dépôt - Pièce complémentaire	Facultatif		Non traité	
02/02/2026	ARED - Instruction - Lettre de saisine	Lettre de l'établissement à transmettre à la Région (utiliser le modèle disponible dans la rubrique "Documents à télécharger")		Non traité	
02/02/2026	ARED - Versement - Convention de partenariat	Le cas échéant (si autorisation de reversement)		Non traité	
02/02/2026	ARED - Versement 2 - CV doctorant.e	Pour versement tranche 2		Non traité	
02/02/2026	ARED - Versement 2 - Copie du contrat doctoral (ou CDD ou attestation))	Pour versement tranche 2		Non traité	
02/02/2026	ARED - Versement 2 - Attestation bon déroulement travaux année 1	Pour versement tranche 2		Non traité	
02/02/2026	ARED - Versement 2 - Bilan financier année 1	Pour versement tranche 2 ARED		Non traité	
02/02/2026	ARED - Versement 3 - Attestation bon déroulement travaux année 2	Pour versement 50% tranche 3 ARED		Non traité	
02/02/2026	ARED - Versement 3 - Bilan financier année 2	Pour versement 50% tranche 3 ARED		Non traité	
02/02/2026	ARED - Versement 4 - Bilan financier année 3	Pour versement solde année 3 ARED		Non traité	
02/02/2026	ARED - Versement 4 - Certificat administratif précisant statut thèse	Pour versement du solde de la tranche 3		Non traité	

Aline Roumy

CONTACT INFORMATION

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Campus de Beaulieu
35042 Rennes cedex
France

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E-mail: aline.roumy@inria.fr
WWW: people.rennes.inria.fr/Aline.Roumy

CITIZENSHIP

French

RESEARCH INTERESTS

Expertise: algorithms and theory for image/video compression.
General interests: Image and signal processing, Information theory, Machine learning.
Specialization: Source coding, Channel coding, Image and video coding for multimedia communications, Distributed source coding, Universal source coding, Error resilient video coding, Interactive communication, Sparse representations, Compressive sensing, Zero-error information theory, DNA-based data storage.

ACADEMIC EXPERIENCE

Inria, Rennes, France.
Senior Research Scientist (DR1) **Jan. 2025 - present**

Inria, Rennes, France.
Senior Research Scientist (DR2) **Nov. 2020 - Dec. 2024**

Inria, Rennes, France.
Research Scientist **Nov. 2001 - Oct. 2020**

University of California, Berkeley, Dept. of Electrical engineering, California, USA.
Visiting researcher **Sept. - Dec. 2007**

Eurecom, Sophia Antipolis, France.
Visiting Professor **May - June 2006**

Princeton University, Dept. of Electrical engineering, NJ, USA.
Postdoctoral Research Fellow **Nov. 2000 - Oct. 2001**

Thales, Gennevilliers, France.
Graduate student **Oct. 1997 - Oct. 2000**

EDUCATION

University Rennes 1, France.
Habilitation à diriger des recherches (Habilitation) Nov. 2018
Dissertation Topic: Universal transmission and compression: send the model?

University of Cergy Pontoise, France
- Master degree in Image and Signal Processing. First in Class, with honors. 1997
- Thèse de doctorat (PhD degree) Oct. 2000
  Dissertation Topic: Joint equalization and decoding: Turbo methods
  Advisor: Inbar Fijalkow.

École Nationale Supérieure de l'Électronique et de ses Applications, France.
- Engineer, First in class. 1996
- Erasmus student **Technical University Berlin** Sept. 1995-Sept. 1996

AWARDS

Top 3%of the accepted papers at IEEE ICASSP 2023 for the paper [C10].

Outstanding editorial board member award for IEEE Transactions on Image Processing 2023

Scientific excellence grant, awarded by Inria, 2012-2015, 2016-2019, 2022-2024, 2026-2028 (not eligible 2020-2021, since member of the committee granting the award).

Top 10% paper award at IEEE ICIP 2015 for the paper [C47].

Best Paper Award "Francesco Carassa" 2011 awarded by Italian Group on Telecommunication and Information Theory GTTI.

Student Advising

PhD students: 5 current. 4 in September 2026

- Adarsh Jamadandi (25%) 2025 - 2028
  Topic: Generative Graph models and garantees.
  With: N. Keriven (CNRS).
  Funding: Project ERC Malaga (PI N. Keriven).
- Antoine Monier (25%) 2025 - 2028
  Topic : Video compression hybrid: conventional and deep learning.
  Avec : P. Hellier (Univ Rennes), F. Le Léannec, K. Naser (InterDigital).
  Funding: CIFRE with InterDigital (through Joint Inria/InterDigital challenge: Nisk.AI).
- Sara Al Sayyed (75%) [C4][C2] 2024 - 2027
  Topic: Compression for data storage on DNA.
  With: T. Maugey (Inria).
  Funding: Project PEPR MoleculArXiv.
- Antonin Joly (25%) [C1] 2024 - 2027
  Topic: Graph reduction for deep learning on graphs.
  With: N. Keriven (CNRS).
  Funding: Project PEPR Sharp.
- Esteban Pesnel (25%) [C3] 2023 - 2026
  Topic: Video content downscaling and rate-distortion optimization for video streaming.
  With: T Maugey (Inria), J. Le Tanou, M. Ropert (MediaKind).
  Funding: CIFRE with MediaKind.

PhD students: 14 defended.

- Claude Petit (100%) [C8] [NC2] 2021 - 2024
  Topic: Database Compression, Graph Reduction, and Compressive Sensing; 3 Aspects of Dimensionality Reduction.
  Funding: Insee administrator on secondment to Inria.
  Currently: Associate professor Univ. Rennes.
- Rémi Piau (60%) [C11][C12] [NC3] 2021 - 2025
  Topic: Coding for machine.
  With: T Maugey (Inria).
  Funding: Project CoLearn (LabEx CominLabs).
  Currently: Post Doc at Simon Fraser University, Canada.
- Reda Kaafarani (33%) [C5][C18] 2021 - 2024
  Topic: Optimization of multi-profile video storage for streaming.
  With: T Maugey (Inria), J. Le Tanou, M. Ropert (MediaKind).
  Funding: CIFRE with MediaKind.
  Currently: Engineer R&D CapGemini.
- Pascal Bacchus (50%) [C16][C9][C10] [NC5] 2020 - 2023
  Topic: Learning-based satellite image compression.
  With: C. Guillemot (Inria), R. Fraisse (Airbus Defence and Space).
  Funding: BPI/Airbus.
  Currently: Post-doc at CEA-LETI.
- Nicolas Charpenay (30%) [J1][J2] [C6][C7][C17] [NC1][NC6] 2020 - 2023
  Topic: 0-error network information theory: graphs, coding for computing, source-channel duality
  With: M. Le Treust (Irisa).
  Funding: Grant of ENS Paris-Saclay.
- Arthur Lecert (50%) [J3] [C13] [NC4] 2020 - 2023
  Topic: Low-light image restoration.
  With: C. Guillemot (Inria), R. Fraisse (Airbus Defence and Space).
  Funding: BPI/Airbus.
  Currently: Engineer R&D Yxir, filiale EDF.
- Yiqun Liu (33%) [C14][C15] 2020 - 2023
  Topic: Learning for new generation video coders.
  With: C. Guillemot (Inria), T. Guionnet (ATEME).

Funding: CIFRE avec ATEME.
Currently: PostDoc Fraunhofer Heinrich-Hertz-Institut, HHI, Berlin.

- Navid Mahmoudian Bidgoli (40%) Oct. 2016 - Nov. 2019
[J5][J6][J8] [BC1] [C21][C22][C23][C30] [NC8]
Topic: Video interactive communication: transmission with user interaction at the receiver.
With: T. Maugey (Inria).
Currently: R&D Engineer at Trimble Inc. and leader of the ANAX startup project.
- Thierry Dumas (50%) [J10] [C25][C28][C32] [NC9] Oct. 2015 - Oct. 2018
Topic: Deep learning for image compression.
With: C. Guillemot (Inria).
Currently: Research engineer at InterDigital, Rennes.
- David Gommelet (25%) [J11][J13] [C31] Oct. 2014 - Dec. 2017
Topic: High Dynamic Range Video Compression.
With: C. Guillemot (Inria), M. Ropert (Ericsson), J. Le Tanou (Ericsson).
Currently: Research engineer at MediaKind, Paris.
- Marco Bevilacqua (70%) [J15] [C35][C36][C37][C38][C43][C42] Feb. 2011 - June 2014
Topic: Algorithms for Super-resolution of Images and Videos based on Learning Methods.
With: : C. Guillemot (Inria), M.L. Alberi-Morel (Alcatel Lucent).
Currently: Data Scientist at Cdiscount, Bordeaux.
- Elsa Dupraz (40%) [J17] [C39][C40][C44] [NC12][NC13] Sept. 2010 - Dec. 2013
Topic: Source coding with side information and uncertain knowledge of the correlation.
With: M. Kieffer (L2S, Univ. Paris-Saclay, Gif sur Yvette), F. Bassi (ESME Sudria).
Currently: Assistant professor, IMT Atlantique (ex-Telecom Bretagne), Brest, France.
- Imed Hadj Kacem (30%) [J22] [C59][C56][C57] [NC14] Sept. 2007 - July 2011
Topic: Resource allocation: downlink optimization.
With: N. Sellami (ENIS, Sfax, Tunisie) et I. Fijalkow (ENSEA).
Currently: Assistant professor, ISECS, Sfax, Tunisia.
- Tiaray TotoZarasoa (70%) Oct. 2007 - Nov. 2010
[J20][J19] [C60][C53][C54][C55][C50][C51][C52][C47]
Topic: Distributed Source Coding: Tools and application to Video Compression.
With: C. Guillemot (Inria).
Currently: R&D expert engineer at Ateme, Rennes.

Post-doctoral fellows and research engineer: 8 previous

- Ahcen Aliouat (50%) Jan. 2025 - Dec. 2025
Topic: Image retrieval in the compressed domain.
With: E. Dupraz (IMT Atlantique).
Funding: CoMET Coding for iMage rETrieval (LabEx CominLabs)
- Navid Mahmoudian Bidgoli (40%) [J4] [NC7] Dec. 2019 - Aug. 2021
Topic: Video compression for omnidirectional images.
With: T. Maugey (Inria), P. Frossard, R. Azevedo (EPFL).
- Mai Quyen PHAM (30%) [J7] April 2018 - Aug. 2019
Topic: Graph optimization for massive random access.
With: T. Maugey (Inria), E. Dupraz (IMT Atlantique).
Currently: Assistant professor, IMT Atlantique (ex-Telecom Bretagne), Brest, France.
- Antoine Criniere (50%) engineer [C27] [NC10] Nov. 2016 - Apr. 2018
Topic: Interactive compression of large database: spatio-temporally correlated and massive georeferenced Data.
With: T. Maugey (Inria).
Currently: Research engineer at Scalian, Rennes, France.
- Raul Martinez-Noriega (100%) [C45][C41] June 2011 - June 2013
Topic: A unified framework for dimensionality reduction and application to image inpainting.
Currently: Research Scientist at Central Bank of Mexico, Mexico city, Mexico.
- Rodrigue Imad (30%) [C46] [RR4] Oct. 2010- June 2011
Topic: Strategies for Unequal Error Protection.

With: V. Roca (Inria), B. Sayadi (ALU)
Currently: Assistant Professor, University of Balamand, Lebanon.

- Khaled Lajnef (50%) [C66] March 2007 - July 2007
  Topic: Distributed video coding using LDPC codes.
  With: C. Guillemot (Inria).
  Currently: Telematics System Architect at Valeo, Paris.
- Mutlu Koca (50%) [C73] Aug. 2003 - June 2004
  Topic: Turbo-quantization.
  With: E. Fabre (Inria).
  Currently: Professor, Bogazici University, Turkey.

Other supervision: 1 past visiting PhD student.
In the past, I co-supervised one visiting PhD student.
- Alexander Sagel (50%) visiting PhD Student from TU Munich [C20] Feb. 2019 - Jan. 2020
  Topic: Deep learning for inverse problems. Application to Light field imaging.
  With: C. Guillemot (Inria).

RESPONSIBILITIES

Senior Associate Editor (SAE):
- **IEEE Transactions on Image Processing**, since Nov. 2023.

Associate Editor ((AE):
- **IEEE Transactions on Image Processing**, Nov. 2018 - Dec. 2023.
- Annals of Telecommunications, Springer, 2016-2022.

Technical Program Chair: ICIP IEEE Int. Conf. on Image Processing) 2026.

Program Committee Member: member of international and national conferences in image/signal processing but also workhops of A* conferences in computer vision such as
- **CVPR** New Trends in Image Restoration and Enhancement - NTIRE Workshop 2017-2026.
- **ECCV** (2020-2022-2024) and **ICCV** (2025) Advances in Image Manipulation - AIM Workshop .
- **IEEE ICC International Communication Conference** (ML4COM - Machine Learning for Communications Workshop) 2018-2020.
- French Symposium on Signal and Image processing since 2009

Organization of scientific events:
International
- member of the **IEEE Image, Video and Multidimensional Signal Processing Technical Committee** since 2020.
- Special Session at **Picture Coding Symposium (PCS)** with E. Magli (Polito, Italy) 2013
  "Compressed sensing and sparse representations for visual information processing"

National
- Online workshop "Learning Based Coding for Image and Video " co-organizer, June 2021
- One-day workshop "Coding Day" co-organizer, at Inria, Rennes Nov. 2019
- Two-day workshop "Learning and sparsity", co-organizer, Rennes Oct. 2012
- One-day workshop on "Turbo methods", Paris Apr. 2002

Committees:
- member of the Gender equality committee at Inria, Rennes since Sept. 2023
- member of the **Inria Evaluation Committee** Sept. 2019- Aug. 2023
  Committee responsible for the recruitment, promotion, career advancement, and evaluation of Inria researchers and research teams
- member of the **National Council of Universities (CNU section 61)** 2012-2015
  Council under the French Ministry of Higher Education and Research responsible for the

qualification (required before recruitment), promotion, career advancement, and evaluation of university professors and associate professors.

- member of the Inria Joint Administrative Committee 2016-2019
- member of the Executive board of the National Research group in Image and Signal Processing (GRETSI), since 2018.

MANAGEMENT

Management of Research team: Leader of the Compact Inria research team since July 2024
Beyond team management (seminars, workshops to foster internal collaboration), implementation of cross-checking for software before publication as open source.

Management of Collaborative Scientific Projects
To ensure the success of the projects I coordinate, I organize working sessions: reading groups, tutorials, brainstorming workshops, and even writing workshops.

- InterCom, **Project Coordinator** Oct. 2016 - Dec. 2020
  Objective: Random access in the compressed domain
  Funding: Cominlabs, Laboratory of Excellence (ANR-10-LABX-07-01)
  Partners: IMT-Atlantique, IFFSTAR, Supélec-L2S, EPFL
- Mature Omnidirectional Video Exploration, **Project Coordinator** Jan. 2021 - Dec. 2022
  Objective: Compression of 360° image operating on the sphere and its application in the ANAX startup project.
  Funding: Cominlabs, Laboratory of Excellence (ANR-10-LABX-07-01)
  Partners: IMT-Atlantique, EPFL

PROJECTS

European projects

- FP7-NEWCOM++ (Obj. ICT-2007.1.1) Jan. 2008 - Apr. 2011
  Network of Excellence in wireless communications.
  Member of Work Package 7: robust transmission of multimedia over wireless channels
- FP6 NoE NEWCOM: NoE in Wireless COMmunications Mar. 2004 - Mar. 2007
  Network of Excellence in the area of wireless communications.
  Member of Work Package SWP1: Iterative Decoding and Receiver Design

National initiatives

- PEPR MoleculArXiv. 2022-2032
  Topic: Data storage on DNA
- CoMET Coding for iMage rETrieval. 2025
  Topic: video coding for machine
- Coding for learning CoLearn. 2021-2035
  Topic: compression and analysis in the compressed domain
- French Defense Procurement Agency (DGA) Oct. 2015 - Oct. 2018
  Topic: Convolutional sparse image representations and deep learning for video compression.
- ANR-ARSSO June 2010 - May 2013
  Topic: Design of video streaming solutions, robust to network and transmission impairments.
  Partners: Alcatel Lucent Bell Labs, Thales Communications, Eutelsat, TESA-ISAE, CEA-LETI, Inria-Planete
- ANR ESSOR codagE de SourceS vidéO distRibué Nov. 2006 - Oct. 2009
  Topic: Distributed video coding
  Partners: Supélec-L2S, Telecom Paris, University of Nice Sophia-Antipolis-i3s
- RNRT VIP Oct. 2001 - June 2004
  Topic: Visiophony over IP
  Partners: Thales Communication, Supélec-L2S, Telecom Paris, Comsys, ENSEA-Etis, France Telecom R&D, Inria-Rennes, Inria-Sophia, University Paris-6
- RNRT turbo-equalization Jan. 1998 - Dec. 1999
  Topic: Design of coupled coding and equalization for single and multiple access channels

Partners: Thales Communication, ENSEA-Etis, Telecom Bretagne

Industrial contracts

- InterDigital Joint challenge Nisk.AI. 2025 - 2029
  co-leader with O. LeMeur (Interdigital) of a joint research project (4 PhDs+2PostDocs)
  PhD on Hybrid (convertional+deep) video compression.
- MediaKind CIFRE contract. 2023 - 2026
  PhD on Video content downscaling and rate-distortion optimization for video streaming
- Airbus funded by BPI 2020 - Apr. 2023
  2 PhDs: (i) Learning-based satellite image compression / (ii) Low-light image restoration
- Ateme CIFRE contract. Sept. 2020-Aug. 2023
  PhD Thesis on learning for new generation video coders
- Envivio (then Ericsson, now MediaKind) CIFRE contract. Oct. 2014 - Dec. 2017
  PhD Thesis on compression of high dynamic range video sequences.
- Enensys technologies Consulting. Apr. 2016 - May 2016
  Topic: Matrix inversion for video streaming.
- Alcatel Lucent Bell Labs Joint Research lab: Inria/ALU, Nov. 2008 - June 2014
  Topic: Video coding self-adaptable to the underlying transport network
- Eutelsat Consulting. Aug. 2012 - Feb. 2013
  Topic: study of the variability of HEVC video traffic.

PUBLICATIONS The pdf files of my publications are available on my website at:
http://people.rennes.inria.fr/Aline.Roumy/roumy_publis.html.
First quartile journals, A* conferences, 10% or 3% best papers, best paper are highlighted in blue.

International journals

[J1] N. Charpenay, M. Le Treust, **Aline Roumy**, On the Additivity of Optimal Rates for Independent Zero-Error Source and Channel Problems', IEEE Trans. on Information Theory", Dec. 2025.

[J2] N. Charpenay, M. Le Treust, **Aline Roumy**, Side Information Design in Zero-Error Coding for Computing, Entropy, Igal Sason's Special Issue on "Extremal and Additive Combinatorial Aspects in Information Theory", April 2024.

[J3] A. Lecert and **Aline Roumy** and R. Fraisse and C. Guillemot. 'GAN Architecture Leveraging a Retinex Model With Colored Illumination for Low-Light Image Restoration, IEEE Access, vol. 11, pp. 84574-84588, 2023.

[J4] N. Mahmoudian Bidgoli, R. Azevedo, T. Maugey, **Aline Roumy**, P. Frossard, OSLO: On-the-Sphere Learning for Omnidirectional images and its application to 360-degree image compression, IEEE Transactions on Image Processing, vol. 31, pp. 5813-5827, 2022.

[J5] F. Ye, N. Mahmoudian Bidgoli, E. Dupraz, **Aline Roumy**, K. Amis, T. Maugey. Bit-Plane Coding in Extractable Source Coding: optimality, modeling, and application to 360-degree data, IEEE Communication Letter, vol. 25, no. 5, pp. 1412-1416, May 2021.

[J6] N. Mahmoudian Bidgoli, T. Maugey , **Aline Roumy**, Fine granularity access in interactive compression of 360-degree images based on rate adaptive channel codes, IEEE Transactions on MultiMedia, vol. 23, pp. 2868-2882, 2021.
Cited in IEEE COMSOC MMTC Review Letter of October 2020.

[J7] M. Q. Pham, **Aline Roumy**, T. Maugey, E. Dupraz, M. Kieffer, "Optimal Reference Selection for Random Access in Predictive Coding Schemes", IEEE Transactions on Communications, vol. 68, no. 9, pp. 5819-5833, Sept. 2020.

[J8] N. Mahmoudian-Bidgoli, T. Maugey, A. Roumy, "Excess rate for model selection in interactive compression", Annals of Telecommunications, Vol. 75, 623–633, Oct. 2020.

[J9] Thomas Maugey, **Aline Roumy**, Elsa Dupraz, and Michel Kieffer. Incremental coding for extractable compression in the context of Massive Random Access. *IEEE Transactions on Signal and Information Processing over Networks*, vol. 6, pp. 251-260, 2020.

[J10] T. Dumas, **Aline Roumy**, and C. Guillemot. Context-adaptive Neural Network based prediction for image compression. *IEEE Transactions on Image Processing*, 29:679–693, 2020.

[J11] D. Gommelet, J. LeTanou, **Aline Roumy**, M. Ropert, and C. Guillemot. Optical-Flow Based Nonlinear Weighted Prediction for SDR and Backward Compatible HDR Video Coding. *IEEE Transactions on Image Processing*, 29(1):2123–2138, 2020.

[J12] Elsa Dupraz, **Aline Roumy**, Thomas Maugey, and Michel Kieffer. Rate-storage regions for Extractable Source Coding with side information. *Physical Communication*, 37:100845, 2019. Special Issue on Coding and Information Theory for Emerging Communication Systems.

[J13] D. Gommelet, **Aline Roumy**, C. Guillemot, M. Ropert, and J. LeTanou. Gradient-Based Tone Mapping for Rate-Distortion Optimized Backward-Compatible High Dynamic Range Compression. *IEEE Transactions on Image Processing*, 26(12):5936 – 5949, Dec. 2017.

[J14] **Aline Roumy**. An information theoretical problem in interactive multi-view video services. *IEEE Communications Society Multimedia Communications Technical Committee (ComSoc MMTC) E-Letter*, 11:11–16, March 2016.

[J15] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. Single-image super-resolution via linear mapping of interpolated self-examples. *IEEE Transactions on Image Processing*, 23(12):5334–5347, Dec. 2014.

[J16] Giulio Coluccia, **Aline Roumy**, and Enrico Magli. Operational Rate-Distortion Performance of Single-source and Distributed Compressed Sensing. *IEEE Transactions on Communications*, 62(6):2022–2033, Apr. 2014.

[J17] Elsa Dupraz, **Aline Roumy**, and Michel Kieffer. Source Coding with Side Information at the Decoder and Uncertain Knowledge of the Correlation. *IEEE Transactions on Communications*, 62(1):269 – 279, January 2014.

[J18] Rachid Guerraoui, Kévin Huguenin, Anne-Marie Kermarrec, Maxime Monod, Swagatika Prusty, and **Aline Roumy**. Tracking Freeriders in Gossip-Based Content Dissemination Systems. *Computer Networks*, 64:322–338, 2014.

[J19] Velotiaray Toto-Zarasoa, **Aline Roumy**, and Christine Guillemot. Source modeling for Distributed Video Coding. *IEEE Trans. on Circuits and Systems for Video Technology*, 22(2), Feb. 2012.

[J20] Velotiaray Toto-Zarasoa, **Aline Roumy**, and Christine Guillemot. Maximum Likelihood BSC parameter estimation for the Slepian-Wolf problem. *IEEE Communications Letters*, 15(2):232–234, Feb. 2011.

[J21] N. Sellami, M. Siala, **Aline Roumy**, and I. Kammoun. MAP sequence equalization for imperfect frequency selective channel knowledge. *European Transactions on Telecommunications*, 21(2):121–130, 2010.

[J22] I. Hadj Kacem, N. Sellami, **Aline Roumy**, and I. Fijalkow. Training sequence length optimization for a turbo-detector using decision-directed channel estimation. *Research Letters in Communications*, 2008.

[J23] N. Sellami, **Aline Roumy**, and I. Fijalkow. A proof of convergence of the MAP turbo-detector to the AWGN case. *IEEE Trans. on Signal Processing*, 56(4):2716 – 2724, April 2008.

[J24] **Aline Roumy** and D. Declercq. Characterization and Optimization of LDPC codes for the 2-user Multiple Access Channel. *EURASIP Journal on Wireless Communications and Networking*, 2007. Artcile ID 74890.

[J25] **Aline Roumy** and D. Gesbert. Optimal matching in wireless sensor networks. *IEEE Journal on Selected Topics in Signal Processing, special issue on convex optimization methods in signal processing*, 1(4):725 – 735, Dec. 2007.

[J26] N. Sellami, **Aline Roumy**, and I. Fijalkow. The impact of both a priori information and channel estimation errors on the MAP equalizer performance. *IEEE Trans. on Signal Processing*, pages 2716 – 2724, July 2006.

[J27] G. Caire, S. Guemghar, **Aline Roumy**, and S. Verdu. Maximizing the spectral efficiency of coded CDMA under successive decoding. *IEEE Trans. on Information Theory*, pages 152 – 164, Jan. 2004.

[J28] **Aline Roumy**, S. Guemghar, G. Caire, and S. Verdu. Design Methods for Irregular Repeat-Accumulate Codes. *IEEE Trans. on Information Theory*, pages 1711 – 1727, Aug. 2004.

[J29] **Aline Roumy**, I. Fijalkow, and D. Pirez. Low-Cost Turbo Receiver for Coded Asynchronous DS-CDMA in Frequency Selective Channels. *Journal of Communications and Networks*, pages 202–210, Sept. 2001.

Reviewed international conferences

[C1] A. Joly, N. Keriven and **Aline Roumy**, "Taxonomy of reduction matrices for Graph Coarsening", Advances in Neural Information Processing Systems (NeurIPS), 2025.

[C2] S. Al Sayyed, **Aline Roumy**, T. Maugey, "Compact image representation for content-based image retrieval in DNA data storage", Picture coding symposium (PCS), 2025.

[C3] E. Pesnel, J. Le Tanou, M. Ropert, T. Maugey **Aline Roumy**, "SCALED : Surrogate-gradient for Codec-Aware Learning of Downsampling in ABR Streaming", Picture coding symposium (PCS), 2025.

[C4] S. Al Sayyed, **Aline Roumy**, T. Maugey, "Efficient constraining of transcoding for DNA-based data storage", IEEE International Conference on Image Processing (ICIP), 2025.

[C5] R. Kaafarani , J. Le Tanou, M. Ropert, T. Maugey **Aline Roumy**, "Joint multi-profile video coding for cost optimization of standard ABR streaming", ACM Mile-High Video Conference (MHV), 2025.

[C6] N. Charpenay, M. Le Treust, **Aline Roumy**, "Complementary Graph Entropy, AND Product, and Disjoint Union of Graphs", IEEE International Symposium on Information Theory (ISIT), 2023.

[C7] N. Charpenay, M. Le Treust, **Aline Roumy**, "Optimal Zero-Error Coding for Computing Under Pairwise Shared Side Information", IEEE Information Theory Workshop (ITW), 2023.

[C8] C. Petit, T. Maugey, **Aline Roumy**, "A Water-filling Algorithm Maximizing the Volume of Submatrices Above the Rank", European conference on signal processing (EUSIPCO), 2023.

[C9] P. Bacchus, R. Fraisse and **Aline Roumy** and C. Guillemot. "Filtered residual compression for satellite images", International Geoscience and Remote Sensing Symposium (IGARSS), 2023.

[C10] P. Bacchus, R. Fraisse and **Aline Roumy** and C. Guillemot. "Joint compression and demosaicking for satellite images", IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2023. **Top 3 % of the accepted papers**,

[C11] R. Piau, T. Maugey and **Aline Roumy**. "Learning on entropy coded images", IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2023.

[C12] R. Piau, R. Piau and T. Maugey and **Aline Roumy**. "Predicting CNN learning accuracy using chaos measurement", IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)-Satellite Workshop: HMM-QoE – Humans, Machines and Multimedia: Quality of Experience and Beyond, 2023.

[C13] A. Lecert, R. Fraisse and **Aline Roumy** and C. Guillemot. "A new reagularization for retinex decomposition of Low-light images", IEEE International Conference on Image Processing, 2022.

[C14] Y. Liu, M. Abdoli and T. Giuonnet and C. Guillemot and **Aline Roumy**. "Statistical analysis of inter cod-ing in vvc test model (VTM)", IEEE International Conference on Image Processing, 2022.

[C15] Y. Liu, M. Abdoli and T. Giuonnet and C. Guillemot and **Aline Roumy**. "Light-weight CNN-based VVC Inter Partitioning Acceleration", IEEE 14th Image, Video, and Multidimensional Signal Processing Workshop (IVMSP) 2022).

[C16] P. Bacchus, R. Fraisse and **Aline Roumy** and C. Guillemot. "Quasi Lossless Satellite Image Compression", IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2022.

[C17] N. Charpenay, M. Le Treust, **Aline Roumy**, "Zero-error source coding when side information may be present", International Zurich Seminar on Information and Communication, 2022.

[C18] R. Kaafarani, M. Blestel, T. Maugey, M. Ropert, **Aline Roumy**, "Evaluation Of Bitrate Ladders For Versatile Video Coder", IEEE International Conference on Visual Communications and Image Processing (VCIP) 2021).

[C19] A. Marie, N. Mahmoudian Bidgoli, T. Maugey, **Aline Roumy**, Rate-distortion optimized motion estimation for on-the-sphere compression of 360 videos, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2021.

[C20] Alexander Sagel, **Aline Roumy**, and Christine Guillemot. SUB-DIP: Optimization on a Subspace with Deep Image Prior regularization and application to Superresolution. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2020.

[C21] N. Mahmoudian Bidgoli, T. Maugey, and **Aline Roumy**. Evaluation Framework for visual content compression with user view-dependent transmission. In *IEEE International Conference on Image Processing (ICIP)*, 2019.

[C22] N. Mahmoudian Bidgoli, T. Maugey, and **Aline Roumy**. Intra-coding of 360-degree images on the sphere. In *Picture Coding Symposium*, 2019.

[C23] N. Mahmoudian Bidgoli, T. Maugey, **Aline Roumy**, and F. and Nasiri, F. Payan. A geometry-aware compression of 3D mesh texture with random access. In *Picture Coding Symposium*, 2019.

[C24] Claude Petit, Giulio **Roumy**, **Aline** Coluccia, and Enrico Magli. Density evolution of Orthogonal Matching Pursuit. In *Signal Processing with Adaptive Sparse Structured Representations (SPARS) workshop*, 2019.

[C25] T. Dumas, **Aline Roumy**, and C. Guillemot. Autoencoder based Image compression: can the learning be quantization independent? In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2018.

[C26] Elsa Dupraz, Thomas Maugey, **Aline Roumy**, and Michel Kieffer. Rate-Distortion Performance of Sequential Massive Random Access to Gaussian Sources with Memory. In *Proceedings of the Data Compression Conference*, Snowbird, États-Unis, 2018.

[C27] Antoine Crinière, **Aline Roumy**, Thomas Maugey, Michel Kieffer, and Jean Dumoulin. Compression of spatio-temporally correlated and massive georeferenced Data. In *EGU 2018 - European Geosciences Union General Assembly*, Vienne, Austria, April 2018.

[C28] T. Dumas, **Aline Roumy**, and C. Guillemot. Image compression with stochastic Winner-Take-All Autoencoder. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2017.

[C29] Giulio Coluccia, **Aline Roumy**, and Enrico Magli. Mismatched sparse denoiser requires overestimating the support length. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2017.

[C30] N. Mahmoudian Bidgoli, T. Maugey, and **Aline Roumy**. Correlation model selection for interactive video communication. In *IEEE International Conference on Image Processing (ICIP)*, 2017.

[C31] D. Gommelet, **Aline Roumy**, C. Guillemot, M. Ropert, and J. LeTanou. Rate-distortion optimization of a tone mapping with SDR quality constraint for backward-compatible high dynamic range compression. In *IEEE International Conference on Image Processing (ICIP)*, 2016.

[C32] T. Dumas, **Aline Roumy**, and C. Guillemot. Shallow sparse Autoencoders versus sparse coding algorithms for image compression. In *IEEE International Conference on Multimedia and Expo (ICME)*, 2016.

[C33] **Aline Roumy** and T. Maugey. Universal lossless coding with random user access: the cost of interactivity. In *IEEE International Conference on Image Processing (ICIP)*, 2015. **Among 10% best papers.**

[C34] Giulio Coluccia, **Aline Roumy**, and Enrico Magli. Exact Performance Analysis of the Oracle Receiver for Compressed Sensing Reconstruction. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2014.

[C35] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. Compact and coherent dictionary construction for example-based super-resolution. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2013.

[C36] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. K-WEB: Nonnegative dictionary learning for sparse image representations. In *IEEE International Conference on Image Processing (ICIP)*, September 2013.

[C37] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. Super-resolution using Neighbor Embedding of Back-projection residuals. In *18th International Conference on Digital Signal Processing (DSP)*, July 2013.

[C38] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. Video super-resolution via sparse combinations of key-frame patches in a compression context. In *30th Picture Coding Symposium (PCS)*, December 2013.

[C39] Elsa Dupraz, **Aline Roumy**, and Michel Kieffer. Practical Coding Scheme for Universal Source Coding with Side Information at the Decoder. In *Proceedings of the Data Compression Conference*, pages 1–11, Snowbird, États-Unis, March 2013.

[C40] Elsa Dupraz, **Aline Roumy**, and Michel Kieffer. Universal Wyner-Ziv Coding for Gaussian Sources. In *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*, pages 1–4, Vancouver, Canada, May 2013.

[C41] Raul Martinez-Noriega and **Aline Roumy**. Prior and macro-filling order for image completion. In *IEEE Intl. Conf. on Image Processing (ICIP)*, Melbourne, Australie, September 2013.

[C42] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. Low-Complexity Single-Image Super-Resolution based on Nonnegative Neighbor Embedding. In *BMVC (British Machine Vision Conference)*, 2012.

[C43] Marco Bevilacqua, **Aline Roumy**, Christine Guillemot, and Marie-Line Alberi Morel. Neighbor embedding based single-image super-resolution using Semi-Nonnegative Matrix Factorization. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2012.

[C44] Elsa Dupraz, **Aline Roumy**, and Michel Kieffer. Source Coding with Side Information at the Decoder: Models with Uncertainty, Performance Bounds, and Practical Coding Schemes. In *International Symposium on Information Theory and its Applications 2012*, October 2012.

[C45] Raul Martinez Noriega, **Aline Roumy**, and Gilles Blanchard. Exemplar-based image inpainting: fast priority and coherent Nearest Neighbor search. In *IEEE Workshop on Machine Learning for Signal Processing (MLSP)*, September 2012.

[C46] **Aline Roumy**, Vincent Roca, and Bessem Sayadi. Memory Consumption Analysis for the GOE and PET Unequal Erasure Protection Schemes. In *IEEE International Conference on Communications*, February 2012.

[C47] Giulio Coluccia, Enrico Magli, **Aline Roumy**, and Velotiaray Toto-Zarasoa. Lossy compression of distributed sparse sources: a practical scheme. In *European Signal Processing Conference (EUSIPCO)*, September 2011. **Best Paper Award Francesco Carassa.**

[C48] Olivier Le Meur, Thierry Baccino, and **Aline Roumy**. Prediction of the Inter-Observer Visual Congruency (IOVC) and Application to Image Ranking. In *ACM Multimedia*, Phoenix, USA, 2011.

[C49] L. Helouet and **Aline Roumy**. Covert channel detection using Information Theory. In *International Workshop on Security Issues in Concurrency (SecCo)*, Aug. 2010.

[C50] V. Toto-Zarasoa, **Aline Roumy**, and C. Guillemot. Non-uniform source modeling for Distributed Video Coding. In *European Signal Processing Conference (EUSIPCO)*, Aug. 2010.

[C51] V. Toto-Zarasoa, **Aline Roumy**, and C. Guillemot. Hidden Markov model for Distributed Video Coding. In *International Conference on Image Processing (ICIP)*, Sept. 2010.

[C52] V. Toto-Zarasoa, **Aline Roumy**, and C. Guillemot. Non-asymmetric Slepian-Wolf coding of non-uniform Bernoulli sources. In *International Symposium on Turbo Codes (ISTC)*, Sept. 2010.

[C53] V. Toto-Zarasoa, **Aline Roumy**, C. Guillemot, and C. Herzet. Robust and Fast Non Asymmetric Distributed Source Coding Using Turbo Codes on the Syndrome Trellis. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2009.

[C54] C. Herzet, V. Toto-Zarasoa, and **Aline Roumy**. Error-resilient non-asymmetric Slepian-Wolf coding. In *IEEE Intl. Conf. on Communications, ICC*, 2009.

[C55] V. Toto-Zarasoa, E. Magli, **Aline Roumy**, and G. Olmo. On Distributed Arithmetic Codes and Syndrome Based Turbo Codes for Slepian-Wolf Coding of Non Uniform Sources. In *European Conf. on Signal Processing, EUSIPCO*, 2009.

[C56] I. Hadj Kacem, N. Sellami, I. Fijalkow, and **Aline Roumy**. Joint training interval length and power allocation optimization for MIMO flat fading channels. In *IEEE International Symposium on Wireless Communication Systems 2009 (ISWCS'09)*, Sienna, Italy, Sept. 2009.

[C57] I. Hadj Kacem, N. Sellami, I. Fijalkow, and **Aline Roumy**. Training interval length optimization for MIMO flat fading channels using decision-directed channel estimation. In *IEEE International Conference on Wireless and Mobile Computing (WiMob'09)*, Morocco, Oct. 2009.

[C58] I. Kammoun, M. Siala, N. Sellami, and **Aline Roumy**. Symbol MAP Detection Aided with First Channel Estimate for TDMA Systems Over a Frequency Selective Channel. In *IEEE International Symposium on Wireless Communication Systems 2009 (ISWCS'09)*, Sienna, Italy, Sept. 2009.

[C59] I. Hadj Kacem, N. Sellami, **Aline Roumy**, and I. Fijalkow. Training sequence optimization for frequency selective channels with MAP equalization. In *Proc. of IEEE International Symposium on Communications, Control and Signal Processing ISCCSP*, pages 532–537, Malta, March 2008.

[C60] V. Toto-Zarasoa, **Aline Roumy**, and C. Guillemot. Rate-adaptive codes for the entire Slepian-Wolf region and arbitrarily correlated sources. In *IEEE Intl. Conference on Acoustic, Speech and Signal Processing*, Las Vegas, USA, Apr. 2008.

[C61] T. Banerjee, A.A. Kherani, M. Debbah, and **Aline Roumy**. Impact of Physical Layer Design on the Deployment of a Sensor Network with Correlated Observations. In *IEEE International Workshop on Signal Processing Advances for Wireless Communications, Helsinki, Finland*, June 2007.

[C62] S. Chaabouni, N. Sellami, and **Aline Roumy**. The Impact of a priori information on the MAP equalizer performance with M-PSK modulation. In *Proc.of 15th European Signal Processing conference, EUSIPCO*, Poznan, Poland, Sept. 2007.

[C63] S. Chaabouni, N. Sellami, and **Aline Roumy**. Lower bounds on the performance of the MAP equalizer with a priori over MIMO systems. In *Proc.of ISSPA, International Symposium on Signal Processing and its Applications*, Sharjah, UAE, Feb. 2007.

[C64] O. Dabeer, **Aline Roumy**, and C. Guillemot. Optimal Distributed Linear Transceivers for Sending Independently Corrupted Copies of a Colored Source Over the Gaussian MAC. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2007.

[C65] **Aline Roumy** and D. Gesbert. Optimal matching in wireless sensor networks. In *IEEE International Symposium on Information Theory*, June 2007.

[C66] **Aline Roumy**, K. Lajnef, and C. Guillemot. Rate-adaptive turbo-syndrome scheme for Slepian-Wolf Coding. In *41st Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, Nov. 2007.

[C67] N. Sellami, M. Siala, **Aline Roumy**, and I. Kammoun. Generalized MAP: sequence detection for non ideal frequency selective channel knowledge. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2007.

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[C69] V. Ramon, **Aline Roumy**, C. Herzet, and L. Vandendorpe. Calculating the performance degradation of a MMSE/IC turbo-equalization scheme due to SNR estimation errors. In *IEEE International Conference on Communications (ICC 2006)*, June 2006.

[C70] N. Sellami, **Aline Roumy**, and I. Fijalkow. Convergence analysis of the MAP turbo detector: New representation and convergence to the AWGN case. In *Proc.of 14th European Signal Processing conference, EUSIPCO*, Sept. 2006.

[C71] N. Sellami, **Aline Roumy**, and I. Fijalkow. Performance analysis of the MAP equalizer with a priori and distribution of the extrinsic LLRs. In *IEEE International Workshop on Signal Processing Advances for Wireless Communications, SPAWC 2005*, June 2005.

[C72] N. Sellami, **Aline Roumy**, and I. Fijalkow. Performance analysis of the MAP equalizer within an iterative receiver including a channel estimator. In *IEEE Vehicular Technology Conference, VTC'F04*, Sept. 2004.

[C73] M. Koca, E. Fabre, and **Aline Roumy**. Turbo Decoding of multiple descriptions with quantized frame expansions. In *International Symposium on Image/Video Communications over fixed and mobile networks, ISIVC'04*, July 2004.

[C74] **Aline Roumy**, D. Declercq, and E. Fabre. Low Complexity Code Design for the 2-user Gaussian Multiple Access Channel. In *Proc. of ISIT, IEEE Int. Conference on Information Theory*, June 2004.

[C75] N. Sellami, **Aline Roumy**, and I. Fijalkow. On the analysis of the MAP equalizer performance within an iterative receiver. In *IEEE International Workshop on Signal Processing Advances for Wireless Communications, SPAWC 2004*, July 2004.

[C76] **Aline Roumy**, S. Guemghar, G. Caire, and S. Verdu. Design Methods for Irregular Repeat Accumulate Codes. In *Proc.of ISIT, IEEE Int. Conference on Information Theory*, Yokohama, JAPAN, June 2003.

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[C80] I. Fijalkow, **Aline Roumy**, S. Ronger, D. Pirez, and P. Vila. Improved Interference cancellation for Turbo-equalization. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2000.

[C81] **Aline Roumy**, I. Fijalkow, and D. Pirez. Iterative Multi-user algorithm for convolutionnally coded asynchronous DS-CDMA systems- Turbo-CDMA. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2000. **Cited in the expert summary of the Icassp 2000 conference**.

[C82] **Aline Roumy**, I. Fijalkow, and D. Pirez. Full Turbo receiver for coded asynchronous DS-CDMA over multipath channel. In *Proc.of IEEE 2nd International Symposium on Turbo-codes & Related Topics*, Brest, France, Sept. 2000.

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Books and book chapters

[BC1] T. Maugey, M. Rizkallah, N. Mahmoudian Bidgoli, **Aline Roumy** and C. Guillemot, *Graph Spectral 3D Image Compression Graph Spectral Image Processing*, chapter 6 in book *Graph Spectral Image Processing*, Ed. Gene Cheung, Enrico Magli, ISTE, under final reading 2020.

[BC2] C. Guillemot and **Aline Roumy**. *Toward constructive Slepian-Wolf coding schemes*, chapter 6 in book *Distributed source coding: Theory, Algorithms and Application*, pages 131–156. Elsevier Inc., 2009.

Reviewed national conferences

[NC1] N. Charpenay, M. Le Treust, **Aline Roumy**, "Codage optimal zéro-erreur pour le calcul de fonction avec information adjacente partagée deux à deux", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2023.

[NC2] C. Petit, T. Maugey, **Aline Roumy**, "Algorithme de type "Water-Filling" maximisant le volume de matrices rectangulaires au-delà du rang", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2023.

[NC3] R. Piau, T. Maugey, **Aline Roumy**, "Prédiction de la précision d'apprentissage des réseaux de neurones convolutifs par mesure du chaos", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2023.

[NC4] A. Lecert, **Aline Roumy**, R. Fraisse, C. Guillemot, "Illumination colorée et information mutuelle pour le modèle Retinex en restauration d'images à faible luminosité", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2023.

[NC5] P. Bacchus, **Aline Roumy**, R. Fraisse, C. Guillemot, "Compression quasi sans perte d'images satellites par filtrage de résidus", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2023.

[NC6] N. Charpenay, M. Le Treust, **Aline Roumy**, "Codage de source zéro-erreur pour un réseau de Gray-Wyner lorsque l'information adjacente peut être présente", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2022.

[NC7] N. Mahmoudian Bidgoli, R. Azevedo, T. Maugey, **Aline Roumy**, P. Frossard, "Méthode d'apprentissage opérant sur la sphère : Application à la compression d'images omnidirectionnelles", Colloque Gretsi (Symposium of the French Research group on signal and image processing), 2022.

[NC8] N. Mahmoudian Bidgoli, T. Maugey, and **Aline Roumy**. Compression de contenus 360° et transmission adaptée à la navigation de l'utilisateur. In *Actes de la 27ème édition du colloque Gretsi*, 2019.

[NC9] T. Dumas, **Aline Roumy**, and C. Guillemot. Auto-encodeur optimisé au sens débit-distorsion : indépendant de la quantification ? In *Actes de la 26ème édition du colloque Gretsi*, 2017.

[NC10] A. Criniere, **Aline Roumy**, T. Maugey, M. Kieffer, and J. Dumoulin. Sélection optimale de capteurs de référence pour le stockage de données spatialement corrélées. In *Actes de la 26ème édition du colloque Gretsi*, 2017.

[NC11] **Aline Roumy** and T. Maugey. Compression et interactivité : étude de la navigation au récepteur. In *Actes de la 25ème édition du colloque Gretsi*, 2015.

[NC12] Elsa Dupraz, **Aline Roumy**, and Michel Kieffer. Codage de Sources avec Information Adjacente et Connaissance Imparfaite de la Corr élation : le problème des cadrans. In *Actes de la 24ème édition du colloque Gretsi*, pages 1–4, Brest, France, September 2013. ID286 ID286.

[NC13] Elsa Dupraz, **Aline Roumy**, and Michel Kieffer. Codage Distribué dans des Réseaux de Capteurs avec Connaissance Incertaine des Corrélations. In *Actes de la 24ème édition du colloque GRETSI*, pages 1–4, Brest, France, September 2013. ID390 ID390.

[NC14] I. Hadj Kacem, N. Sellami, I. Fijalkow, and **Aline Roumy**. Optimisation conjointe du nombre des symboles pilotes et de l'allocation des puissances pour les canaux MIMO non selectifs en frequence. In *22th Symposium on Signal and Image Processing, Gretsi*, Dijon, France, Sept. 2009.

[NC15] O. Dabeer, **Aline Roumy**, and C. Guillemot. Linear Transceivers for Sending Correlated Sources Over the Gaussian MAC. In *National Communication Conference*, Jan. 2007.

[NC16] N. Sellami, **Aline Roumy**, and I. Fijalkow. Impact de l'a priori sur les performances de l'égaliseur MAP et distribution des LRV extrinsèques. In *Proc.of 20th GRETSI Symposium on Signal and Image Processing*, Sept. 2005.

[NC17] **Aline Roumy**, I. Fijalkow, and D. Pirez. Turbo-equalization- Convergence Analysis. In *Proc.of Gretsi, 18th Symposium on Signal and Image processing*, Toulouse, France, Sept. 2001.

[NC18] **Aline Roumy**, I. Fijalkow, D. Pirez, and P. Duvaut. Quelques aspects de la Turbo-égalisation. In *Proc.of Gretsi, 17th Symposium on Signal and Image processing*, pages 801–804, Vannes, France, Sept. 1999.

Research reports and publications under review

[RR1] N. Charpenay, M. Le Treust, **Aline Roumy**, "On the Linearization of Optimal Rates for Independent Zero-Error Source and Channel Problems", submitted to *IEEE Transactions on Information Theory*, Sept. 2024.. (ArXiv)

[RR2] R. Kaafarani, M. Blestel, T. Maugey, M. Ropert, **Aline Roumy**, "Partial decoding and RD optimizations for joint multiprofile video coding based on Predictive Residual Coding", submitted to *IEEE Transactions on Broadcasting*, July 2024.

[RR3] **Aline Roumy** and Laurent Guillo. Bit rate statistical analysis of hevc encoded video in a broadcast transmission. Eutelsat research report, contract between eutelsat s.a. and inria (ref inria : Alloc 7016)., 2013.

[RR4] **Aline Roumy**, Vincent Roca, Bessem Sayadi, and Rodrigue Imad. Unequal erasure protection and object bundle protection with the generalized object encoding approach. INRIA Research Report RR-7699, Jul. 2011.

Dissertations

[D1] **Aline Roumy**. *Universal transmission and compression: send the model?* Habilitation thesis, Université Rennes 1, November 2018.

[D2] **Aline Roumy**. *Egalisation et décodage conjoints : méthodes Turbo*. PhD thesis, Université de Cergy-Pontoise, October 2000.

[D3] **Aline Roumy**. Synchronisation des modems OFDM en contexte non coopératif. Master's thesis, Univ. of Cergy Pontoise, 1997.

Contributions to standard

[S1] Vincent Roca, **Aline Roumy**, and Bessem Sayadi. The Generalized Object Encoding (GOE) Approach for the Forward Erasure Correction (FEC) Protection of Objects and its Application to Reed-Solomon Codes over GF(2^8). IETF RMT Working Group, Work in Progress: <draft-roca-rmt-goe-fec-02.txt>, July 2012.

[S2] Vincent Roca, **Aline Roumy**, and Bessem Sayadi. The Generalized Object Encoding (GOE) LDPC-Staircase FEC Scheme. IETF RMT Working Group, Work in Progress: <draft-roca-rmt-goe-ldpc-01.txt>, July 2012.

[S3] Vincent Roca, **Aline Roumy**, and Bessem Sayadi. The Need for Extended Forward Erasure Correction (FEC) Schemes: Problem Position. IETF RMT Working Group, Work in Progress: <draft-roca-rmt-extended-fec-problem-00.txt>, July 2012.

Patents

[P1] **Aline Roumy**, D. Pirez, and I. Fijalkow. Method and device for demodulating signals from multiple users (Procédé et dispositif pour demoduler des signaux provenant de multi-utilisateurs), March 2002.

[P2] **Aline Roumy**, D. Pirez, and I. Fijalkow. Method and device for sequencing signals from multiusers (Procédé et dispositif pour ordonner des signaux provenant de multi-utilisateurs), March 2002.

General audience

[GA1] C. Guillemot and **Aline Roumy**. De Fourier à la compression d'images et de vidéos. Interstices. Anniversaire de Fourier, 250 ans., Apr. 2019.

Riad Bendouro

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Profile

INSA Rennes computer engineering graduate seeking a PhD opportunity in compression, image/video processing, 3D reconstruction, and computer graphics.

Education

INSA Rennes, France — Electronics and Computer Engineering double degree (EII) 2023–2025

Courses: Image/Video Processing, Artificial Intelligence, Computer Vision, Electronics, Embedded Linux, Real-Time Systems.

École Mohammadia d'Ingénieurs (EMI), Rabat, Morocco — Electrical Engineering Degree 2021–2025

Focus: Automation, Signal Processing, Control, Networks and Telecom, Embedded Systems, Industrial Computing.

Experience

Research Intern at InterDigital *Sept–Nov 2025*

Rennes, France - Designing compression algorithms for 3D Gaussian splats on a 3D mesh surface.

- Filed 4 patents.
- Implemented orientation alignment by aligning Gaussian orientations with average surface normals to reduce redundant rotation parameters.
- Engineered an adaptive subdivision strategy to refine mesh and 3DGS data based on local geometric and attribute variations.
- Constructed a Gaussian clustering approach to group similar Gaussians for compact representation of coherent spatial and appearance regions.

Research Intern at InterDigital *Feb–Aug 2025*

Rennes, France — Study of joint 3D-mesh and 3D-Gaussian representations from Multi-View Image.

- Filed 3 patents.
- Developed a transcoding pipeline to convert plenoptic point clouds into high-quality 3DGS models, even in the absence of original captured images.
- Designed custom initialization strategies to improve 3DGS model quality and convergence speed.
- Created a joint representation framework combining 3D mesh geometry with 3DGS attributes for accurate, view-dependent rendering.
- Proposed a progressive compression method for spherical harmonic coefficients to reduce memory usage while preserving visual fidelity at different quality levels.

Engineering Intern at ONCF (Office National des Chemins de Fer) *Jul–Aug 2023*

Rabat, Morocco — Focused on the optimization of passenger train production by analyzing operational planning, rolling stock rotation, and train path scheduling.

Engineering Intern at ONEE (Office National de l'Électricité et de l'Eau potable) *Jul–Aug 2022*

Rabat, Morocco — Studied the complete water treatment process and its associated electrical, pumping, and automation (tele-management) systems.

Projects

Dockerized NeRF Studio — 3D Reconstruction and rendering experiments.

Machine Learning & Deep Learning — Butterfly species classification. Implemented two ML and two DL models with PyTorch and Scikit-learn.

Embedded Linux — Developed an application on an embedded Linux system (Udoo) to interface with an HC-SR04 ultrasonic sensor and display real-time distance measurements.

Technical Skills

Languages:	Python, Bash, C++, C, VHDL
Tools:	Git, Docker, Linux, OpenCV, PyTorch, COLMAP, gsplat
Concepts:	Computer Vision, Compression, 3D Reconstruction, AI/ML, Embedded Systems

Languages

French:	Bilingual
English:	Advanced (TOEIC 945)
Arabic:	Native proficiency

Interests

Video games • Cinema • Reading • Music • Cooking • Running