

Hanane ARAHMANE

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Work Experience

2015-now Researcher in Nuclear Instrumentation and Signal Processing

ESMAR Laboratory, Faculty of Sciences, Mohammed V University, Rabat-Morocco.

Activities:

- Development of signal processing algorithms for neutron measurements and analysis;

2015-2016 Associate Researcher

ESMAR Laboratory, Faculty of Sciences, Mohammed V University, Rabat-Morocco.

Activities:

- Supervision of Bachelor students (Laboratory teaching assistant in nuclear physics (Practical Works))

Education

2015-now Ph.D. in Nuclear Physics

Specialty: Nuclear Instrumentation

ESMAR Laboratory, Faculty of Sciences, Mohammed V University, Rabat-Morocco.

Topic: “Application of nonnegative matrix and tensor factorization algorithms to signals resulting from neutron detectors: New statistical approaches for blind neutron and gamma discrimination and characterization”.

PhD Advisor: Prof. Rajaa Cherkaoui El Moursli and Dr. El Mehdi Hamzaoui

2012-2014 Master's degree

Specialty: Physics of Materials and Radiation

Laboratory of Team Radiations and Nuclear Systems (ERSN), Faculty of Sciences, Abdelmalek Essaadi University, Tetouan-Morocco.

Topic: “Application of Neutron Instrument Simulation Package NISP”.

2009-2012 Bachelor's degree

Specialty: Mechanics

Laboratory of the Simulation and System Analysis (LSAS), Faculty of Sciences, Abdelmalek Essaadi University, Tetouan-Morocco.

Topic: "Aerodynamic Study of Wind Turbine Blades".

2008 High School Diploma

Specialty: physics.

Oued Eddahab High school, Assilah-Morocco.

Qualifications & Trainings

- ❖ **2018:** Participation in 5th Edition of "Ecole Franco-Marocaine de la Mesure et l'Instrumentation Nucléaires", 08-12 October 2018, Faculty of Sciences, Mohammed University, Rabat, Morocco.
- ❖ **2018:** Participation in innovation week 2018 "i-Week18", Robotics Training Workshop, National School of Computer Science and Systems Analysis (ENSIAS), 7-8 May 2018, Rabat, Morocco.
- ❖ **2018:** Ma thèse 180s, 5-6 April 2018, Mohammed V University, Rabat, Morocco.
- ❖ **01 November 2016–31 December 2017 (1 year 2 months):** PhD Traineeship *Technical and Logistic Division of the National Centre for Nuclear Energy, Science and Technology (CNESTEN).*
Training task: "Application of nonnegative matrix and tensor factorization algorithms to signals resulting from organic scintillation detectors: Blind neutron and gamma discrimination and characterization".
- ❖ **2017:** Participation in 16th Edition of European Summer School 2017 «Radiochemistry and Nuclear Instrumentation low level Radioactivity», 21-25 August 2017, Faculty of Physics and Engineering, University of Strasbourg, France.
- ❖ **2017:** Participation in 17th the BMinNT - BRIDGING METHODS IN NUCLEAR THEORY summer school. 26-30 June 2017, Hubert Curien Multidisciplinary Institute (IPHC), Strasbourg, France.
- ❖ **2017:** Participation in innovation week 2017 "i-Week17", Arduino and Raspberry training, National School of Computer Science and Systems Analysis (ENSIAS), 3-4 May 2017, Rabat, Morocco.
- ❖ **2016:** Participation in "journées de la relève en recherche", 28-29 September 2016, National Center for Scientific and Technical Research (CNRST), Rabat, Morocco.
- ❖ **2016:** Participation in 4th Edition of "Ecole Franco-Marocaine de la Mesure et l'Instrumentation Nucléaires", 18-21 July 2016, Aix-En-Provence University, Marseille, France.

- ❖ **2016:** Participation in NUBA- 2016: 3rd International Nuclear Physics Summer School, 29 May- 5 June 2016, Akdeniz University, Antalya, Turkey.
- ❖ **2016:** Participation in entrepreneurship training (1 day a week), 23 February-12 May 2016, Rabat, Morocco.
- ❖ **2016:** Ma thèse 180s, 14-15 March 2016, Mohammed V University, Rabat, Morocco.
- ❖ **2015:** IAEA International Distance Learning Course on Radiation Detection Techniques, 25 December 2015.
- ❖ **2015:** IAEA International Distance Learning Course on Nuclear Security Disciplines: Computer Security.
- ❖ **2015:** IAEA International Distance Learning Course on Nuclear Security Disciplines Nuclear Material Accounting and Control NMAC for Nuclear Security, 25 December 2015.
- ❖ **2015:** IAEA International Distance Learning Course on Nuclear Security Disciplines Radiological Crime Scene Management, 25 December 2015.
- ❖ **2015:** IAEA International Distance Learning Course on Nuclear Security Disciplines Transport Security, 25 December 2015.
- ❖ **2015:** IAEA International Distance Learning Course on Nuclear Security Disciplines Physical Protection, 25 December 2015.
- ❖ **2015:** Training Course on Geant4 at Laboratory of the Linear Accelerator, 18 – 22 May 2015, National Institute of Nuclear Physics and Particle Physics (IN2P3), Orsay, France.
- ❖ **2015:** Participation in Francophone University Agency (AUF) training course: “Article de recherché : comment le publier ”, 02-04 December 2015, Rabat, Morocco.
- ❖ **01 January 2015 – 31 July 2017(7 months):** PhD Traineeship
Technical and Logistic Division of the National Centre for Nuclear Energy, Science and Technology (CNESTEN).
Training task: “Application of nonnegative matrix factorization algorithms to signals resulting from fission chamber detector: Identification, characterization and discrimination”.
- ❖ **2015:** Participation in Organizational management (1 day a week), 29 April-12 June 2015, Rabat, Morocco.
- ❖ **2015:** World Intellectual Property Academy: e-learning centre (www.wipo.int)

- General Course on Intellectual Property (DL-101F12S2), 15 March - 2 May 2015, **Score:** 95/100.
- Primer on Intellectual Property (DL-001).
- PCT Distance Learning Course: Introduction to the Patent Cooperation Treaty.

- ❖ **2015:** Participation in training course “Apport de la nouvelle loi de dépôt des brevets”, 24 April 2015, Rabat, Morocco.

- ❖ **2015:** Participation in training course “Accès à la base données Science Direct”, Rabat, Morocco.

- ❖ **2015:** Participation in training course “ Les méthodes d’interrogation des bases de données scientifiques”, 18 March 2015, Rabat Morocco.

- ❖ **2015 :** Participation in training course “Rédaction Scientifique et Publication Electronique”, 6 March 2015, Rabat, Morocco.

- ❖ **2015 :** Participation in training course “ journées doctoriales”, 19-21 February 2015, Rabat, Morocco.

- ❖ **2015 :** Participation in training course “Outils de recherché et d’accès à la documentation scientifique”, 18 February 2015, Rabat, Morocco.

- ❖ **2015:** Participation in training course “ comment rédiger une problématique, une communication et un poster scientifique”,12 February 2015, Rabat, Morocco.

- ❖ **25 March -> 31 July 2014 (4 months):** Final Project of Master’s Degree. *Laboratory of Team Radiations and Nuclear Systems (ERSN), Faculty of Sciences Tetouan.*
Project title: Application of Neutron Instrument Simulation Package NISP.

- ❖ **25-26 March 2014:** Participation in workshops organized by the ERSN, on:
 - Nuclear reactors: operation principle.
 - Overview on the nuclear fuel cycle.
 - The elements of nuclear Safety.
 - Overview on the CNESTEN TRIGA MARK II reactor.
 - Neutron life cycle & reactivity.

- ❖ **05 February -> 09 April 2014 (2 months):** Mini-project of Master’s Degree (2nd year).
Laboratory of Team Radiations and Nuclear Systems (ERSN), Faculty of Sciences of Tetouan-Morocco.
Project title: Doping of Semiconductors.

- ❖ **05 March -> 10 June 2013 (3 months):** Mini-project of Master’s Degree (1st year).
Laboratory of Team Radiations and Nuclear Systems (ERSN), Faculty of Sciences of Tetouan.

Project title: Calculation of Infinite Multiplication Factor K using Monte Carlo Simulation Method.

❖ **03 May-> 02 July 2013 (2 months):** Mini-project of Master's degree (1st year).
Laboratory of Team Radiations and Nuclear Systems (ERSN), Faculty of Sciences of Tetouan-Morocco.

Project title: Determination of the Gamma Energy Spectrum Delivered by NaI Scintillation Detector using Monte Carlo Simulation Method.

❖ **15 February-> 31 July 2012 (5 months):** Final Project of Bachelor.
Laboratory of the Simulation and System Analyses (LASS), Faculty of Sciences of Tetouan-Morocco.

Project title: Aerodynamic study of wind turbine blades.

❖ **03 January -> 10 February 2012 (1 month):** Mini-project of Bachelor's degree.
Department of the Management, Languages and Communication, Faculty of Sciences of Tetouan-Morocco.

Project title: Creation of a Virtual company

Research Experience

I. Research projects

1. Signal Processing:

- Application of nonnegative matrix and tensor factorization of neutron signals: a new approach for blind neutron-gamma discrimination data processing: Neutron flux monitoring in research reactors (TRIGA MARK II Reactor).
- Implementation of new advanced digital signal processing techniques, such as blind source separation methods for neutron data processing with different neutron detectors.

Nuclear Physics Laboratory (ESMAR) University Mohammed V, Faculty of Sciences Rabat (www.fsr.ac.ma/ESMAR/) in collaboration with National Centre for Nuclear Energy, Sciences et Techniques (CNESTEN (www.Cnesten.Org.ma)).

2. Nuclear Instrumentation

- Development of a new digital neutron chain using fission chamber and organic scintillator as neutron detectors.

Nuclear Physics Laboratory (ESMAR) University Mohammed V, Faculty of Sciences Rabat (www.fsr.ac.ma/ESMAR/) in collaboration with National Centre for Nuclear Energy, Sciences et Techniques (CNESTEN) (www.Cnesten.Org.ma).

II. Member of organizing committee of conferences:

- ICDTET2018: 20th International Conference on Data Transmission Engineering and Technology, 13-14 December 2018, London, United Kingdom.
- ICDTSA2018: 20th International Conference on Discrete-Time Signal Analysis, 11 – 12 December, 2018, Havana, Cuba.
- ICCEEE2018: 20th International Conference on Communication, Electrical and Electronics Engineering, 29 - 30 October 2018, Paris, France.
- EFMMIN5: 5th Ecole Franco-Marocaine de la Mesure et l'Instrumentation Nucléaires (EFMMIN5), 08-12 October 2018, Rabat, Morocco.
- ICQCQM2018: 20th International Conference on Quantum Chaos and Quantum Magnetism, 24 – 25 September 2018, Lisbon, Portugal.
- ICART2018: 20th International Conference on Advanced Radar Technologies, 6 – 7 September, 2018, Istanbul, Turkey.
- ICMSPA2018: 20th International Conference on Multidimensional Signal Processing and Applications, 30 – 31 July, 2018, Zurich, Switzerland.
- ICNDPWT2018: 20th International Conference on Nuclear Decommissioning Process and Waste Management Technology, 23 – 24 July, 2018, Rome, Italy.
- ICDTSPR2018: 20th International Conference on Discrete-Time Signal Processing Research, 12 – 13 July 2018, Stockholm, Sweden.
- ICTSP2018: 20th International Conference on Telecommunications and Signal Processing, 23 – 24 April 2018, Boston, USA.
- ICSV 2018 : 20th International Conference on Sound and Vibration, 23 - 24 April 2018, Boston, USA
- The IAEA Role and Contribution in Education, Training and Research for Socio-economic Development in Africa, 11 April 2017, Rabat, Morocco.
- TEDux : Pratiques pédagogiques innovantes, 26 November 2016, Rabat, Morocco.
- Workshop ANTARES/KM3NET, 20 January 2016, Rabat Morocco.
- Rencontre FSR/GANIL: Aspects possibles de coopération, 29-30 October 2015, Rabat, Morocco.
- Third International Conference on Physics And Technology of Reactors And Applications (PHYTRA3), 12-14 May 2014, Tetouan Morocco.

III. Publications: International journals and conferences proceedings indexed in (Scopus, DBLP, ISI Thomson Reuters, ...)

1. **H.Arahmane**, E-M.Hamzaoui, A.Mahmoudi, R.Cherkaoui El Moursli, "Time-Scale Characterization of Neutron and Gamma Signals Using Continuous Wavelet Transform", Proc. IEEE, 9th International Symposium on Signal, Image, Video and Communications, ISIVC2018, Rabat, Morocco, 27-30 November 2018. (Accepted)
2. **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, "Spectrogram analysis of neutron signals using nonnegative matrix and tensor factorization algorithms". Proc. IEEE International Multi-Conference on Systems, Signals and Devices, SSD 2018, 19-22 March 2018, Hammamet, Tunisia. (Accepted)
3. **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, "Time-scale characterization of neutron and gamma signals resulting from nonnegative matrix factorization algorithms of stilbene organic scintillator's outputs", Proc. International Youth Nuclear Congress and the 26th WiN Global Annual Conference IYNCWiN18, 11-17 March 2018, Bariloche, Argentina. (Accepted)
4. **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, "Blind nonnegative matrix factorization algorithms to estimate the neutron flux of fission chamber detector: Application to neutron-gamma discrimination", Journal of neutron research, JNR, June 28, 2018, vol.20, pp 33-40, <https://content.iospress.com/articles/journal-of-neutron-research/jnr059>.
5. **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, "Application de la factorisation en matrices nonnégatives à la discrimination des signaux neutron-gamma issus d'un détecteur à scintillation stilbène: Caractérisation temps-échelle", Proc. 2ème colloque Signal, ImaGe, Multimédia et Applications, SIGMA 2018, 17-18 April 2018, Rabat, Morocco. (Accepted)
6. **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, "Fission chamber's neutron signal characterization using nonnegative matrix factorization", Proc. IEEE International Conference on Advanced Technologies for Signal & Image Processing, ATSIP 2017, 22-24 May 2017, Fez, Morocco.
7. **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, "Neutron flux monitoring based on blind source separation algorithms in Moroccan TRIGA MARK II reactor", Science and Technology of Nuclear Installations, March 30, 2017, vol. 2017, pp 1-8, ID 5369614, <https://www.hindawi.com/journals/stni/2017/5369614/>.

IV. Communications (Oral & Poster)

- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, Women in Science-1st Erlangen Symposium, “Neutron-gamma discrimination of stilbene scintillator using nonnegative matrix and tensor factorization methods”, Nürnberg, Germany, 9-11 December 2018.(Oral)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, IAEA Ministerial Conference on Nuclear Science and Technology: Addressing Current and Emerging Development Challenges, Vienna, Austria, 28–30 November 2018.(Oral)
- **H.Arahmane**, E-M.Hamzaoui, A.Mahmoudi, R. Cherkaoui El Moursli, “Time-scale characterization of neutron and gamma signals using continuous wavelet transform”, 9th International Symposium on Signal, Image, Video and Communications (ISIVC2018), Rabat, Morocco, 27-30 November 2018. (Oral)
- **H.Arahmane**, E-M Hamzaoui, and R. Cherkaoui El Moursli, “Spectrogram time-frequency analysis based on nonnegative matrix factorization for fission chamber’s neutron signal characterization”, 5^{ème} Ecole Franco-Marocaine de la Mesure et l’Instrumentation Nucléaires (EFMMIN5), 8-12 October 2018, Faculty of Sciences, Rabat, Morocco. (Poster)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Application de la factorisation en matrices nonnégatives à la discrimination des signaux neutron-gamma issus d'un détecteur à scintillation stilbène: Caractérisation temps-échelle”, 2ème colloque Signal, Image, Multimédia et Applications (SIGMA 2017), 17-18 April 2018 Rabat, Morocco. (Poster)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Spectrogram analysis of fission chamber's outputs signals using nonnegative matrix and tensor factorization algorithms”,15th International Multi-Conference on Systems, Signals and Devices (SSD2018), 19-22 March 2018 Hammamet, Tunisia.(Oral)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Time-Scale Discrimination and characterization of neutron and gamma Signals using nonnegative matrix factorization of stilbene organic scintillator’s outputs”, International Conference on Development and Applications of Nuclear Technologies (NUTECH2017),10-13 September 2017 Krakow, Poland. (Oral)

- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Neutron-gamma discrimination using blind nonnegative and tensor factorization algorithms”, 16th Edition of European Summer School 2017 «Radiochemistry and Nuclear Instrumentation low level Radioactivity», 21-25 August 2017, Strasbourg, France. (Poster)
- **H.Arahmane**, R.Cherkaoui El Moursli, E-M.Hamzaoui, “Fission chamber’s neutron signal characterization using nonnegative matrix factorization”, 3rd International Conference on Advanced Technologies for Signal & Image Processing (ATSIP2017), 22-24 May 2017, Fez, Morocco. (Oral)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Neutron-gamma discrimination using nonnegative matrix factorization blind sources separation algorithms”, International Conference on Application of Radiation Science and Technology (ICARST2017), 24-28 April 2017, Vienna, Austria.(Oral and Poster)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Neutron-gamma discrimination using nonnegative matrix factorization blind sources separation algorithms”, International Conference on Nuclear Data for Science and Technology (ND2016), 11-16 September 2016, Bruges Belgium. (Oral)
- **H.Arahmane**, EM.Hamzaoui, R.Cherkaoui El Moursli, “Neutron signals identification and characterization by NMF algorithms”, IX International Workshop on Nuclear Structure Properties (NSP2016), 1-3 September 2016, Sivas, Turkey. (Oral)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Identification et caractérisation des signaux neutronique par l'application des algorithmes NMF”, 4th Ecole Franco-Marocaine de la Mesure et l’Instrumentation Nucléaires (EFMMIN4), 18-21 July 2016, Aix-En- Provence University, Marseille, France. (Poster)
- **H.Arahmane**, E-M.Hamzaoui, R.Cherkaoui El Moursli, “Identification et caractérisation des signaux nucléaires par l'application des algorithmes NMF ”, Journées Doctoriales de la Faculté des Sciences de Rabat, 09-11 Mars 2016, Rabat Morocco. (Poster)

V. Course Teaching

- **2015-2016:** Laboratory teaching assistant in nuclear physics (Practical Works) for Bachelors students. Section ESMAR Laboratory, Mohammed V University, Faculty of Sciences, Rabat Morocco.

Skills

I. Signal processing

- **Filtering methods:** Linear adaptive Filtering (LMS, RLS), wavelets filtering;
- **Blind source separation:** ICA, NMF, NTF, TDA...
- **Spectral Analysis:** Fourier Transform (FFT), Time-frequencies Transform Wavelets.
- **Real time processing:** DSP, FPGA...
- **Machine learning methods:** Support Vector Machine (SVM), Random Forest, XGBoost, ...

II. Computer science

- **Operating Systems:** Linux, Windows XP/7, Raspberry PI.
- **Programming Languages:** Pascal, FORTRAN, Maple, Monte Carlo, Python, and C/C++.
- **Software's:** Profili, NISP, Geant4, Garfield++, MATLAB, python-based of Fission Chamber (pyFC) suite code, Transport of Ions in Matter (TRIM), Bolzig.

III. Other skills

- **Data structures and Algorithms;**
- **Mathematics:** Numerical Analysis, Data Analysis, Statistics.

Language

- **Arabic:** Mother tongue
- **French:** Fluent (reading, writing and speaking);
- **English:** Working and Scientific knowledge.
- **Spanish:** Basics.

Other Activities

- Member of IEEE Instrumentation & Measurements Society.
- Member of Women in Nuclear Global (WiN Global).
- Member of American Physical Society belongs To:
 1. Division of Computational Physics;

2. Division of Nuclear Physics;
 3. Forum on Industrial and Applied physics;
 4. Forum on International Physics;
 5. Mid-Atlantic Section.
- Editorial board member and reviewer of Physical Review E journal.
 - Editorial board member and reviewer of Archives in Biomedical Engineering & Biotechnology journal (ABEB).
 - Editorial board member and reviewer of Modern Environmental Science and Engineering journal (MESE).
 - Editorial board member and reviewer of American Journal of Modern Energy (AJME).
 - Reviewer of the international conferences (TPC member).
 - Member of the Moroccan Association for Nuclear Engineering and Reactor Technology (GMTR).
 - Member of the Association of Moroccan Nuclear Engineers (AIGAM), communication manager, Rabat section.