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# Postdoctoral Researcher Position

## AI/ML for Clinical Proteomics

### (DIA Mass Spectrometry Data)

**Project:** AI-based Diagnosis of bloodstream Infection from digitized BOttom-up Proteomes (AIDIBOP)

**Location:** LIRIS, École Centrale de Lyon, France.

**Duration:** **2 years** (expected start: February 2026, flexible within Q1 2026).

**Application Deadline:** December 15th, 2025

## PROJECT OVERVIEW

We are looking for a highly motivated Postdoctoral Researcher to lead the development of innovative Artificial Intelligence (AI) and Machine Learning (ML) models for the analysis of Data-Independent Acquisition (DIA) proteomics data. This position is part of the ANR-funded AIDIBOP project, which aims to design a novel, rapid diagnostic platform for Bloodstream Infections (BSI), capable of simultaneously identifying pathogens and determining their antibiotic resistance profiles directly from clinical samples.

You will play a key role within a multidisciplinary team (ISA Laboratory and *Hospice Civil de Lyon*), turning complex spectral data into meaningful clinical insights, to enhance patient outcomes and combat microbial resistance.

## KEY RESEARCH AREAS AND RESPONSIBILITIES

You will be responsible for driving the core computational research of this project, which is structured around three key technical pillars:

### 1. Development of a State-of-the-Art Spectrum-Spectrum Matching (SSM) Model

- Develop SSM models for high-accuracy peptide identification from DIA data.
- Conduct a joint comparative study on feature selection and model architecture (e.g., transformers) to maximize identification performance.
- Integrate spectral library generation tools into a robust, automated pipeline.

### 2. Protein Inference and Explainable AI (XAI) for Clinical Deployment

- Adapt existing protein inference algorithms to minimize false-negative rates, a critical metric for clinical diagnostics.
- Implement innovative XAI techniques (e.g., SHAP attention mechanisms) to provide peptide and protein-level explanations for model predictions, ensuring the pipeline is trustworthy and interpretable for healthcare professionals.
- Rigorously evaluate the pipeline using standard metrics (sensitivity, specificity, etc.).

### 3. Pioneering Direct Antibiotic Resistance Prediction from Spectral Data

- Lead the prospective task of developing a novel, sequencing-independent framework for direct antibiotic resistance prediction.
- Explore the transformation of MS/MS data into pseudo-images (MS1) or tensors (MS2) to leverage advanced Deep Learning architectures like CNNs.
- Compare the performance of this end-to-end approach against the traditional peptide-based pipeline, with a target of >80% sensitivity and specificity for Antimicrobial Susceptibility Testing (AST).

## REQUIRED QUALIFICATIONS

- A Ph.D. in Computational Biology, Bioinformatics, Computer Science or Biostatistics.
- **Expertise in AI/ML:** Demonstrable, hands-on experience with machine learning and deep learning. Proficiency in **Python** and key libraries (e.g., **PyTorch or TensorFlow, Scikit-learn, etc.**) is mandatory.
- **Research Mindset:** A track record of innovation, problem-solving, and the ability to work independently on a complex, multi-faceted project.
- **Software Skills:** Experience with git version control and creating reproducible code.
- Excellent communication skills in English, with a proven ability to convey complex technical concepts to both specialist and non-specialist audiences.

## ADDITIONAL SKILLS AND COMPETENCIES

- Experience with any of the following: Spectrum-Spectrum Matching models, transformer architectures, protein inference algorithms.
- Experience in handling and processing large-scale biological datasets.
- A background or strong interest in microbiology, infectious diseases, or microbial resistance.

## WHY JOIN US

- A **2-year full-time postdoctoral position** in a cutting-edge, clinically relevant project.
- The opportunity to **publish high-impact papers** and develop patentable methodologies.
- A monthly gross salary of 2,800 euros.
- A dynamic, collaborative, and supportive international research environment.
- Access to high-performance computing resources and high-quality, novel experimental datasets.
- An opportunity to see your contribution to the development of a life-saving diagnostic tool.

## HOW TO APPLY

Please prepare a single PDF file containing:

1. A detailed **Curriculum Vitae**, including a list of publications.
2. A 1-page **motivation letter** explaining your specific interest in this project and how your background directly addresses the key responsibilities and qualifications listed above.
3. The **names and contact information** of at least two academic references.

Submit your application to **stephane.derrode@ec-lyon.fr** and **zied.bouyahya@ec-lyon.fr** with the subject line “**Postdoc Application- AIDIBOP**” before December 15th, 2025.