

**** If you'd like to meet us, we will attend the EuPA 2025 meeting in St Malo
& the JFSM 2025 meeting in Montpellier ****

Postdoctoral researcher in mass spectrometry applied to the structural determination of plant cell wall protein-carbohydrate complexes

Keywords: protein-pectin complexes, structural mass spectrometry, native MS, ion mobility, proteomics

A fully funded **24-month postdoctoral position** available in the group of Dr. David Ropartz and Dr. Helene Rogniaux at the INRAE-BIA-BIBS laboratory in Nantes.

JOB DESCRIPTION

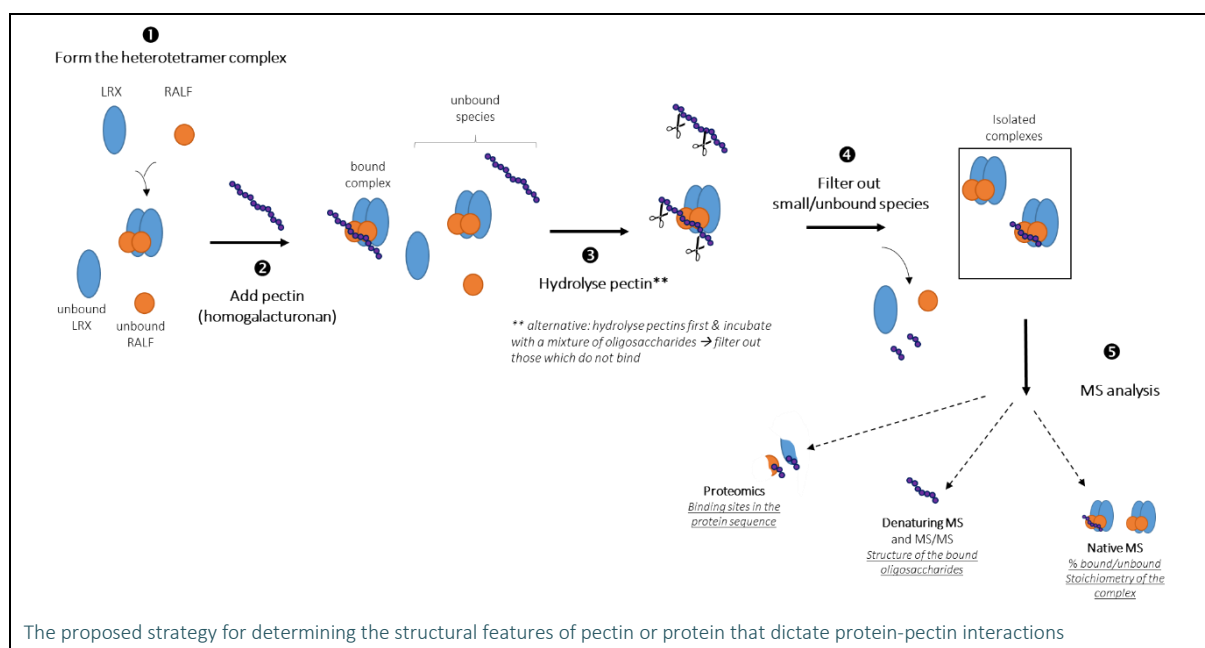
The position is part of a bilateral France-Switzerland ANR project entitled **WallScope**, which aims to investigate the underexplored—yet probably pivotal—role of protein-polysaccharide interactions in controlling the assembly, remodelling and expansion of plant cell walls.

The project specifically focuses on protein-pectin interactions in the pollen-tube and root hair cell walls of *Arabidopsis thaliana*, with the following objectives: (i) identify novel pectin-interacting proteins implicated in cell wall assembly and expansion; (ii) determine structural pectin features that dictate protein interaction; (iii) determine protein structure features that dictate pectin recognition, and (iv) elucidate the *in vivo* function of these interactions and their role in cell wall architecture and expansion.

The project builds on earlier results from the same consortium, which highlighted the role of a hetero-tetramer composed of two copies of a cell wall-associated polycationic peptide (RALF) and a dimer of the cell wall protein leucine-rich repeat extensin (LRX) in the compaction of negatively charged pectin chains into a load-bearing fibrous network.¹

In this context, you will take on the ambitious goal of elucidating the structural determinants that govern the RALF-LRX-pectin interaction—on both on the protein and pectin sides—by developing and applying advanced analytical strategies that leverage high-resolution mass spectrometry.

To do so and as represented schematically in the figure below, you will combine several approaches including native MS, structural MS, high-energy MS/MS fragmentation, proteomics.... You will have access to several mass spectrometers, including a SELECT SERIES Cyclic IMS (cIMS) instrument from Waters Corp.™—which offers high-resolution ion mobility—and other advanced MS instruments capable of high-energy fragmentation, which our group has demonstrated to be particularly effective for the structural characterization of carbohydrates.



¹ Moussu, S.; Lee, H. K.; Haas, K. T.; Broyart, C.; Rathgeb, U.; De Bellis, D.; Levasseur, T.; Schoenaers, S.; Fernandez, G. S.; Grossniklaus, U.; Bonnin, E.; Hosy, E.; Vissenberg, K.; Geldner, N.; Cathala, B.; Hofte, H.; Santiago, J. Plant Cell Wall Patterning and Expansion Mediated by Protein-Peptide-Polysaccharide Interaction. Science 2023, 382 (6671), 719–725. <https://doi.org/10.1126/science.adi4720>.

You will present your findings at leading international conferences in mass spectrometry and/or glycosciences, and will publish in peer review journals.

Your work will be co-supervised by Dr. David Ropartz and Dr. Helene Rogniaux. The anticipated start date is Oct. 1, 2025 but reasonable accommodations can be made for the right candidate.

Related publications of the group:

1. Ollivier, S.; Tarquis, L.; Fanuel, M.; Li, A.; Durand, J.; Laville, E.; Potocki-Veronese, G.; Ropartz, D.; Rogniaux, H. Anomeric Retention of Carbohydrates in Multistage Cyclic Ion Mobility (IMSn): De Novo Structural Elucidation of Enzymatically Produced Mannosides. *Anal. Chem.* 2021, 93 (15), 6254–6261. <https://doi.org/10.1021/acs.analchem.1c00673>.
2. Ropartz, D.; Fanuel, M.; Ollivier, S.; Lissarrague, A.; Benkoulouche, M.; Mulard, L. A.; André, I.; Guieysse, D.; Rogniaux, H. Combination of High-Resolution Multistage Ion Mobility and Tandem MS with High Energy of Activation to Resolve the Structure of Complex Chemoenzymatically Synthesized Glycans. *Anal. Chem.* 2022, 94 (4), 2279–2287. <https://doi.org/10.1021/acs.analchem.1c04982>
3. Deslignière, E.; Ollivier, S.; Ehkirch, A.; Martelet, A.; Ropartz, D.; Lechat, N.; Hernandez-Alba, O.; Menet, J.-M.; Clavier, S.; Rogniaux, H.; Genet, B.; Cianférani, S. Combination of IM-Based Approaches to Unravel the Coexistence of Two Conformers on a Therapeutic Multispecific mAb. *Anal. Chem.* 2022. <https://doi.org/10.1021/acs.analchem.2c00928>.
4. Ollivier, S.; Ropartz, D.; Fanuel, M.; Rogniaux, H. Fingerprinting of Underivatized Monosaccharide Stereoisomers Using High-Resolution Ion Mobility Spectrometry and Its Implications for Carbohydrate Sequencing. *Anal. Chem.* 2023, 95 (26), 10087–10095. <https://doi.org/10.1021/acs.analchem.3c01531>.
5. Deslignière, E.; Ollivier, S.; Beck, A.; Ropartz, D.; Rogniaux, H.; Cianférani, S. Benefits and Limitations of High-Resolution Cyclic IM-MS for Conformational Characterization of Native Therapeutic Monoclonal Antibodies. *Anal. Chem.* 2023, 95 (8), 4162–4171. <https://doi.org/10.1021/acs.analchem.2c05265>
6. Benazza, R., Fanuel, M.; Rogniaux, H.; Ropartz, D. Deciphering branched galactomannan structures via multistage ion mobility MS and MSn fragmentation (Multistage IMSN). *Rapid Comm. In Mass Spectrom. Under revision*.

DESIRED SKILLS AND QUALIFICATIONS

Required:

- A PhD degree in Chemistry, Physical-Chemistry or Biochemistry;
- Lab experience with mass spectrometry (HR-MS, MS/MS and ion mobility MS);
- A publishing record with at least one first-author publication;
- Proficiency in English;
- Capacity to quickly acquire new knowledge and master new skills;
- Ability to work independently and as a member of a research team;

Preferred:

- Lab experience with Waters Corp.™ instruments
- Native MS applied to protein analysis
- Knowledge of carbohydrates chemistry and their structural analysis

EMPLOYER

INRAE (www.inrae.fr) is a world-leading institute for research on agriculture, food and the environment, with a responsibility to address the global challenges of our time, namely climate change, food insecurity and biodiversity loss. Through an integrated approach, INRAE is able to identify and develop solutions with multiple applications to achieve the agro-ecological, nutritional and energy transitions we need to make.

INRAE is committed to nurturing an inclusive culture and a welcoming atmosphere. The Institute has made the "Social and Environmental Responsibility" a collective priority, in line with its commitment to sustainable development. This should lead the Institute's research and internal practices to converge with ambitious values of environmental responsibility, solidarity and equity.

CONDITIONS OF EMPLOYMENT

The pay is commensurate with experience and ranges from 2,500 to 3,200 EUR per month.

By joining us, you will benefit from:

- 30 + 15 days of annual leave (for full-time employees, meaning 38.5h/week);
- Support for parenthood;
- Skills development programmes;
- Social support, holiday and leisure services;
- Sport and cultural activities.

APPLICATION PROCEDURE

Interested candidates are invited to submit a cover letter, an up-to-date CV and the contact details of at least one reference to david.ropartz@inrae.fr and helene.rogniaux@inrae.fr

Deadline for application: July 10., 2025

Contract start date: October 1., 2025 (adjustable depending on availability of the selected candidate)