

Ellyn Redheuil

Postdoctoral Researcher in Biochemistry & Single-Molecule Biophysics

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Education

Ph.D in Biochemistry, ESPCI Paris – Quantum-Si • *Paris, France* Nov 2022 – Dec 2025

Thesis title: Development of dynamic detection assays: Quantification and identification of protein biomarkers at the single-molecule level.

Supervisor: Pr. Andrew D. Griffiths, Dr. Marco Ribezzi-Crivellari & co-encadrante: Dr. Margarida Gomes

Diplôme d'ingénieur civil, MINES ParisTech • *Paris, France* Aug 2020 – Jun 2022

Major: Design Engineering – Dual degree with ESPCI Paris - PSL.

Diplôme d'ingénieur, ESPCI Paris - PSL • *Paris, France* Sep 2017 – Jun 2021

Major: Physico-Chemistry.

CPGE – Preparatory classes PCSI-PSI, Montpellier, France 2014 – 2017

Research Experience

Postdoctoral Researcher, ESPCI Paris – CNRS (UMR 8231) • *Paris, France* Jan 2026 – Present

Biochemistry Laboratory (CBI), under the supervision of Prof. Andrew D. Griffiths.

- Application of PhD-developed technology to patient samples (CSF).
- Exploration of machine learning tools for signal classification.
- First-author manuscript in preparation.

Ph.D Student in Biochemistry, ESPCI Paris & Quantum-Si • *Paris, France* Nov 2022 – Dec 2025

Biochemistry Laboratory (CBI) / Doctoral School FIRE (Learning Planet Institute).

- Adapted Quantum-Si's [semiconductor-based peptide sequencing platform](#) into a versatile single-molecule immunodetection system (see: [USPD](#)).
- Key results: Achieved femtomolar sensitivity for IL-6 in human serum – used machine learning tools for signal classification and discrimination of tau protein variants (isoforms and phosphorylation sites) relevant to Alzheimer's disease.
- Visited Quantum-Si – *Branford, CT, USA* (Aug 2025): One-week immersion at the partner company, presented project to on-site teams.
- Notable courses: Pasteur Course (Protein Biochemistry, Institut Pasteur, Jan–Feb 2024) and Molecular Evolution and Design summer school, IESC (Cargèse 2025).

Pre-doctoral Research, Sanofi, Curie, ESPCI, Agricoool, Pasteur 2018 – 2022

- **ESPCI & Quantum-Si (2021–22)**: Directed evolution of proteins (SNAP-display) for sequencing and on-chip single-molecule characterisation.
- **Agricoool (2021)**: Management science research (Mines elective internship). Two publications: AIMS 2022 and M@n@gement 2026. Introduction to intervention research: conducting interviews, qualitative data analysis, design and facilitation of collaborative innovation workshops.
- **Institut Curie (2020)**: MyoChip project. Development of 3D irrigated muscle-on-chip (C2C12).
- **Sanofi R&D (2019)**: Droplet microfluidics for high-throughput antibody screening (ESPCI Paris industrial internship).
- **iGEM Institut Pasteur (2018)**: Gold Medal. Student team design of a device against pathogenic biofilms (synthetic biology and microfluidics, website coding).

Publications

Redheuil, E., et al. Single-molecule ultra-sensitive protein biomarker immunodetection and proteoform discrimination on a semiconductor chip. *Manuscript in preparation*. The technology is featured on Quantum-Si's [website](#).

Hutchinson, S., Mansour, G.H., Rehan, A., Pichard-Kostuch, A., Redheuil, E., Reed, B.D., Griffiths, A.D., Ribezzi-Crivellari, M. Parallelization of single-molecule binding kinetic measurements via protein barcode sequencing. *Under review*. [doi:10.1101/2025.06.05.658126](https://doi.org/10.1101/2025.06.05.658126)

Taupin L., Barbier, R., Le Masson P., Segrestin B., **Redheuil, E.**, Valibhay C., Designing a Creative Heritage for a Deep-Tech Start-Up in the Scale-Up Phase. M@n@gement, doi:10.37725/mgmt.2024.8889 (Accepted – to be published in Jun 2026).

Taupin, L., Barbier, R., Le Masson, P., **Redheuil, E.**, Segrestin, B., et al. (2022). De la validation du business model au patrimoine de création : le scale-up vu par la conception. *Association Internationale de Management Stratégique (AIMS)*, Annecy, France. hal-03708134

Conference Presentations

Oral Presentations,

- **Soft and Living Matter Days** (2025): Counting and identifying proteins at the single-molecule level. IPGG, Paris.
- **Biological Physics Community Day** (2024): Measuring VHH kinetics and specificity at the single-molecule level. Paris.
- **S3IC** (2024): Measuring VHH kinetics and specificity at the single-molecule level. Paris.

Poster Presentations,

- **Gordon Research Conference & Seminar (GRC–GRS) on Protein Engineering** (2025): Counting and identifying proteins at the single-molecule level. Bryant University, USA.
- **Summer school: Molecular Evolution and Design** (2025): Counting and identifying proteins at the single-molecule level. Cargèse, Corsica.
- **S3IC** (2023): Measuring nanobody kinetics at the single-molecule level. Barcelona, Spain.
- **FIRE retreat** (2023): Detection of proteins at the single-molecule level. Sète, France.

Teaching and Mentoring

- **Physics oral examinations in PC*** (2023–2024): IPESUP. Weekly 2-hour sessions for preparatory class students (L2 level) in groups of 3–4.
- **PSL Week course** (Feb 2025): “Synthetic Biology” (Master level). Introduction to synthetic biology, the iGEM competition, and presentation of my thesis work.
- **Private tutoring** (2023–2025, 2h/week): Multidisciplinary support (Physics, Chemistry, Biology) for first-year medical school entrance exams over two years, maths support (L3), and secondary school tutoring.
- **Alumni mentoring, ESPCI Paris** (Since 2025): Mentoring a 3rd-year engineering student.

Science Communication & Outreach

- **Fête de la Science 2024** (Oct 2024): Mediation activity with Université PSL and the TRACES association. Facilitated a discussion game with secondary school students on “challenges of research on emotions”.
- **Discovering scientific careers** (Oct 2024): Presented my career path with the *SciencesForGirls* association during Fête de la Science at Jussieu.
- **Chroniques doctorales – PC Focus**: Accessible presentation of my thesis work in “placemat” format for a general audience.

Community Involvement & Commitments

Research community and networks

- **Judge for the international iGEM competition** (2022, 2023, 2024): Annual evaluation of 6 synthetic biology projects from international student teams (oral juries at the Giant Jamboree).
- **Organisation of the FIRE Doctoral School retreat** (2023 & 2024): Full organisation of the 2024 edition in Annecy (talks, logistics, transport, accommodation and activities for 30 people over 4 days).
- **IPGG Days** (2024): Member of the organising committee (ESPCI – IPGG). Involvement in the *IPGG connexion* network for scientific animation among early-career researchers in 2024.
- **Thematic workshops**: Organised a seminar at the FIRE doctoral school on the topic “Sleep and consciousness”.

Commitments to promoting women and science

- **Grandes Écoles au Féminin (GEF)** (Since 2024): Representative for MINES ParisTech. Information relay to alumni, Charte Mixité team, volunteer for events including “GEF Startup 2025” (supporting women-led startups) and GEF breakfast meetings, and contribution to the “Femmes et Sciences” working group (led by AFNOR).

- **Charte Mixité GEF:** Facilitation and organisation of roundtables for the charter signing by alumni associations of MINES (Sep 2024) and ESPCI (Dec 2024).
- **Ingénieures Grandes Écoles** (Since 2025): Representative for ESPCI Paris (formerly ParisTech au féminin).
- **Mentor:** *SciGi* (*SciencesForGirls*) and *Elles bougent* associations, inspiring young people towards science.

Other Activities

- **Student life and volunteering:** President of the ESPCI Culture Club (2018–2019), offering affordable theatre and concerts for students. Communication Manager for the PSL University Student Council (2019). Volunteer at the French Red Cross (Mission aux Invalides, 2019).
- **Sport:** Taekwondo (Black belt, 1st Dan). Running and trails: Paris Marathon, Paris Half-Marathon, trails, hiking.