

# What are all these extra ATP synthases doing?

## Background & aim

Photosynthesis is one of the most fundamental biological processes on Earth, supplying the energy that sustains nearly all life and shaping global carbon and oxygen cycles. Within this intricate system, the chloroplast ATP synthase plays a central regulatory role, and understanding how this complex is regulated is key for future efforts to engineer plants with improved resilience and productivity. Interestingly, ATP synthase appears to accumulate at levels far higher than needed under controlled conditions, suggesting that a large fraction of ATP synthase is inactivated by post-translational modifications.

**This project aims to uncover the environmental conditions under which this 'inactive' pool becomes activated.**

To achieve this, the student will use high-throughput phenotyping of transgenic tobacco plants engineered to accumulate roughly half the wild-type amount of ATP synthase. During the project, the student will gain hands-on experience with chlorophyll a fluorescence imaging, quantitative assays of ATP synthase activity in intact leaves and isolated thylakoids, and protein quantification techniques. A student with a strong interest in biochemistry, plant physiology, or a related field, along with enthusiasm for data analysis in Python or similar tools, will be a great fit. The preferred (but not fixed) start date is in the second quarter of 2026.



**Institute:** Jan Ingenhousz Institute

**Theme:** Plant biochemistry

**Type of experiment:** NPEC, molecular

**Location:** Radix

## Methods

- High-throughput phenotyping
- Chlorophyll a fluorescence
- Spectroscopy
- Western blotting and immunodetection
- Data analysis in Python

## Jan IngenHousz Institute

The Jan IngenHousz Institute (JII) is an open science research institute dedicated to improving photosynthesis to enhance global crop productivity, sustainability, and climate resilience. JII brings together expertise in engineering, data science, plant biology, biophysics, genetics, and breeding. We develop innovative sensors, research methods, and data analysis platforms that enable collection and interpretation of real-time field measurements of photosynthesis.

Located on the campus of Wageningen University, JII offers a dynamic, interdisciplinary environment where curiosity meets impact. If you're a student eager to apply your knowledge to photosynthetic efficiency challenges, this is your opportunity!



For more information, contact **Thekla von Bismarck** ([thekla.von.bismarck@jii.org](mailto:thekla.von.bismarck@jii.org)) or **Deserah Strand** ([dez@jii.org](mailto:dez@jii.org))

