



University  
of Basel

Department of  
Biomedical Engineering



Seminar Series:

**Latest Breakthroughs in Biomedical Engineering Research**

Location: DBE Science Lounge, Hegenheimermattweg 167C, 4123 Allschwil

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Host: Dr. Sidaty El Hadramy

# **Introduction to Differentiable Scientific Computing in JAX + Equinox**

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## **Abstract**

Automatic differentiation is transforming scientific computing, enabling gradient-based approaches to optimization. It powers modern artificial intelligence, and now also transforms the world of scientific computing, enabling end-to-end workflows bridging both worlds.

This talk introduces how JAX's composable transformations and the Equinox ecosystem make this practical: Equinox provides module system built on JAX's functional paradigm with Pytorch-like syntax, while libraries such as Diffrax for differential equations, Lineax for linear solvers, and Optimistix for nonlinear optimization and root-finding — offer performant numerics out of the box. We'll walk through key concepts and real examples showing how this ecosystem enables end-to-end differentiable scientific workflows.

## **Biosketch**

Johanna is a maintainer of Optimistix and an active contributor to scientific computing libraries in the Equinox ecosystem in JAX. She is currently a PhD researcher in systems biology at ETH Zurich.