

## Elucidating spatio-temporal coherence of cellular processes by data-driven inverse analysis: redox rhythmicity in yeast and diffusion controlled hormone feedback cycles

### Abstract

Perhaps the major goal in systems biology is the elucidation of cellular processes. Its pursuit requires the joint efforts of computational, applied mathematicians, experimental biologists and engineers. Advanced mathematical techniques from the fields of nonlinear, inverse and ill-posed problems, are necessary for extracting the desired information about complex cellular processes from the ever increasing datasets available. In this project we plan to develop data-driven inverse methods then apply these to analyse redox phenomena in yeast respiratory oscillation, diffusion controlled cortisol feedback cycles and circadian regulation of cyanobacterial photosynthesis.

### Keywords:

Systems biology, experimental high throughput data, nonlinear ill-posed and inverse problems, regularization methods, inverse bifurcation analysis, parameter identification, respiratory oscillations of yeast, large scale ODEs, hormone regulation, react

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Status: Completed (01.03.2008 - 31.08.2010) 30 months

Funding volume: EUR 434,800

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Further links about the involved persons and regarding the project you can find at

<https://archiv.wwtf.at/programmes/mathematics/MA07-030>