



### What is TIP?

The Temporal Interference Planning (TIP) tool is a sophisticated cloud-based software solution designed specifically for optimizing and visualizing temporal interference stimulation protocols. TIP enables researchers to precisely plan and validate their stimulation strategies through advanced electromagnetic

simulations using both established and personalized anatomical human and animal models. Powered by o<sup>2</sup>S<sup>2</sup>PARC technology, TIP reduces complex protocol optimization to just a few simple steps, while providing comprehensive analysis capabilities through integration with the Sim4Life.web computational platform.

# TIP Planning Tool for Optimized Temporal Interference Research

## Background

Temporal interference (TI) stimulation allows deep-brain regions to be non-invasively modulated without activating overlying structures. With TIP, developed by the IT'IS Foundation ([www.itis.swiss](http://www.itis.swiss)), we offer researchers and clinical scientists an intuitive online software tool for the design and optimization of TI stimulation protocols, without the need for prior expertise in computational modeling.

## Online Software Tool

TIP offers three distinct simulation modes to accommodate various stimulation paradigms. The classic TI mode enables two-channel optimization with automatic parameter sweeping. The multi-channel TI mode supports up to 8 channels for improved focality and selective stimulation. The phase-modulation TI mode offers advanced control over modulation schemes and temporal dynamics, including features such as pulse shape and bursting. All modes are fully compatible with our TIBS-R device.

## Personalization Workflow

TIP's personalized optimization functionality enables researchers to use subject-specific imaging data for personalized dosimetry and stimulation parameter optimization. Starting with T1-weighted magnetic resonance imaging (MRI) data for anatomy and optionally incorporating diffusion tensor imaging (DTI) for anisotropic and heterogeneous brain conductivity personalization, our artificial intelligence (AI) system automatically creates highly detailed head models. The standardized 10–10 electrode system is then mapped to the personalized head model, ensuring consistent electrode placement across subjects.

## Analysis and Post-Processing

TIP provides comprehensive analysis capabilities through integration with Sim4Life.web ([www.sim4life.swiss](http://www.sim4life.swiss)). Users can explore field distributions through advanced visualization tools, such as volume rendering and streamlines extraction, and computation of derived exposure quantities. Interactive multi-goal optimization permits real-time weighing of conflicting objectives – e.g., target exposure strength, stimulation selectivity, and collateral exposure – guided by field visualizations and quantitative quality metrics.

## Fields of Application

TIP can be used in the design of human and animal studies, mechanistic research, clinical trial preparation, and educational purposes.

## Early Adopter Program

As part of our Early Adopter Program (EAP), TIP is available at no cost to TIBS-R users and participating research groups. Researchers interested in joining the EAP should contact us at [eap@temporalinterference.com](mailto:eap@temporalinterference.com).

For further information, contact [info@tip.science](mailto:info@tip.science).

## Specifications

Simulation Modes	Classic TI (2 channels) Multi-channel TI (8 channels) Phase-modulation TI
Supported Input Data	T1-weighted MRI, DTI (NIfTI files)
Head Models*	Personalized models from MRI data MIDA high-resolution model IXI025 (female) IXI208 (male) Animal models (mouse)
Tissue Segmentation	30 distinct tissues AI-powered, fully automatic head model generation Anisotropic brain conductivity mapping (optional)
Electrode System	10–10 international system Automatic placement Customizable configurations
Optimization	Interactive multi-goal optimization Target exposure strength Stimulation selectivity Collateral exposure assessment
Post-Processing	Volume rendering Streamlines extraction Custom masking and projections Derived quantity calculations Interactive 3D exploration (with Sim4Life.web)
Report Generation	Detailed PDF reports Performance metrics Field distribution visualizations Protocol parameters TIBS-R compatible formats
Platform	o <sup>2</sup> S <sup>2</sup> PARC technology AWS cloud infrastructure Browser-based, guided GUI
Security	Encrypted data transfer
Instructions for Use	Online manual Step-by-step guidance

AWS: Amazon web services; GUI: graphical user interface

\*[www.itis.swiss/vip](http://www.itis.swiss/vip)



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