



# Brain & Human Body Modeling (BHBM) – Online Local Conference

August 19-20, 2021

A.A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Charlestown MA

<http://education.martinos.org/brain-and-human-body-modeling-conference/>

Support of the A.A. Martinos Center for Biomedical Imaging, Novocure, Inc., and the National Institute of Mental Health (NIMH), National Institutes of Health, is greatly acknowledged

*It is planned posting recordings of the talks on the Conference website at Massachusetts General Hospital and distributing them through the network of Harvard Medical School*

Authors are welcome to publish their presentations in a sponsored open-access annual book Brain & Human Body Modeling 2021 by Springer Nature. All open-access publications are free of charge

Final Program as of August 18, 2021

Presentation schedule (presentation times have been corrected to accommodate different time zones):

Review presentation: 20-30 min (25 min + 5 min for questions)

Research presentation: 12 min (10 min + 2 min for questions)

2021 BHBM Session Organizers:

Kyoko Fujimoto, Kris Carlson, Gregory Noetscher, Marc Horner,  
Aapo Nummenmaa, Sergey Makarov

### **Conference Introduction:**

**Bruce Rosen (MGH), Ishmael Amarreh (NIH/NIMH), 7:00-7:10 AM**

### **Session I. In Silico Brain & Human Body Models**

*Thursday Aug. 19, 2021, Online Presentations*

**Chairs: Kyoko Fujimoto (GE Healthcare), Lilla Zöllei (MGH)**

#	Presenters/email	Title	Organization	Eastern Standard Time (USA)
For <i>Virtual Population</i> please refer to Session VI				
1	Lilla Zöllei <a href="mailto:lzollei@mgh.harvard.edu">lzollei@mgh.harvard.edu</a>	FreeSurfer for human brain: How to learn and use? ( <b>overview</b> )	Mass General Hospital, USA	7:10 – 7:40 AM
2	Chansoo Choi, Chan Hyeong Kim <a href="mailto:cchoi91@hanyang.ac.kr">cchoi91@hanyang.ac.kr</a>	Next generation of ICRP adult and pediatric computational models and their potential applications	Hanyang University, Korea	7:40 – 7:52 AM
3	Sofia Rita Fernandes, Pedro Cavaleiro Miranda <a href="mailto:srefernandes@fc.ul.pt">srefernandes@fc.ul.pt</a>	Accurate realistic model of the spinal cord and surrounding tissues	Universidade de Lisboa, Portugal	7:52 – 8:04 AM
4	Gregory Noetscher <a href="mailto:gregn@nevaem.com">gregn@nevaem.com</a>	VHP-Female full body human model and its applications	NEVA Electromagnetics, USA	8:04 – 8:16 AM
14 min break. Questions to presenters				

### **Session II. Modeling Neuroimaging and Electrical Stimulation (Very Low Frequency Band), and Interplay Between Them**

*Thursday Aug. 19, 2021, Online Presentations*

**Chairs: Sofia Fernandes (U Lisbon), Scott Lempka (U. Michigan, Ann Arbor)**

#	Presenters/email	Title	Organization	Eastern Standard Time (USA)
1	John Mosher <a href="mailto:John.C.Mosher@uth.tmc.edu">John.C.Mosher@uth.tmc.edu</a>	Source Modeling of Neural Activity: “All models are wrong, but some are useful” ( <b>overview</b> )	McGovern Medical School, University of Texas Health Science Center at Houston, Texas, USA	8:30 – 9:00 AM
2	Carsten Wolters <a href="mailto:carsten.wolters@uni-muenster.de">carsten.wolters@uni-muenster.de</a>	New non-invasive multimodal neuroimaging and neurostimulation methods for improved diagnosis and therapy in refractory focal epilepsy ( <b>overview</b> )	University of Münster, Germany	9:00 – 9:30 AM
3	Matti Hämäläinen <a href="mailto:mhamalainen@mgh.harvard.edu">mhamalainen@mgh.harvard.edu</a>	MNE: Scalable and Sensor-Agnostic Software for Real-Time and Off-Line Processing of MEG/EEG Data ( <b>overview</b> )	Harvard Medical School, USA	9:30 – 10:00 AM
10 min break. Questions to presenters				

## Session II. (Cont.)

4	Hans J. Zander, Meagan K. Brucker, David Dinsmoor, Scott F. Lempka <a href="mailto:lempka@umich.edu">lempka@umich.edu</a>	Model-based analysis of evoked compound action potentials generated during spinal cord stimulation	U. Michigan, Ann Arbor, Medtronic, USA	10:10 – 10:22 AM
5	Sofia Rita Fernandes, Pedro Cavaleiro Miranda <a href="mailto:srcfernandes@fc.ul.pt">srcfernandes@fc.ul.pt</a>	Interplay between Electrical Conductivity of Tissues and Position of Electrodes in Transcutaneous Spinal Direct Current Stimulation	Universidade de Lisboa, Portugal	10:22 – 10:34 AM
6	Sergey Makarov, Haowen Wei, Aapo Nummenmaa <a href="mailto:makarov@wpi.edu">makarov@wpi.edu</a>	Interplay between TES and EEG modeling with boundary element fast multipole method (BEM-FMM) via Helmholtz reciprocity principle	Mass General Hospital, Worcester Pol. Inst., USA	10:34 – 10:46 AM
7	Paul Lunkenheimer <a href="mailto:p_lunk01@uni-muenster.de">p_lunk01@uni-muenster.de</a>	Comparison of BEM-FMM and CG-FEM approaches for forward problems of EEG	University of Münster, Germany	10:46 – 10:58 AM
8	Malte Höltershinken <a href="mailto:m_hoel20@uni-muenster.de">m_hoel20@uni-muenster.de</a>	Block Krylov Solvers for Transfer Matrix Computations in Bioelectromagnetism	University of Münster, Germany	10:58 – 11:10 AM
10 min break. Questions to presenters				

### **Session III. Modeling Transcranial Magnetic Stimulation (Very Low Frequency Band)**

*Thursday Aug. 19, 2021, Online Presentations*

**Chairs: Aapo R. Nummenmaa (MGH), Samuel Zibman (BrainsWay)**

#	Presenters/email	Title	Organization	Eastern Standard Time (USA)
1	Dylan Edwards <a href="mailto:edwarddy@einstein.edu">edwarddy@einstein.edu</a>	Open TMS and TES modeling problems in clinical rehabilitation ( <b>overview</b> )	Moss Rehabilitation Research Inst., USA	11:20 AM–11:50 AM
2	Hanbing Lu, Qinglei Meng, Simone Baldwin, Samantha Cermak <a href="mailto:luha@mail.nih.gov">luha@mail.nih.gov</a>	Focal TMS of the rat brain: validation and application to a rat model of cocaine dependence	NIH, USA	11:50 AM – 12:02 PM
3	Sina Shirinpour <a href="mailto:shiri008@umn.edu">shiri008@umn.edu</a>	Multi-scale Modeling of Single Neuron under Transcranial Magnetic Stimulation	University of Minnesota, USA	12:02 – 12:14 PM
4	Tayeb Zaidi, Kyoko Fujimoto <a href="mailto:tayeb.zaidi@fda.hhs.gov">tayeb.zaidi@fda.hhs.gov</a>	Comparison of Simulated Electric Fields for TMS Using Three Different Brain Segmentation Methods	CDRH, FDA, USA	12:14 – 12:26 PM
10 min break. Questions to presenters				
5	Konstantin Weise, William Wartman <a href="mailto:kweise@cbs.mpg.de">kweise@cbs.mpg.de</a>	Effect of Brain Membranes in TMS and TES	Max Planck Inst, Germany, WPI, USA	12:36 – 12:48 PM
6	Charles Lu, Zhi-De Deng, Fow-Sen Choa <a href="mailto:charlielu04@gmail.com">charlielu04@gmail.com</a>	TMS Coil Design with Magnetic Materials to Optimally Shape E-Field Distribution	NIH, USA, University of Maryland, USA	12:48 – 1:00 PM
7	Hongming Li, Zhi-De Deng, Desmond Oathes, Yong Fan <a href="mailto:Yong.Fan@penntmedicine.upenn.edu">Yong.Fan@penntmedicine.upenn.edu</a>	Real-time computation of transcranial magnetic stimulation electric fields using self-supervised deep learning	U Penn, USA, NIH, USA	1:00 – 1:12 PM
8	M. Daneshzand, S. Makarov, L. Navarro de Lara, B. Guerin, J. McNab, B.R. Rosen, M.S. Hamalainen, T. Raij, A. Nummenmaa <a href="mailto:mdaneshzand@mg.harvard.edu">mdaneshzand@mg.harvard.edu</a>	Rapid evaluation of TMS induced E-fields using a dipole based magnetic stimulation profile approach	A.A. Martinos Ctr, Mass General Hospital, USA Stanford U USA	1:12 – 1:24 PM
9	Samuel Zibman, Dmitri Motenko, William Wartman, Gaby Pell, Sergey Makarov <a href="mailto:sam@brainsway.com">sam@brainsway.com</a>	Biophysical modeling of Deep TMS H-coils within a TMS Modeling Toolkit	BrainsWay, Israel, WPI, USA	1:24 – 1:36 PM

**Open discussion/questions to presenters**

Chairs: Gregory Noetscher/William Wartman

**1:45 -2:15 PM**

## **Session IV. Modeling Tumor Treating Fields (Intermediate Frequency Band) in the Brain**

*Friday Aug. 20, 2021, Online Presentations*

**Chairs: Eric Wong (BIDMC), Anders Korshøj (Aarhus U Hospital, Denmark)**

#	Presenters/email	Title	Organization	Eastern Standard Time (USA)
1	Tal Marciano <a href="mailto:tmarciano@novocure.com">tmarciano@novocure.com</a>	Overview of TTFields' Research Program Toward Full Efficacy in a Dose-Response Regime ( <b>overview</b> )	Novocure Ltd., Haifa, Israel	7:30 – 8:00 AM
2	Nichal Gentilal, Ariel Naveh, Tal Marciano, Zeev Bomzon, Yevgeniy Telepinsky, Yoram Wasserman, and Pedro Cavaleiro Miranda <a href="mailto:ngentilal@fc.ul.pt">ngentilal@fc.ul.pt</a>	Optimization of TTFields planning: the importance of scalp's temperature in the predicted treatment efficacy	Universidade de Lisboa, Portugal, Novocure, Israel	8:00 – 8:12 AM
3	Nikola Mikic, F. L. Hansen, Fang Cao, Axel Thielscher, Anders R. Korshøj <a href="mailto:nikmik@rm.dk">nikmik@rm.dk</a>	Standardizing skull-remodeling surgery configuration to improve TTFields for first recurrence glioblastoma. A computational head modeling study	Aarhus University Hospital, Denmark, Technical University of Denmark	8:12 – 8:24 AM
4	Bryant D. Chang, Matthew A. Clark, Edwin Lok, Eric T. Wong <a href="mailto:bchang5@bidmc.harvard.edu">bchang5@bidmc.harvard.edu</a>	Modulation of Tumor Treating Fields by Craniectomy	Harvard University, USA	8:24 – 8:36 AM
5	Edwin Chang and Chirag B. Patel <a href="mailto:cbpatel@stanford.edu">cbpatel@stanford.edu</a>	Cell membrane permeabilization effects of tumor treating fields (TTFields): physical observations and theoretical basis	Stanford University, USA	8:36 – 8:48 AM
12 min break. Questions to presenters				

## **Session V. Software Suites for Modeling Purposes and Software-Hardware Interactions**

*Friday Aug. 20, 2021, Online Presentations*

**Chair: Kyoko Fujimoto (GE Healthcare)**

#	Presenters/email	Title	Organization	Eastern St. Time (USA)
1	Ricardo Salvador, <b>Neuroelectrics</b> <a href="mailto:ricardo.salvador@neuroelectrics.com">ricardo.salvador@neuroelectrics.com</a>	EEG Monitoring and Multi-Channel TES with Starstim ( <b>overview</b> )	Neuroelectrics, Spain	9:00 – 9:30 AM
2	Esra Neufeld and Antonino M. Cassara, <b>Zurich Med Tech/IT'IS Foundation</b> <a href="mailto:neufeld@zmt.swiss">neufeld@zmt.swiss</a> , <a href="mailto:cassara@itis.swiss">cassara@itis.swiss</a>	Modeling of EM-Neuron Interactions with Sim4Life: Bioelectronic Medicine, Neuroprosthetics, and Exposure Safety ( <b>overview</b> )	Zurich Med Tech, IT'IS Foundation, Switzerland	9:30 – 10:00 AM
3	Peter Serano, <b>Ansys</b> <a href="mailto:pete.serano@ansys.com">pete.serano@ansys.com</a>	Ansys Thermal ( <b>overview</b> )	Ansys, Inc. PA, USA	10:00 – 10:20 AM
10 min break. Questions to presenters				

**Session VI. Intermediate Frequency and Radio Frequency Modeling with Computational Human Models: Safety and Imaging**

*Friday Aug. 20, 2021, Online Presentations*

**Chairs: Marc Horner (Ansys), James Brown (Biotronic)**

#	Presenters/email	Title	Organization	Eastern St. Time (USA)
<b>MRI Safety Emphasis</b>				
1	Yihe Hua <a href="mailto:yihe.hua@ge.com">yihe.hua@ge.com</a>	Peripheral Nerve Stimulation (PNS) Analysis of MRI Head Gradient Coils with Human Body Models ( <b>overview</b> )	GE Research, USA	10:30 – 11:00 AM
2	Wolfgang Kainz <a href="mailto:wolfgang.kainz@fda.hhs.gov">wolfgang.kainz@fda.hhs.gov</a>	Magnetic Resonance Safety Assessment Using Computational Modeling ( <b>overview</b> )	CDRH, FDA, USA	11:00 – 11:30 AM
3	Alexander Prokop <a href="mailto:alexander.prokop@3ds.com">alexander.prokop@3ds.com</a>	Voxelizing Human Surface Models for MRI RF SAR Simulation	Dassault Systèmes, Germany	11:30 – 11:42 AM
4	Peter Serano, Gregory Noetscher, Marc Horner <a href="mailto:pete.serano@ansys.com">pete.serano@ansys.com</a>	Modeling MRI-Induced RF Heating with Ansys	Ansys Inc., USA WPI, USA	11:42 – 11:54 AM
5	James E. Brown, Krishna K.N. Kurpad, Paul J. Stadnik, Jeffrey A. Von Arx, Dirk Muessig <a href="mailto:james.brown@biotronik.com">james.brown@biotronik.com</a>	RF-induced Heating Near Implanted Medical Devices in MRI: Impact of Computational Human Model	Micro Systems Engineering, Inc., USA	11:54 AM– 12:06 PM
6	Jasmine Vu, Bhumi Bhusal, Elizabeth Nowac, Joshua Rosenow, Julie Pilitsis, Laleh Golestanirad <a href="mailto:jasmine.vu@northwestern.edu">jasmine.vu@northwestern.edu</a> <a href="mailto:bhumi.bhusal@northwestern.edu">bhumi.bhusal@northwestern.edu</a>	SAR estimation of patients with deep brain stimulation implants in vertical open-bore MRI: Effect of patient-derived lead trajectories	Northwestern University, Albany Medical College, USA	12:06 – 12:18 PM
7	Mikhail Kozlov, K. Pine, and N. Weiskopf <a href="mailto:kozlov@cbs.mpg.de">kozlov@cbs.mpg.de</a>	Realistic model of the 3T Siemens Connectom birdcage coil	Max Planck Inst., Germany	12:18 – 12:30 PM
10 min break. Questions to presenters				
<b>Communications and Imaging Emphasis</b>				
8	Louis Chen <a href="mailto:louis_chen@bose.com">louis_chen@bose.com</a>	Electromagnetics of On-Body Communications at 2.4 GHz	Bose Corp., USA	12:40 – 12:52 PM
9	Jorge A. Tobon V, Francesca Vipiana <a href="mailto:jorge.tobon@polito.it">jorge.tobon@polito.it</a>	Microwave Imaging for Brain Stroke Continuous Monitoring	Politecnico di Torino, Italy	12:52 – 1:04 PM
10	Johnathan W Adams <a href="mailto:jwadams2@wpi.edu">jwadams2@wpi.edu</a>	Dual-Antiphase Antenna for Through-Body Propagation: Neural Network Classifier	Worcester Polytechnic Inst., USA	1:04 – 1:16 PM
11	Ara Nazarian <a href="mailto:anazaria@bidmc.harvard.edu">anazaria@bidmc.harvard.edu</a>	How Microwave Imaging Might Help Orthopaedic Doctors? A Wish List	Harvard Univ., USA	1:16 – 1:28 PM

<b>Open discussion/questions to presenters</b>	Chairs: Gregory Noetscher/William	<b>1:30 PM - 2:00 PM</b>
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