

BIOGRAPHICAL SKETCH

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NAME: **Eugene Kronberg**

eRA COMMONS USER NAME (credential, e.g., agency login): **E.KRONBERG**

POSITION TITLE: **Research Associate**

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Moscow Physical Technical Institute, Moscow, Russia	M.Sc.	06/1978	Physics
A.F.Ioffe Physical Technical Institute, St. Petersburg, Russia	Ph.D.	10/1985	Physics
New York University School of Continuing Education	Certificate	05/1996	UNIX SysAdmin

A. Personal Statement

As a part of the interdisciplinary team approach, my objectives are ensuring high quality magnetoencephalography (MEG) recordings and the development of novel computational resources to process neuroanatomical and neurophysiological data. I have broad background in math and computer science - specifically in signal and image processing. During my 30-year career (at New York University and University of Colorado Denver) I was involved in multiple research projects where signal processing and image reconstruction/dimension reduction (PCA/SVD/ICA) were the key components of the projects. This research has been dedicated to human neuroimaging and neurophysiology and I have been continuously involved in the operation of MEG instruments, data recording and research as well as magnetic resonance imaging (MRI/fMRI). I have extensive experience in software development (C/C++, Matlab) and as certified UNIX system administrator I have experience in data integrity and security. I have more than 30 year experience in magnetoencephalography (MEG) and magnetic resonance imaging (MRI/fMRI).

a) B. Positions, Scientific Appointments, and Honors**Positions and Employment**

1978-1980 Programming Analyst, Proletarsky Zavod Corporation, St. Petersburg, Russia.
1980-1991 Associate Scientist, A.F. Ioffe Physical Technical Institute, St. Petersburg, Russia
1992-2002 Research Scientist, NYU Medical Center, Dept. of Physiology and Neuroscience, New York
2003-present Research Scientist, Health Science Center, University of Colorado, Denver, Colorado

Professional Memberships

2014-present American Clinical MEG Society

C. Contributions to Science

1. Magnetoencephalography (MEG) is a valuable tool for mapping eloquent cortex. Results of MEG mapping could be used for pre-surgical planning as well as during surgery. During my early work at NYU, I have created several computer software that allowed MEG mapping available in stereotactic and frameless neurosurgery systems.

- a) Rezai AR, Hund M, Kronberg E, Deletis V, Zonenshayn M, Cappell J, Ribary U, Llinas R, Kelly PJ. Introduction of magnetoencephalography to stereotactic techniques. *Stereotact Funct Neurosurg*, 65(1-4): 37-41, 1995
- b) Rezai AR, Hund M, Kronberg E, Zonenshayn M, Cappell J, Ribary U, Kall B, Llinas R, Kelly PJ. The interactive use of magnetoencephalography in stereotactic image-guided neurosurgery. *Neurosurgery*, 39(1): 92-102, 1996
- c) Hund M, Rezai AR, Kronberg E, Cappell J, Zonenshayn M, Ribary U, Kelly PJ, Llinas R. Magnetoencephalographic mapping: basic of a new functional risk profile in the selection of patients with cortical brain lesions. *Neurosurgery*, 40(5): 936-43, 1997
- d) Kamiryo T, Cappell J, Kronberg E, Woo HH, Jafar JJ, Llinas RR, Nelson PK. Interactive use of cerebral angiography and magnetoencephalography in arteriovenous malformations. *Neurosurgery*, 50(4): 903-11, 2002

2. Spectral analysis of MEG recordings is often a necessary step in the data analysis. Due to complexity of the brain electro-physiological activity traditional spectral techniques often fail to produce clear results. Development of the multi-pater technique to analyze data acquired from patients with thalamo-cortical dysrhythmia was the aim of my work for many years.

- a) Llinas RR, Ribary U, Jeanmonod D, Kronberg E, Mitra PP. Thalamocortical dysrhythmia: A neurological and neuropsychiatric syndrome characterized by magnetoencephalography. *PNAS*, 96(26): 15222-7 1999
- b) Llinas, R.; Ribary, U. ; Jeanmonod, D. ; Cancro, R. ; Kronberg, E.; Schulman, J.; Zonenshayn, M. ; Magnin, M.; Morel, A.; Siegmund, M. Thalamocortical dysrhythmia I. Functional and imaging aspects *Thal Rel Sys*, 1(3): 237-244, 2001
- c) Jeanmonod, D.; Magnin, M.; Morel, A.; Siegmund, M.; Cancro, R.; Lanz, M.; Llinas, R.; Ribary, U.; Kronberg, E.; Schulman, J.; Zonenshayn, M. Thalamocortical dysrhythmia II. Clinical and surgical aspects *Thal Rel Sys*, 1(3): 245-254, 2001

3. Analysis of the MEG time series continues to be a focus of my work. Independent component analysis (ICA), analysis of the steady state, and phase analysis as applied to the brain oscillations were implemented and applied to the data acquired under different conditions. I have provided diverse analysis expertise to our ongoing MEG lab members for over 10 years.

- a) Wilson TW, Slason E, Asherin R, Kronberg E, Teale PD, Reite ML, Rojas DC. Abnormal gamma and beta MEG activity during finger movements in early-onset psychosis. *Dev Neuropsychol*. 2011;36(5):596-613
- b) Rojas DC, Teale PD, Maharajh K, Kronberg E, Youngpeter K, Wilson LB, Wallace A, Hepburn, Transient and steady-state auditory gamma-band responses in first-degree relatives of people with autism spectrum disorder. *S.Mol Autism*. 2011 Jul 5;2:11.
- c) Buard I, Rogers SJ, Hepburn S, Kronberg E, Rojas DC. Altered oscillation patterns and connectivity during picture naming in autism. *Front Hum Neurosci*. 2013 Nov 8;7:742.
- d) Buard I, Dewispelaere WB, Teale P, Rojas DC, Kronberg E, Thaut MH, Kluger BM. Auditory entrainment of motor responses in older adults with and without Parkinson's disease: An MEG study. *Neurosci Lett*. 2019 Aug 24;708:134331. doi: 10.1016/j.neulet.2019.134331. PMID: 31226362
- e) Geller AS, Teale P, **Kronberg E**, Ebersole JS. Magnetoencephalography for Epilepsy Presurgical Evaluation. *Curr Neurol Neurosci Rep*. 2024 Feb;24(2):35-46. doi: 10.1007/s11910-023-01328-5 PMID:38148387

4. Magnetic resonance imaging (MRI) and its functional extension (fMRI) are critical tools to analyze brain activity. While there are multiple standard software packages to extract and analyze information on structural and functional connectivity of the brain, often there is need for the novel approach. I have created and successfully applied tools for the brain connectivity analysis.

- a) Wylie KP, Kronberg E, Maharajh K, Smucny J, Cornier MA, Tregellas JR. Between-network connectivity occurs in brain regions lacking layer IV input. *NeuroImage*. 2015; 116:50-8.
- b) Berman BD, Smucny J, Wylie KP, Shelton E, Kronberg E, Leehey M, Tregellas JR. Levodopa modulates small-world architecture of functional brain networks in Parkinson's disease. *Mov. Disord*. 2016 Nov;31(11):1676-1684.
- c) Smucny J, Wylie KP, Kronberg E, Legget KT, Tregellas JR. Nicotinic modulation of salience network connectivity and centrality in schizophrenia. *J Psychiatr Res*. 2017 Jun;89:85-96.
- d) Wylie KP, Kluger BM, Medina LD, Holden SK, Kronberg E, Tregellas JR, Buard I. Hippocampal, basal ganglia and olfactory connectivity contribute to cognitive impairments in Parkinson's disease. *Eur J Neurosci*. 2022 Dec 14. doi: 10.1111/ejn.15899.

5. Often – as is the case in the olfactory system research – results of the measurements are presented in the almost arbitrary system of coordinates. I have design and implemented software, which could help to create realistic 3D model of the olfactory bulb of mice. This software was successfully used to study different aspects of the olfactory system.

- a) Salcedo E, Zhang C, Kronberg E, Restrepo D. Analysis of training-induced changes in ethyl acetate odor maps using a new computational tool to map the glomerular layer of the olfactory bulb. *Chemical senses*. 2005; 30(7):615-26.
- b) Salcedo E, Cruz NM, Ly X, Welander BA, Hanson K, Kronberg E, Restrepo D. A TAP1 null mutation leads to an enlarged olfactory bulb and supernumerary, ectopic olfactory glomeruli. *Open Biol*. 2013 May 22;3(5):130044.

A full listing of my published manuscripts can be found at My NCBI website

<http://www.ncbi.nlm.nih.gov/sites/myncbi/1TcD1JNNW0A54/bibliography/48182089/public/?sort=date&direction=ascending>

or on Google Scholar:

<https://scholar.google.com/citations?user=zLHo8tgAAAAJ&hl=en>