*Valparaiso January 7-19, 2019*

**PRELIMINARY PROGRAM:**

A twelve days Intensive hands-on international workshop on modern techniques to understand the biophysics of ion channels at the Centro Interdisciplinario de Neurociencia de la University of Valparaiso. A body of experts in the field will give morning lectures followed by laboratory work. Several lab activities will provide comprehensive coverage of the different tools being used today toward our understanding of ion channel gating and modulation at an atomic scale. Students will have the opportunity to rotate and learn different techniques or to learn one in depth.

**Teachers:**

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| Osvaldo Álvarez | Teresa Giráldez |
| Francisco Bezanilla | Miguel Holmgren |
| Andrea Bruggemann | Ramon Latorre |
| Andrés Chávez | Agustín Martínez |
| Chiayu Chiu | Alan Neely |
| Ana María Correa | Eduardo Perozo |
| Luis Cuello | Juan Carlos Sáez |
| José Antonio Gárate | Sergei I. Sukharev |
| Isaac García | Teresa Giráldez |
| Carlos González | Karen Castillo |
| Helmuth Sanchez |  |
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**Sunday,. January 6th a Welcome reception starting at 7 pm**

**Summary Schedule**

**January 7th** Teachers: Bezanilla, Alvarez, Holmgren

* General concepts of electronics.
* HH in action
* Actions potentials and ion currents in the squid giant axon

Lab: (1 activity) Squid axon voltage-clamp at Montemar: Action potential ion channels and Na/K ATPase

**January 8-9th** Teachers: González, Latorre, Neely.

* Biophysics of ion channels
* General concepts
* Principles of methods and techniques
* Structure and Function

Lab: (4 activities) Using two-electrode voltage clamp, cut-open oocyte voltage clamp and patch-clamp to record ionic and gating currents from voltage-dependent ion channels. Noise analysis on small, intermediate and large conductance channels Modulation of CaV by recombinant auxiliary subunit and other associated proteins. BK gating currents.

**January 10-11th** 5 Teachers: Bezanilla, Giráldez, González, Neely

* Voltage clamp fluorometry
* Patch clamp fluorometry
* Luminescence Resonance Energy Transfer

Lab: (3 activities) VCF, Patch fluorometry and LRET measurements

**January 12th** Teachers: Correa, Bruggemann, Latorre, Sukharev

* Reconstitution of channels in black lipid films
* Reconstitution in liposomes
* Patch-clamping of bacterial spheroplasts

Lab (3 activities) Reconstitution of channels in black lipid films, Reconstitution in liposomes, patch-clamping of bacterial spheroplasts

**Sunday - January 13th – Field trip**

**January 14-15th** Teachers: Perozo, Cuello, Garate

* Ion channel structure
* X-Ray
* Cryo-Microscopy
* Structural analysis

Lab (4 activities) Production and purification of recombinant ion channels. Functional study of purified channels on reconstituted bilayer. Theory and analysis of X-Ray/Crio EM data and modelling.

**January 16th** Teachers: Martinez, Sáez, García.

* Connexins: Hemichannels and Gap Junctions, General concepts.
* Physiological importance and role of Hemichannels in inflammatory processes and genetic diseases.

Lab (2 activities). Dye coupling and Fluorescence and Recovery After Photobleaching, patch-clamp, double whole-cell patch clamp.

**January 17th** Chiu, Chávez

* Neurons at work. Synaptic integration and neuronal excitability.

Lab: one-day demonstration of what you can do with a two-photon microscope. Optogenetics, patch-clamp in brain slices.

**January 18th** – Students presentations

**Saturday - January 19th – Closing remarks and farewell party**