Title: **PhD position in REM sleep research**

Introduction: Sleep is characterized by rapid transitions between REM (rapid eye movement)- and non-REM states, the former being hallmarked by rapid eye movements, atony of the postural muscles, a suspension of homeostasis, desynchronized EEG activity and vivid dreaming. Wherefrom stem the motor commands that underlie the rapid eye movements remains an enigma. We have observed the existence of a cluster of calbindin-D28K (Calb)-expressing neurons (*Nucleus papilio [NP])* in the dorsal paragigantocellular nucleus that is activated during REM-sleep, and that project to the three contralateral eye-muscle nuclei. Optogenetic studies (in collaboratrion with Prof. Adamantidis, Berne) indeed indicate a role of the *NP* in the control of eye movement (*Girard et al., 2018, manuscript in preparation*). Subpopulations of Calb-neurons express various neuropeptides.

Research: The aim of the PhD thesis consists in studying subpopulations of Calb+ neurons of the NP expressing specific neuropeptides. Adenoviral and rabies constructs will be applied stereotactically in these neurons to study their projections and afferences. The consequences of manipulating the activity of these neurons on eye movement., atony, homeostasis, EEG and other REM sleep parameters will be tested by chemo- and otpogenetic techniques (in collaboration with Prof. Adamantidis).

Relevance: The *NP* seems to be a "brain center" which is in charge of eye movement during REM-sleep. The neuropeptide-expressing subpopulations of these neurons could assume special roles in influencing characteristics of REM-sleep.

References:

Celio (1990) Neuroscience, 35 :375-475.
Girard et al (2015) 294 : 116-155
Girard et al (2018) *to be submitted*

Requirements: Apart from basic skills in manual work and interest in experimental research, there are no special requirements. The topic involves animal experimentation.

Specials: The PhD-thesis financed by the Swiss National Foundation.

Date of start: The PhD-thesis can be started upon mutual agreement (earliest on July 1st, 2018)

Contact:

Prof. Marco R. Celio phone: 026 300 84 91
e-mail: marco.celio@unifr.ch
Dr. Franck Girard phone: 026 300 84 95
e-mail: ranck.girard@unifr.ch
Anatomy Unit and Program in Neuroscience, Fribourg University,
Rte. A. Gockel 1, CH-1700 Fribourg