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investigate mean values on a larger scale. The purpose was to investigate the possibility to quantitatively evaluate multiple flow speeds in complex time evolution of the blood flow.

MediaChrom: a new class of versatile polarity-sensitive dyes for imaging applications.

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Modern biophysical and biomedical research asks for a continuous development of new fluorescent dyes characterized by improved performances and suitable for sensitive monitoring of a wide range of processes. Solvatochromic dyes are able to change their spectroscopic properties in response to changes of environment polarity. We designed a new class of polarity-sensitive dyes, named MediaChrom, that absorb and emit light in the visible range with good extinction coefficient and quantum yield. MediaChrom proved to be highly sensitive to the environment polarity, and can be easily conjugated to proteins and peptides for directing them to defined biological targets.

Optical detected magnetic resonance and fluorescent nanodiamonds: towards molecular resolution neuronal imaging

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While neuronal electrical potential changes can be monitored, few is known about neuronal response in terms of its magnetic field. Our project develops novel cellular imaging technique, derived from ODMR and exploiting the properties of Nitrogen Vacancy NanoDiamonds (NV-NDs), to be used as an original alternative to Calcium- or Voltage-Sensitive fluorophores. Having NV-NDs in the close proximity, or even internalized by neurons, will enable us to image single cell and network-level activity and to directly evaluate the local electromagnetic fields generated by neuronal activity, leading to a novel magnetic description of neuronal excitability, currently fully unexplored.

Stressing biological samples with pulsed magnetic fields: physical aspects and experimental results.

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Magnetic field effects are diffused among living organisms. They are mainly studied with static or extremely low-frequency fields, while scarce information are available for pulsed fields. This work is devoted to the study of the interaction between *Drosophila melanogaster* flies, both adults and larvae, and pulsed magnetic fields. In particular, we noticed a marked magnetic field effect exposing larvae to a peak field of 0.4T, lasting for about 2 μs, within