

Optimising closed-loop stimulation of slow wave sleep

Supervisory team:

Main supervisor: Prof Penny Lewis (Cardiff University)

Non-academic supervisor: Mathieu Galtierb (Rythm)

Prof Rob Honey (Cardiff University), Dr Alex Casson (University of Manchester)

Collaborators: Quentin Soulet de Brugière (Rythm)

Host institution: Cardiff University

Project description:

We spend 1/3 of our life asleep, and the brain is very busy during this time. The neural oscillations of sleep have known restorative functions, and are also critical for memory consolidation and emotional processing. We are interested in enhancing sleep to improve health (for instance by counteracting the impacts of ageing which lead to reductions in deep slow wave sleep). We are also interested in manipulating memory consolidation by triggering the replay of selected memories in different combinations and in different sleep stages. This can lead not only to stronger memory, but to integration of new memories with each other and with existing knowledge, providing a basis for creativity.

We are seeking a PhD candidate to investigate closed loop sound stimulation during deep sleep, studying its impact on behavioural performance, brain function, and (longitudinally) on brain structure. The successful candidate will have access to a wide range of state-of-the art research facilities and resources, including a sleep lab, 3T and 7T MRI scanners, EEG/MEG and behavioural testing labs, and highperformance computing cluster. They will work with a leading neurotechnology company, Rythm, and with signal processing engineers at the University of Manchester in a flexible, highly integrated and highly-multi-disciplinary way.