Gamma MRI

GAMMA-MRI NEWSLETTER: APRIL 2022

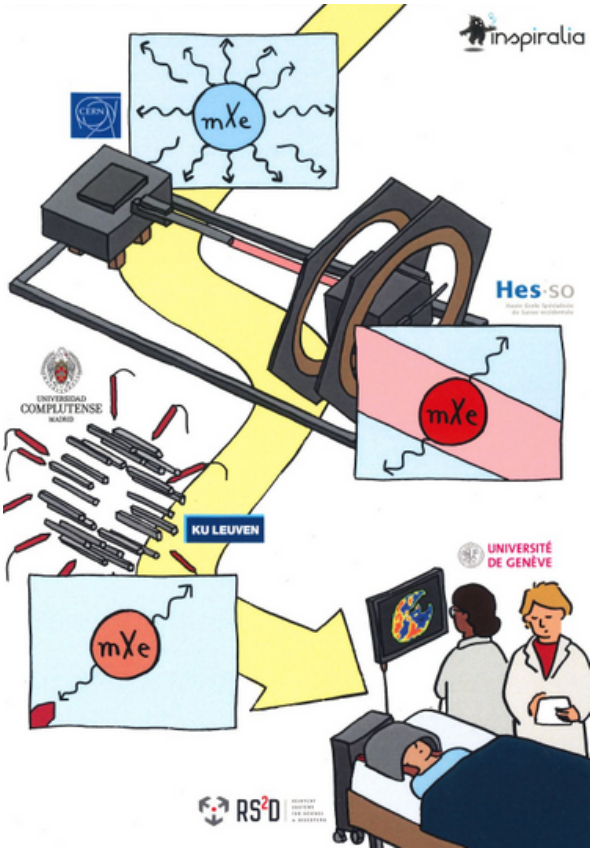
GAMMA-MRI is a 3-year project funded by the European Commission under the Horizon 2020 programme. In the April newsletter we present the main achievements of the project to date. More information will be available in upcoming newsletters.

OVERVIEW OF THE PROJECT

Over 165 million people in Europe are affected by at least one brain disease such as Alzheimer's, Parkinson's, dementia, stroke etc. Most neurological diseases are age sensitive and with the ongoing demographic changes, their incidence is expected to increase. This will be one of the major future societal challenges in Europe and worldwide.

Medical imaging has revolutionized Europe's healthcare, from diagnostics to treatment plans, and it is nowadays impossible to imagine a contemporary healthcare system without its benefits.

However, existing technological aids have been plagued by lack of sensitivity, low spatial resolution, and poor accessibility to devices, due to complex technical infrastructures and high costs.



OUR SOLUTION

GAMMA-MRI is a combination of an MRI system with additional gamma detection. As a result, the overall architecture is composed of these two main subsystems: low magnetic field MRI and gamma detectors. Two synchronised consoles ensure tight integration of both system components.

THE GAMMA-MRI CONSORTIUM

The GAMMA-MRI consortium is composed of the following partner: HESSO, CERN, University of Geneve, Universidad Complutense de Madrid, RS2D, Leuven University and Inspiralia.

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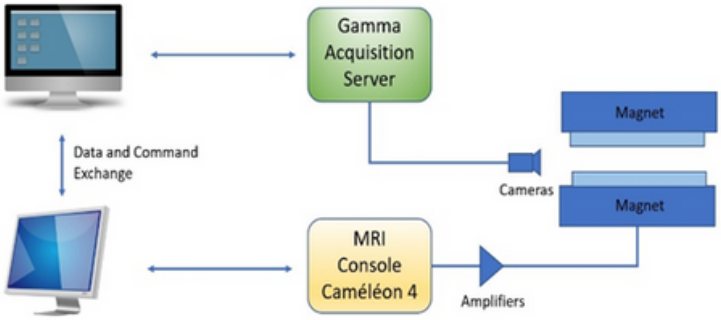
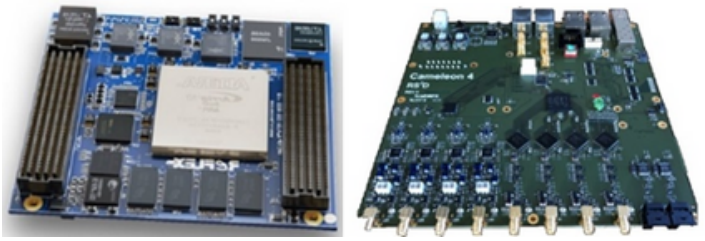
During this first year of development, GAMMA.MRI has achieved several important milestones



- The new gas transfer system with integrated radioactive Xe purification has been successfully built and tested and the final protocol is available, while SEOP and gamma asymmetry detection tests are currently ongoing, as well as the simulations to predict gamma signals in our prototype.
- SEOP experiment: the first results show a small hint that there is asymmetry, all the system was checked, it should work. We will try to increase this asymmetry by changing parameters.
- The MRI device is organised in terms of pulse generation hardware, around two main boards: FPGA core board to numerically generate the different pulses at high-speed rate and input/output MRI board to convert the generated waveform in analogical signal



- The main user interface of the system is made in Java and runs under Windows to facilitate ease of use and portability. The pulse sequence kernel is designed as a smart graphical editor with an additional layer that allows advanced calculations.

- The gamma detectors fit inside openings made inside the magnet structure. To determine the optimal detector features, the 3D field mapping of the magnet has been completed.