Highlight CERIMED Newsletter N°3
April 2008

EDITORIAL

Since the second issue of the Highlight Newsletter in July 2007, significant progress has been made with regards to the CERIMED project. A local team has been set up with J.-M. Bartoli, B. Guillet, P. Lecoq, C. Morel, O. Mundler, C. Oliver, P. Pisano and T. Pourcher to study the CERIMED infrastructure program, in cooperation with Mrs. E. Goig (head of the real estate office at Université de la Méditerranée) and Mr. Y. Dubois and Mr. P. Frère from the Couzane Programmation consulting company. The CERIMED infrastructure consists in 5 different areas :

- technological : this area will be dedicated to the assembly of innovative biomedical imaging devices and will consist in various workshops and an assembly hall taking up altogether 480 m² ;
- radiopharmaceutical : this comprises all the radiopharmaceutical production and research facilities occupying 369 m² ;
- preclinical imaging : this relates to the animal experimentation area, including an animal house and occupying altogether 465 m² ;
- clinical imaging : this consists in a clinical research unit that includes patient facilities with radiological and nuclear medicine application rooms occupying 297 m² ;
- offices and meeting rooms taking up 743 m².

This infrastructure comes in addition to the already existing services and facilities available on the hospital and university campus.

CERIMED has been officially introduced to representatives of the local authorities and of research organizations on November, 15th 2007. Surface allocation to the different infrastructure areas, as well as the financial breakdown and a tentative agenda for the construction of the CERIMED building and start of operation have been presented.

Presently, a number of important activities are managed in parallel :

- selection of the company to install and operate part of the radiopharmaceutical unit (cyclotron and radiochemistry lab) for commercial purpose. A call for tender has been launched. Opening of the tenders scheduled on May, 16th 2008 ;
- organization of an operational funding scheme that can involve multiple sources from academic and industrial partners spread over several European Member States ;

- structuration of the CERIMED clinical research unit as a part of the Clinical Investigation Centre (C.I.C.) of Marseilles, which is related to the European Clinical Research Infrastructures Network (ECRIN) ;

- organization of a transverse education programme in the Marseilles area, involving two engineering schools as well as a science and medicine faculties of Aix-Marseille Universities. A new master module has been introduced in 2007-2008 on human anatomy and physiopathology for physicists and engineers. New modules on optics, mechanics and nanotechnologies for medical and pharmaceutical doctors will be introduced next year. All these modules are defined with regards to their relevance for medical imaging.

The CERIMED team has also strengthened contacts with :

- European colleagues at the Warsaw PET Consortium, the Universita degli Studi di Milano-Bicocca and the Institute for Scintillation Materials in Kharkov ;

- The management of the National Institute for Nuclear and Particle Physics (IN2P3) (M. Spiro, scientific director and A. Mueller, adjunct director for accelerator and interdisciplinary applications) ;

- the group of the National Institute for Scientific Research Energy, Materials and Telecommunications (INRS-EMT) at the University of Quebec (J-C Kieffer, director) and the Lasers, Plasmas and Photonic Processes (LP3) laboratory of the Université de la Méditerranée and CNRS (M. Sentis, director)n with whom is discussed the implantation of a femtosecond laser facility for stimulated fluorescence X-ray production as a part aside the CERIMED infrastructure.

Unfortunately, the TRIMODAL FP7 project for the development of a PET/SPECT/Ultrasound breast camera will not be funded by the European Commission, although it was well received with a ranking of 12/15. Nevertheless, a slightly reduced version of this project (PET/Ultrasound), the ClearPEM Sonic CERIMED pilot project, is presently carried on and has been funded by the General Council of the Department of the Bouches-du-Rhône, the City of Marseilles, CERN, the laboratório de Instrumençăo e física experimental de Partículas in Lisbon (LIP), the Vrije Universiteit Brussel (VUB), the Laboratory of Mechanics and Acoustics (LMA) of CNRS in Marseilles, the University Milano-Biccoca and the company SuperSonic Imagine in Aix-en-Provence.

Last but not least, a brainstorming workshop will be held in Saint-Maximin with high level European stakeholders in medical imaging (on April, 24-25 2008) to discussing and asserting a strategy in order to turn CERIMED into an institution.

CERIMED MEETING IN SAINT-MAXIMIN

A two-days workshop is organized at the Hotel "Le Couvent Royal" in Saint-Maximin La Sainte Baume, a small city located half-way between Nice and Marseilles. The program of the seminar consists in :

- two parallel sessions on :
  - the strategic positioning of CERIMED at the academic and industrial interface with regards to the future medical imaging landscape ;
  - the European dimension of CERIMED : why and how ?

- the synthesis of both sessions ;

- a workshop dedicated to the Technological Research axis of the Canceropole of the Provence-Alpes-Côte d'Azur (PACA) region.

CANCEROPOLE PACA ANNUAL MEETING (February, 27th 2008 – Regional Council, Marseilles)

A meeting has been held in the context of the Technological Research axis of the Canceropole PACA. The program of this meeting chaired by J.-P. Gérard (Nice) and C. Oliver (Marseilles) comprised :

- a brief comment by both chairmen on the cooperation between the Canceropole PACA and CERIMED for research projects to be developed between the research teams in biomedical imaging and radiotherapy in Nice and Marseilles ;

- a short description of ongoing projects :

  - Design of a multicentric atlas-based automatic segmentation software for the pulmonary delineation (P-Y Bondiau, Centre Antoine Lacassagne - Nice)

  - Preliminary results on the evaluation of thyroid nodules using elastography combined with echography (C. Oliver, Université de la Méditerranée - Marseilles)

  - Automated extraction and distribution of lesions in oncologic imaging : diagnosis applications (A. Butzbach, R&D director of Median Technologies).

NEWS FROM THE CERIMED COORDINATION

- Mrs. Isabelle Halgand has joined the CERIMED team and is acting as assistant manager of CERIMED since September, 1st 2007. First recruited in 1996 to work as the assistant of a former President of the Université de la Méditerranée, she then joined the International relation office of the university in 2000 before starting her new activity with C. Oliver, the CERIMED project leader.

- A CERIMED office has been opened. It is located in the Faculty of medicine :
  27, boulevard Jean Moulin
  13385 Marseille Cedex 05
  France
  Phone : +33 (0) 4-91-32-46-66 - Fax : +33 (0) 4-91-32-43-06 (temporary)

NEWS FROM THE CENTRE FOR PARTICLES PHYSICS OF MARSEILLES (CPPM)

Since January 1st 2008, Dr. E. Kajfasz succeeded to Dr. R. Aleksan as director of the Centre for Particles Physics of Marseilles (CPPM). Dr. Kajfasz is director of research at CNRS and presently vice-president of the D0 international collaboration, which operates the D0 particle physics experiment on the Tevatron at Fermilab, near Chicaco. His research activities were related to electromagnetic calorimetry (ALEPH experiment at CERN) search for toponium (D0 experiment, Fermilab).

We would like to take this opportunity to express our warmest thanks to Dr. Aleksan, member of the CERIMED Executive Committee since its beginning, who has been very instrumental in the preparatory work to setup CERIMED in Marseilles and who developed fruitfully medical imaging spin-off activities at CPPM.

We wish Dr. Kajfaz full success with his new responsibilities.

THE CLINICAL VALIDATION UNIT OF THE CERIMED

The clinical validation unit of CERIMED has been structured. It has been recognized as a component of the Clinical Investigation Centre (CIC) of Marseilles (INSERM – AP-HM – Université de la Méditerranée). The clinical research projects of CERIMED will be evaluated by the CIC Technical Committee and conducted under the Good Clinical Practices. The clinical validation unit of CERIMED is coordinated by C. Oliver.

It is composed of :

- methodologists (Prof. X. Thirion and Dr. J. Berbis) ;
- clinical research assistants ;
- chief investigators for radiology (Dr. V. Vidal) and nuclear medicine (Dr. E. Guedj).

At present, four CERIMED projects have been integrated in the unit :

- three of them are initiated by the hospitals of Marseilles :
  - evaluation of thyroid nodules by elastography combined to echography ;
  - preparation of neuroimaging in controls ;
  - brain metabolic changes during spontaneous vascular pain crisis ;

- one of them is initiated by the company SuperSonic Imagine :
  - optimization of acoustic parameters in ultrasound elastographic and echographic evaluation in breast examination

An important contribution of CERIMED in the near future will be devoted to networking the CERIMED clinical validation unit with other Clinical Investigation Centers in Europe.

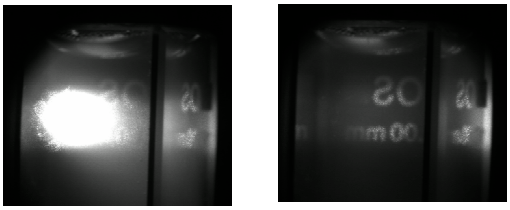
TECHNICAL NOTE ON THE CERIMED PILOT PROJECTS (2)

POCASI

Polarimetric Controlled Annulation for Selective Imaging in scattering biological tissue

Standard optical systems show good performances when visualizing objects in transparent or low scattering media. New challenges have appeared over the last years, such as the extraction of images from noisy background (polarimetric or spectroscopic imaging, ballistic/selective laser amplification…), real time correction in turbulent media (adaptive optics), or discrimination of complex objects (tomography, multi-photonic/non-linear imaging…). These efforts have given rise to several modern high-resolution imaging techniques in biological

tissue, with the advantage of being non-ionizing, non-invasive, with low cost and having a large field of application in the biomedical and biological field. However, a major difficulty is to get rid of the tissue light-scattering, in order to optimize the contrast and spatial resolution. In this project we propose to apply a novel selective cancellation principle of light-scattering through the control of light polarimetric properties.
The principles underlying selective polarimetric cancellation were recently published and their applicative consequences have been patented. First data have validated the principles, such as extinction of bulk scattering in low scattering media (see figure).



We will explore two applications : breast imaging and (functional) imaging of the cerebral cortex. This pluri-disciplinar program requires collaboration from physicists, neuroscientists, medical staff and industrials. The development of a laboratory prototype has been started, mainly devoted to preliminary tests and applications. In this draft we propose to join several laboratories together as well as industrial partners ; this will give the project another and more applied dimension to investigate the feasibility of the technique within the context of specific biomedical and biological situations (breast imaging and functional imaging of the cortex). Specific application prototypes will be developed and will be turned into "systems", on the basis of a key expertise at Institut Fresnel in Marseilles.

The project has been the label of the French "Pôle de Compétitivité" "Photonics : complex system of optics and imaging".

Investigator : Prof. C. DEUMIE, Central School of Engineering and Fresnel Institute (UMR 6133 CNRS).

Charles OLIVER , project leader
Paul LECOQ , technical director
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