



LabEx **PRIMES**
Physics, Radiobiology, Medical Imaging & Simulation

Scientific directors :

Françoise Peyrin, DR INSERM, CREATIS

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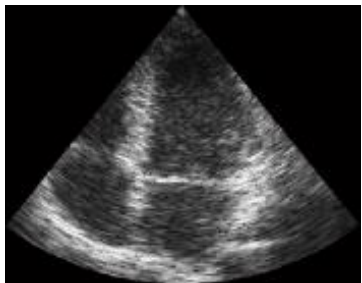
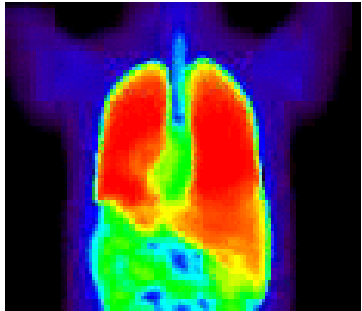
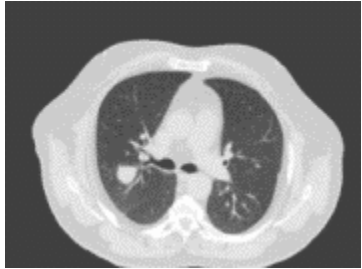
LabEx Manager

Béatrice Rayet, UdL

Objectives

- Context
 - Cancer and Aging diseases (cardiovascular, neuro, osteoarticular)
- Objectives
 - Develop new concepts for exploration, diagnosis and therapy of cancers and diseases of aging
- Research topics
 - New **imaging** methods for the exploration of living tissues (multi-scale, new contrasts, improved spatial resolution, quantification, ...)
 - New **irradiation and control strategies** (detectors, dose simulation, radiation biology, modelling ...)

Technological challenges: Innovative imaging



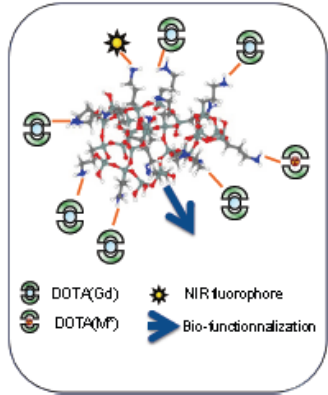
- **Biomedical imaging**

- ✓ Acquisition/ Instrumentation
 - Improve sensitivity, quantification, spatial and temporal resolution, multimodality
- ✓ Data processing
 - Improve image quality, relevant data extraction, big data handling

- **LabEx teams**

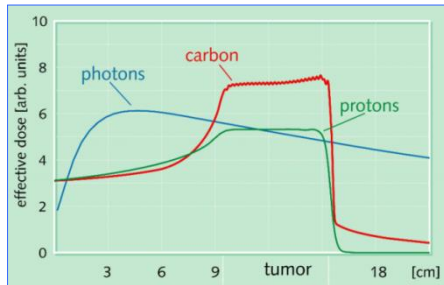
- ✓ Experienced teams: imaging and computing laboratories
 - CREATIS, LIRIS, LIP, LHC, ...
- ✓ Well developed international collaborations
 - VPH network, UCL London, Univ Berlin, Politecnico Milano, ...

Technological challenges : innovative radiotherapies



- **Hadrontherapy, micro-beam RT, PAT-Z (heavy atoms, nanoparticle activation)**

- ✓ General objective: maximize dose in tumeur, while minimizing the dose in healthy tissues
- ✓ Instrumentation
 - Improve Quality Assurance: new tools
- ✓ Radiobiology
 - Understand and predict biological efficiency
- ✓ Simulation/ Modelling
 - Improve treatment planning

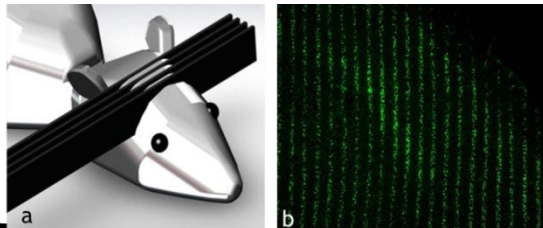


- **LabEx teams**

- ✓ Experienced teams:
 - CPER-Etoile, RSRM-ESRF, IPNL, LPSC, LPC, CREATIS, LIRIS, ...
- ✓ Well-developed international collaborations

ENLIGHT network,

CNAO, HIT, MedAustron, ESRF-Australian Synchrotron...



LabEx PRIMES : Physics, Radiobiology, MEdical Imaging & Simulation

Cancer

Aging

Exploration, Diagnostic, Therapy

WP1

Innov Radiotherapy

WP2

Emerging Imaging

WP3

Radiobiology

WP4

Multi ImageProc

WP5

Simul/Model

Valorization

Education

LabEx PRIMES : Physics, Radiobiology, MEdical Imaging & Simulation

- Partners

- 16 research labs from “Université de Lyon” (INSA, UCBL, Polytech, ENS, Univ St Etienne), “Université de Grenoble Alpes”, “Université d’Auvergne”, Clermont-Ferrand
- Teams : 24

- Topics

- Multi disciplinary : physics, image processing, computer science, biomedical engineering, biomechanics, biology, medicine

- People/Budget

- Permanent people : 209 (118 FTE)
- Budget : 8 M€
- Funding: 30 PhD students (total), 10 Master training students (per year), 4 post-doctoral trainees (current), 3 computing engineers, 1 Instrumentation engineer, 2 projects supports, Invited scientists

Startup – Patents – Clinical Transfer

- **Start up** NH TherAguix, Dec 2015 : transfer nanoparticules AGuIX to clinic. Dec 2016 : new fundraising, Dir: G Le Duc, *coll ILM-FENNEC – clinical trial*
- **Patent** Prognostic relevance of MIR-422a in head and neck squamous cell carcinoma , D Poncet, R Rimokh, C Rodriguez-Lafrasse, dépôt le 01/06/2016 *LRCM – clinical trial*
- **Patent** « Procédé d'estimation automatique d'un taux de survie d'une lignée cellulaire irradiée par une dose d'un rayonnement ionisant »- WO 2016185117 A1 extension internationale, *IPNL-PHABIO*
- **Patent** « Procédé de détection d'une différence entre une caractéristique prédite et une caractéristique réelle d'un faisceau d'hadrons », FR1656378, dépôt 04 juillet 2016, *IPNL-PHABIO*
- **Patent** « Caméra Mono Pixel”, F. Rousset, N Ducros, F Peyrin, FR Patent FR1751515, dépôt 24 Feb 24, 2017), *CREATIS*

WP : Education

- Objectives: initial, research and continuing education
- Practical Training room
 - Imaging devices : US, Optics, MRI, X-ray
 - Simulation room
 - + associated MOOCs
- PRIMES summer schools
 - 2012 : coll Entervision
 - 2014 : coll “Surgical Simulators”
 - 2015 (July) : Simulation in Medical imaging
 - 2016 (June) : OPUS - OPTical and UltraSound imaging - (LabEx Ceylia /ITN OILTEBIA)
 - 2014 and 2016 (Sept) : CNAO/France Hadron/PRIMES school of Hadrontherapy – Pavia, Italy



IRM



US



RX

Publications

- Scientific production

- Creation of a data basis for the scientific production done in the context of PRIMES, Web site <http://hal.archives-ouvertes.fr/PRIMES>
- 1512 references (May 20107) including:
 - 576 peer reviewed articles, 62 book chapters, 19 others
 - 855 conference communications
- Patents since 2012 within PRIMES teams

The screenshot shows the HAL Archives-ouvertes.fr website interface. At the top, there is a navigation bar with logos for CCSD, HAL, Episciences.org, Sciencesconf.org, and Support. A language selector (fr/en) and a 'Connexion' button are also present. Below the navigation bar, the page title is 'Physics, Radiobiology, Medical Imaging, and Simulation (PRIMES)'. The main content area has tabs for 'Accueil', 'Consultation', and 'Recherche simple'. Under 'Consultation', there is a sub-tab 'Liste par WorkPackages'. Below this, there are buttons for 'Document', 'Notice', and 'Annexe'. The main list displays a collection named 'Autre' with 5 sub-collections. Each sub-collection is listed with its name and the number of items in parentheses.

Collection Name	Number of Items
PRIMES_WP1 - WP1: Méthodes et instrumentations innovantes en radiothérapies	104
PRIMES_WP2 - WP2: Techniques innovantes d'imagerie	326
PRIMES_WP3 - WP3: Radiobiologie, instrumentation et modèles pour une thérapie innovante	224
PRIMES_WP4 - WP4: Traitement multidimensionnel de l'image	362
PRIMES_WP5 - WP5: Simulation et modélisation d'images	266

Valorization

Industrial day – 2017 September 13 – Domaine Saint-Joseph Sainte Foy les Lyon



The Laboratory of Excellence PRIMES «Physics, Radiobiology, Medical Imaging and Simulation» is honored to invite you to the second Economical Partners day. This event will allow you to:

- Discover (more) about the researches thematic supported by the LabEx teams
- Present your activities
- Reinforce or develop new collaborations and partnerships

Looking forward to meet you during this day rich in promises of partnership

Françoise PEYRIN and Denis DAUVERGNE
Scientific directors

Invitation
ECONOMICAL PARTNERS DAY
Wednesday 13 September 2017
Domaine Saint-Joseph, 38 Allée Jean-Paul II 69340 Sainte-Foy-Lès-Lyon



Preliminary program:

- **Morning:** Focus on LabEx projects and industrials flash presentations
- **Afternoon :** Thematic workshops and personalized meetings
- **Evening:** Cocktail dinner

- Talks of private companies and of PRIMES teams on research with economical potential
- Posters
- Demonstrations of know-how
- Private meetings upon request
- Brainstorming session on the PRIMES industrial club creation
- Evening cocktail

If you wish to make a flash presentation, please let us know before the 1st of August 2017 at b.rayet@ipnl.in2p3.fr
Registration is free but mandatory before September 1st, 2017 using the on line form on <http://primes.universite-lyon.fr>, section Valorisation, sub section Journée Industrielle 2017